



Comorbidity of PTSD in anxiety and depressive disorders: Prevalence and shared risk factors[☆]

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ABSTRACT

The present study aims to assess comorbidity of posttraumatic stress disorder (PTSD) in anxiety and depressive disorders and to determine whether childhood trauma types and other putative independent risk factors for comorbid PTSD are unique to PTSD or shared with anxiety and depressive disorders. The sample of 2402 adults aged 18–65 included healthy controls, persons with a prior history of affective disorders, and persons with a current affective disorder. These individuals were assessed at baseline (T0) and 2 (T2) and 4 years (T4) later. At each wave, DSM-IV-TR based anxiety and depressive disorder, neuroticism, extraversion, and symptom severity were assessed. Childhood trauma was measured at T0 with an interview and at T4 with a questionnaire, and PTSD was measured with a standardized interview at T4. Prevalence of 5-year recency PTSD among anxiety and depressive disorders was 9.2%, and comorbidity, in particular with major depression, was high (84.4%). Comorbidity was associated with female gender, all types of childhood trauma, neuroticism, (low) extraversion, and symptom severity. Multivariable significant risk factors (i.e., female gender and child sexual and physical abuse) were shared among anxiety and depressive disorders. Our results support a shared vulnerability model for comorbidity of anxiety and depressive disorders with PTSD. Routine assessment of PTSD in patients with anxiety and depressive disorders seems warranted.

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Introduction

Substantial differences in rates of posttraumatic stress disorder (PTSD) within the community have been reported across countries. In the general population of the Netherlands, the lifetime prevalence of PTSD was 7.4% and the 12-months prevalence 3.3% (de Vries & Olf, 2009). A few large-scale studies investigated prevalence of PTSD in unselected primary care and clinical samples using standardized diagnostic instruments. In studies of unselected psychiatric outpatients in the United

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States (Franklin, Sheeran, & Zimmerman, 2002; Villano et al., 2007; Zimmerman, McGlinchey, Chelminski, & Young, 2008), prevalence rates for PTSD as determined by standardized diagnostic interviews varied widely between 12.8% and 46.0%, while prevalence rates as determined by standardized interviews or self-reports in primary care patients in the United States (Kroenke, Spitzer, Williams, Monahan, & Lowe, 2007; McQuaid, Pedrelli, McCahill, & Stein, 2001; Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000), United Kingdom (Gillock, Zayfert, Hegel, & Ferguson, 2005), and Israel (Taubman-Ben-Ari, Rabinowitz, Feldman, & Vaturi, 2001) showed less variation (8.6–11.8%). Moreover, PTSD commonly co-occurs with other psychiatric disorders (for a review, see Brady, Killeen, Brewerton, & Lucerini, 2000). Among subjects with PTSD, co-morbidity rates of depression range from 21% to 94% and of anxiety from 39% to 97% (Ginzburg, Ein-Dor, & Solomon, 2010).

Several mechanisms may account for these widely disparate comorbidity rates (Breslau, 2002; O'Donnell, Creamer, & Pattison, 2004): depression and anxiety may increase the risk for PTSD; PTSD may be a causal risk factor for anxiety and depression; the observed comorbidity may be an artifact of symptom overlap; and PTSD, anxiety, and depression may be independent disorders sharing common risk factors. The present study addresses the last mechanisms and more specifically investigates childhood trauma types as shared risk factors that although not unique to PTSD may be helpful in understanding comorbid PTSD in persons with anxiety and depressive disorders.

Individuals who report childhood trauma are more likely to have PTSD in adulthood than those who do not report childhood trauma (e.g., Cougle, Timpano, Sachs-Ericsson, Keough, & Riccardi, 2010). Furthermore, those with a history of childhood trauma are more likely to be subsequently exposed to traumatic events in adulthood and to develop PTSD (for a review, see Classen, Paresh, & Aggarwal, 2005). Childhood trauma, however, does not seem to be a risk factor unique for PTSD. Indeed, a particularly strong link has been found between childhood trauma and various psychiatric syndromes, in particular mood and anxiety disorders (for a review, see Gilbert et al., 2009).

In recent years the possible negative sequelae of emotional maltreatment have been studied more extensively. A recent review of available studies demonstrated a causal relationship of emotional maltreatment with a range of mental disorders, including depression and suicide attempts (Norman et al., 2012). In addition, a number of studies have indicated that emotional maltreatment remained a significant predictor of PTSD even when controlling for other types of childhood abuse (Grassi-Oliveira & Stein, 2008; Lang et al., 2006; Spertus, Yehuda, Wong, Halligan, & Seremetis, 2003). These findings suggest that it may be fruitful to study the impact of different childhood trauma types on comorbidity with PTSD.

Besides childhood trauma types, various sociodemographic, vulnerability, and clinical variables may constitute risk factors for comorbid PTSD in e.g., major depressive disorder (for a review, see O'Donnell et al., 2004) and social anxiety disorder (for a review, see Collimore, Carleton, Hofmann, & Asmundson, 2010). Previous studies have identified age, gender, education, personality dimensions such as neuroticism and extraversion, recruitment setting, and symptom severity as risk factors for comorbidity among affective disorders (e.g., de Graaf, Bijl, Smith, Vollebergh, & Spijker, 2002; Hovens et al., 2010; Lamers et al., 2011; Spinhoven, de Rooij, Heiser, Smit, & Penninx, 2009; Weistock & Whisman, 2006). It is thus relevant to investigate whether childhood trauma types constitute a shared risk factor for comorbidity with PTSD independent of these other factors within one single study.

Current Study

Most comorbidity studies have investigated a limited number of risk factors for comorbidity with only one or two separate diagnoses, and comorbidity rates from different studies cannot always be directly compared because of differences in sampling and measurements used. The Netherlands Study of Depression and Anxiety (NESDA) offers a unique opportunity to assess comorbidity with PTSD among a wide range of depressive and anxiety disorders and to identify from a wide range of sociodemographic, vulnerability, and clinical characteristics the most important risk factors for comorbid PTSD and determine whether these risk factors are shared among disorders within a single study design (cp., Lamers et al., 2011). Moreover, the repeated measurement of self-reported exposure to various childhood trauma types using both an interview and self-report method allowed us to study the impact of childhood trauma on comorbidity in a reliable and comprehensive way.

The present study had the following three aims: (a) to examine prevalence rates and characteristics of PTSD among a representative sample of persons with anxiety and/or depressive disorders; (b) to assess differences in sociodemographic, vulnerability, and clinical characteristics of participants without PTSD versus those with comorbid PTSD; and (c) to analyze whether significant multivariable risk factors for comorbid PTSD are unique to PTSD or shared with anxiety and depressive disorders. We expected that childhood trauma types would be significant multivariable risk factors for comorbid PTSD independent of sociodemographic variables, other vulnerability factors, and clinical characteristics. We did not expect childhood trauma to be unique to PTSD because it constitutes a broad risk factor for psychopathology in general.

Method

Design and Procedure

The NESDA is an ongoing multi-site naturalistic cohort study in adults designed to investigate course and consequences of the most common depressive and anxiety disorders. The baseline sample of 18- to 65-year-olds consisted of healthy

controls, persons with a prior history of depressive and anxiety disorders, and persons with a current depressive and/or anxiety disorder. Respondents were recruited in the general population through a screening procedure in general practice and when newly enrolled in specialized health care to represent different health care settings and developmental stages of psychopathology. When individuals had a primary severe other psychiatric disorder that required specific other treatment (e.g., bipolar disorder, obsessive-compulsive disorder, PTSD, psychotic or severe addiction disorder), they were not included in the NESDA study. These individuals were omitted because the primary focus of the study is on depressive and anxiety disorders. A further exclusion criterion was not being fluent in Dutch.

A detailed description of the NESDA design and sampling procedures has been presented elsewhere (Penninx et al., 2008). The baseline assessment (T0) involved 2,981 participants and included assessment of demographic and personal characteristics, a standardized diagnostic psychiatric interview and a medical assessment including blood draw. The research protocol was approved by the Ethical Committees of the participating universities, and all respondents provided written informed consent. After two (T2) and four (T4) years, a face-to-face follow-up assessment was conducted with a response of 87.1% ($n = 2,596$) at T2 and 80.6% ($n = 2,402$) at T4.

Measures

Psychiatric Diagnosis. Presence of DSM-IV-TR (American Psychiatric Association, 2000) based depressive (Major Depressive Disorder [MDD], Dysthymia [DYS]) and anxiety (Panic Disorder with or without Agoraphobia [PD], Social Anxiety Disorder [SAD], Generalized Anxiety Disorder [GAD], Agoraphobia without panic [AGO]) disorders was established using the Composite Interview Diagnostic Instrument (CIDI, version 2.1), a highly reliable and valid instrument for assessing depressive and anxiety disorders (Wittchen, 1994). The CIDI was administered by specially trained research staff. We determined the 5-year prevalence of depressive and anxiety disorders based on the T0, T2, and T4 assessments to obtain a 5-year recency diagnosis comparable to the 5-year recency PTSD diagnosis on the basis of the PTSD Symptom Scale–Interview Version (PSS-I). Organic exclusion rules were used in defining diagnoses and hierarchy-free diagnoses.

Posttraumatic Stress Symptoms. We extended the PSS-I with the Life Events Checklist (LEC; Weathers, Keane, & Davidson, 2001) to assess possible exposure to a traumatic event according to DSM-IV-TR. The LEC describes 16 potentially traumatic events, and participants were asked whether they had ever experienced any of these events. Moreover, participants were asked whether they had experienced any additional stressful events in their lives. Next, they were asked to indicate the most bothersome experience and to indicate when the event started and ended. They were also asked to indicate the degree of anxiety and burden during exposure to this event and the present degree of burden on a 10-point scale ranging from 1 to 10, with the endpoints defined as *not at all anxious* or *not at all bothersome* and *extremely anxious* or *extremely bothersome*.

The interview continued with three screening questions asking whether during the past five years (or during a shorter time period in case the event was more recent) the participants had been bothered by intrusive thoughts or images, avoidance of trauma cues, or heightened arousal related to the selected event. Only when one of the screening questions was answered positively was the PSS-I (Foa, Riggs, Dancu, & Rothbaum, 1993) administered using a same event approach. Participants were asked how often (*never*, 0; *a few times a month*, 1; *a few times a week*, 2; *a few times a day or continuously*, 3) they had experienced each of the 17 criteria on the three subscales for PTSD as listed in DSM-IV-TR (i.e., five items on Cluster B (CB), re-experiencing; seven on Cluster C (CC), avoidance/numbing; and five on Cluster D (CD), arousal) during a period of four weeks when the symptoms were the most severe. Finally, they were asked whether this was also the case during the last month and to indicate in which year of the last five years the symptoms had been the most severe.

Presence of a PTSD diagnosis was determined according to the DSM-IV-TR symptom criteria. Symptoms were scored as present when experienced at least a few times a week (cp., Brewin, Andrews, & Rose, 2000; Engelhard, van den Hout, Arntz, & McNally, 2002). By doing so, we used a more conservative scoring than Foa et al. (Foa, Cashman, Jaycox, & Perry, 1997; Foa et al., 1993). In computing PSS-I scale scores, one missing value was allowed on each of the 5-item subscales, two missing values on the 7-item subscale, and 4 missing values on the total PSS-I scale. The score filled in for the missing value was the average of the participant's values on that (sub-)scale. Correlation coefficients between PSS-I scales were as follows: CB (re-experiencing) with CC (avoidance numbing) = .58; CB with CD (arousal) = .56; and CC with CD = .63. Cronbach's α was satisfactory-to-good: CB (.73); CC (.74); CD (.71); and total PSS-I scale (.88).

Childhood Maltreatment

Childhood maltreatment was assessed twice using different methods of measurement with the Childhood Trauma Interview (CTI) at T0 and with the Childhood Trauma Questionnaire-SF (CTQ-SF) at T4. The CTI asks respondents whether they had experienced emotional neglect (EN), emotional abuse (EA), physical abuse (PA), and/or sexual abuse (SA) before the age of 16, and if so, how often it occurred (*never*, *once*, *sometimes*, *regularly*, *often*, or *very often*). EN was defined as, "people at home didn't listen to you, your problems were ignored, and/or you felt unable to find any attention or support from the people in your house." EA was defined as, "you were cursed at, unjustly punished, your brothers and sisters were favored – but no bodily harm was done." PA was defined as, "being kicked, hit with or without an object, or being physically maltreated in any other way." SA was defined as, "being touched sexually by anyone against your will, or being forced to touch anyone sexually, or pressured into sexual contact against your will." Evidence for the predictive validity of the CTI has been collected

in numerous studies showing that CTI scales are related to incidence and prevalence of psychiatric disorder (de Graaf et al., 2002; Hovens et al., 2010; Spinhoven et al., 2010; Wiersma et al., 2009).

The CTQ-SF is a 28-item retrospective self-report instrument for adults and adolescents that assess the following five types of maltreatment: EA, PA, SA, EN, and PN (Bernstein et al., 2003). Each scale is represented with five items that are scored on a 5-point Likert-type scale ranging from *never true* to *very often true*. Three additional items compose the minimization scale for detecting socially desirable responses or false-negative trauma reports. Factor structure and internal consistency of the CTQ has been found to be good for English and non-English versions, although results concerning the PN scale and its reliability have been mixed (e.g., Bernstein et al., 2003; Paivio & Cramer, 2004; Scher, Stein, Asmundson, McCreary, & Forde, 2001). Previous psychometric analyses of the Dutch version indicated that one of the items of the SA scale (“During my youth, I was molested by someone”) had to be deleted (Thombs, Bernstein, Lobbestael, & Arntz, 2009). In the present study Cronbach’s α was satisfactory to good for the PA (.88), EA (.87), SA (.94), and EN (.91) scales, but unsatisfactory for the PN scale (.60), which was consequently not included in further statistical analyses.

We calculated latent variables for childhood maltreatment types based on multiple measured indicators by the CTI and CTQ. A confirmatory factor analysis on the eight indicator variables for CT yielded an acceptable four-factor model in which the CTQ and corresponding CTQ scales loaded on the a priori defined latent factors for EA, EN, SA, and PA, $\chi^2(14) = 216.83$, $p < .001$, CFI = .95, TLI = .91, RMSEA = .08, CI = .07–.09. Because EN was highly correlated with EA (.96), we combined the EN and EA factors into a factor labeled emotional maltreatment (EM) on the basis of a three-factor model that also showed an acceptable fit to the data, $\chi^2(17) = 303.10$, $p < .001$, CFI = .94, TLI = .90, RMSEA = .09, CI = .08–.09).

Severity of Anxiety and Depression Symptomatology. Severity of anxiety and depression symptomatology was measured at T0, T2, and T4. Severity of depressive symptoms was measured using the 30-item Inventory of Depressive Symptomatology (IDS), which assesses depression symptoms on a 4-point scale. The IDS has shown high correlations with observer-rated scales such as the Hamilton Depression Scale (Rush, Gullion, Basco, Jarrett, & Trivedi, 1996). Cronbach’s α in the present study was .90. Severity of anxiety symptoms was measured using the 21-item Beck Anxiety Inventory (BAI), which assesses anxiety symptoms on a 4-point scale. The BAI is a frequently used self-report measure of anxiety, and its reliability and validity are well established (Beck, Brown, Epstein, & Steer, 1988). Cronbach’s α in the present study was .92. Phobic avoidance was measured with the 15-item Fear Questionnaire, which has been found to be reliable and valid and provides a total score for phobic avoidance (Marks & Mathews, 1979). Cronbach’s α in the present study was .90.

Personality Dimensions. Neuroticism and Extraversion were measured at T0, T2, and T4 using the 60-item version of the longer 240-item NEO Personality Inventory Revised (NEO-PI-R) called the NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The NEO-FFI scales show correlations of .75 to .89 with the NEO-PI-R scales. In the present study Cronbach’s α of the neuroticism subscale was .90, and it was .85 for the extraversion subscale.

Statistical Analysis

Descriptive statistics were used to present prevalence rates and characteristics of PTSD. Our second study aim was to analyze differences in sociodemographic, vulnerability, and clinical characteristics of participants with an anxiety and/or depression diagnosis without PTSD versus those with comorbid PTSD. First, univariable logistic regression analyses were conducted to assess the relationships of sociodemographic (age, gender, and education), vulnerability (childhood trauma types, neuroticism and extraversion), and clinical variables (recruitment setting, IDS, BAI, FQ) with anxiety and depressive disorders with or without comorbid PTSD. In these analyses we used mean scores for self-report instruments administered at each wave (NEO-FFI, IDS, BAI, FQ). Two multivariable models were constructed, one model including all sociodemographic and vulnerability variables (Model 1A) and one model including all clinical variables (Model 1B). Next, in order to determine which variables were independent risk factors for comorbidity, all variables with $p < .10$ in the two multivariable models were entered into a final multivariable model (Model 2).

Our third and last study aim was to analyze whether significant multivariable risk factors for comorbid PTSD are unique to PTSD or shared with anxiety and depressive disorders. To this end we fitted a structural equation models (SEM) using weighted least squares estimators (WLSMV) parameter estimates. In these models, pathways to binary outcome variables (e.g., presence of disorder) are denoted by standardized probit regression coefficients. This model included the significant multivariable risk factors as identified by the multivariable logistic regression (i.e., Model 2) analyses as independent variables and seven categorical dependent variables (DYS, MDD, GAD, SAD, PD, AGO, and PTSD).

Model fit was evaluated using the Tucker–Lewis Index (TLI), the Comparative Fit Index (CFI), and the root mean square error of approximation (RMSEA). For the TLI and CFI, values between 0.90 and 0.95 are considered acceptable, and ≥ 0.95 as good. For the RMSEA, good models have values ≤ 0.05 . Logistic regression analyses were run using SPSS v. 20 and SEMs were run using MPlus v. 7.0 (Muthén & Muthén, 1998–2012). A significance level of $p < .05$ was used for all analyses, unless stated otherwise.

Table 1

PSS-I scores of participants with PTSD with trauma exposure before or after 16 year per type of most troublesome traumatic event.

Type of trauma on LEC	PSS-I total score								
	All PTSD diagnoses (n = 160)			Trauma before 16 years of age (n = 33)			Trauma after 16 years of age (n = 113)		
	n (%)	M	SD	n (%)	M	SD	n (%)	M	SD
Accident/disaster	18 (11.2)	29.00	7.98	1 (3.0)	37.00	–	13 (11.5)	29.00	9.02
Physical assault/violence/war/captivity	25 (15.6)	31.28	8.33	5 (15.2)	32.20	9.28	19 (16.8)	31.31	8.46
Sexual assault/unwanted experiences	42 (26.2)	31.73	8.15	24 (72.7)	30.69	8.09	13 (11.5)	31.46	7.63
Life-threatening illness or injury	16 (10.0)	28.89	7.37	–	–	–	16 (14.1)	28.89	7.37
Murder or suicide of a loved one	12 (7.5)	28.83	9.21	–	–	–	10 (8.8)	30.00	9.63
Sudden violent or unexpected death	25 (15.6)	27.28	7.9	–	–	–	25 (22.1)	27.28	7.92
Extreme human suffering	22 (13.7)	31.82	6.32	3 (9.1)	34.67	11.01	17 (15.0)	31.76	5.09

Note: PTSD, post-traumatic stress disorder; PSS-I, PTSD Symptom Scale-Interview Version; LEC, Life Events Checklist.

Results

Sample Characteristics

Of the 2,981 participants assessed at baseline of the NESDA study, 2,402 (80.6%) completed the four-year follow-up assessment and were included in the present study.

Mean age at T4 was 46.0 years ($SD = 13.1$), mean number of years of education was 12.6 years ($SD = 3.3$), and 66.4% was female. Of the participants, 1,631 (67.9%) had a 5-year depressive or anxiety diagnosis (MDD = 78.8%, SAD = 46.0%, PD = 43.6%, GAD = 35.3%, DYS = 28.8%, AGO = 20.9%). Comorbidity among disorders was high. Of those with a 5-year depressive disorder ($n = 1,313$), 73.3% had a 5-year anxiety disorder. Of people with a 5-year anxiety disorder ($n = 1,281$), 75.2% had a 5-year depressive disorder. We examined whether sample attrition had introduced potential selection bias. Compared with completers, dropouts were younger, less educated, manifested higher rates of anxiety and depressive disorders, and reported higher levels of anxiety and depression symptoms and childhood maltreatment (EA, PA, SA, and EN) at T0.

Prevalence of PTSD

Our first study aim was to examine prevalence rates and characteristics of PTSD among a representative sample of persons with anxiety and/or depressive disorders. In the total group of 2,402 participants, 212 (8.8%) did not report a potentially traumatic or bothersome life event. In the remaining 2,190 participants, 677 (30.9%) did not endorse any of the three screening questions. There were 18 persons with incomplete data on the PSS-I; the non-response differed from two missing data per item (*avoid places and activities, detached from others, foreshortened sense of future, irritability*) to 6 (*nightmares*) and in 3 of these persons, no (sub-)scale scores could be computed. Using the conservative scoring rule of considering a symptom as present if it was rated at least to be present 2 to 4 times per week (cp., [Brewin et al., 2000](#); [Engelhard et al., 2002](#)), 160 of the 2,402 participants fulfilled the DSM-IV-TR criteria for PTSD on any moment during the last 5-year (6.7%). Prevalence of PTSD among the 1,631 participants with a 5-year anxiety and/or depressive disorder was 9.2% ($n = 150$). Among the 771 persons without an anxiety and/or depressive disorder, the PTSD prevalence was 1.3% ($n = 10$). Using the more liberal scoring rule of Foa et al. ([Foa et al., 1997](#); [Foa et al., 1993](#)) in which a symptom is scored as present if it was rated at least one (*once a week or less*), 295 of the 2,402 participants fulfilled the DSM-IV-TR criteria for PTSD on any moment during the last 5-year (12.3%) and 269 of the 1,631 participants with an anxiety and/or depressive disorder during the last 5-year (16.5%).

Characteristics of PTSD

Table 1 gives an overview of the total scores on the PSS-I per type of traumatic event as identified as the most troublesome by the 160 persons with PTSD. PSS-I scores are overall quite comparable among trauma categories (an ANOVA comparing the PSS-I total scores of the participants from the seven trauma categories was not significant, $F(6,153) = 1.26$, $p = .278$). In 146 (91.2%) of the 160 participants with PTSD, it was possible to date the beginning of the traumatic event. Of these 146 participants, 33 (22.6%) indicated that the most bothersome trauma started before the age of 16 years. SA was by far the most frequently mentioned childhood traumatic events ($n = 24$; 72.7%).

Of the 160 PTSD cases, 131 (81.9%) were female. Chi-square analyses indicated gender differences in type of bothersome traumatic events for physical assault (18.3% for women vs. 3.4% for men, $p < .05$) and sexual assault (30.5% for women vs. 6.9% for men, $p < .01$).

Among persons with PTSD, comorbidity rates of 5-year DSM-IV-TR depressive and anxiety disorders were high: MDD = 84.4%, SAD = 55.6%, GAD = 42.5%, DYS = 41.9%, PD = 29.4%, and AGO = 26.9%. The mean number of additional anxiety or depressive diagnosis was 3.1 ($SD = 1.6$): 20 persons with one, 28 with two, 39 with three, 31 with four, 20 with five, and 12 with six additional diagnoses.

Table 2Sociodemographic, vulnerability and clinical correlates of comorbidity with anxiety and depressive disorder of participants with a 5-year recency PTSD diagnosis ($n = 1631$).

Variables	Univariable model ^a			Multivariable model 1 ^b			Multivariable model 2 ^c		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Model 1A									
<i>Sociodemographic variables</i>									
Age	.99	.98–1.01	.39	.99	.97–1.01	.19	(–)	(–)	(–)
Gender	2.03	1.34–3.09	<.001	1.74	1.11–2.72	.02	1.74	1.11–2.73	.02
Education	.96	.91–1.01	.10	.98	.92–1.03	.45	(–)	(–)	(–)
<i>Vulnerability indicators</i>									
Emotional maltreatment	1.75	1.45–2.12	<.001	1.11	.82–1.51	.49	(–)	(–)	(–)
Sexual abuse	1.54	1.35–1.76	<.001	1.22	1.02–1.45	.02	1.21	1.02–1.44	.03
Physical abuse	1.60	1.40–1.84	<.001	1.28	.99–1.64	.06	1.31	1.10–1.57	<.01
Mean neuroticism (NEO-FFI)	1.35	1.07–1.70	.01	1.24	.95–1.61	.11	(–)	(–)	(–)
Mean extraversion (NEO-FFI)	.67	.53–.84	<.001	.70	.52–.94	.02	.80	.58–1.10	.17
Model 1B									
<i>Clinical variables</i>									
Setting									
Primary care	1.54	.88–2.69	.13	1.33	.76–2.31	.31	(–)	(–)	(–)
Specialized mental health care	1.44	.83–2.49	.19	1.25	.71–2.23	.44	(–)	(–)	(–)
Mean depression (IDS)	1.45	1.24–1.70	<.001	1.25	.97–1.61	.09	1.20	.96–1.49	.11
Mean anxiety (BAI)	1.35	1.17–1.55	<.001	1.01	.80–1.27	.96	(–)	(–)	(–)
Mean avoidance (FQ)	1.41	1.22–1.62	<.001	1.25	1.04–1.50	.02	1.11	.91–1.34	.29

Mean, mean score of T0, T2, and T4 measurements; IDS, Inventory of Depressive Symptoms; BAI, Beck Anxiety Inventory; FQ, Fear Questionnaire; NEO-FFI, NEO-Five Factor Inventory.

^a Based on univariable logistic regression ($n = 1631$ except for 10 log transformed trauma factor scores ($n = 1547$)).

^b Based on multivariable logistic regression with all sociodemographic and vulnerability variables (model 1A; $n = 1547$) or all clinical variables (model 1B; $n = 1627$) in model.

^c Based on multivariable logistic regression with all variables entered in model that had $p < .10$ in model 1A or 1B ($n = 1547$).

Correlates of Comorbidity with PTSD

Our second study aim was to analyze differences in sociodemographic, vulnerability, and clinical characteristics of participants with an anxiety and/or depression diagnosis without PTSD ($n = 1,481$) versus those with comorbid PTSD ($n = 150$; see Table 2). Compared to the group without PTSD, the comorbidity group was characterized by proportionally more women; higher levels of SA, PA, and EM; higher levels of neuroticism; and lower levels of extraversion. With respect to clinical characteristics, the comorbid group also manifested higher severity scores for depression, anxiety, and phobic avoidance. In multivariable logistic regression analyses, gender, SA, PA, and extraversion remained (trend) significantly associated with comorbidity while controlling for the other sociodemographic variables and vulnerability factors (Model 1A). In the multivariable model for clinical characteristics (Model 1B), depression severity and phobic avoidance were the only independent (trend) significant clinical predictors of comorbidity. In the final model (Model 2), only gender, childhood SA, and childhood PA remained significantly associated with comorbidity after additionally controlling for clinical characteristics.

Gender and Childhood Sexual and Physical Abuse as Shared Risk Factors

Our third and last study aim was to analyze whether significant multivariable risk factors for comorbid PTSD (i.e., gender and childhood SA and PA) are unique to PTSD or shared with anxiety and depressive disorders. Table 3 gives an overview of the distribution of gender, SA, and PA among psychopathology groups. In addition to factor scores for PA and SA, we provide the prevalence of any child PA, SA, EA, and EN on both the CTI (score of *once or more frequent*) and CTQ (a score of resp. 8, 5, 9, 10, or higher, according to Bernstein and Fink (1998)) as an illustration of between group differences in child abuse. As can be derived from Table 3, disordered persons are more often female (68.7% vs. 61.4%) and report a higher exposure to PA (10.5% vs. 2.9%) and SA (12.4% vs. 5.4%). Prevalence rates for EA (23.2% vs. 8.0%) and EN (40.8% vs. 16.7%) were also higher and differed between groups. Among the disordered groups, PTSD clearly stands out in terms of proportion of women (81.9%) and exposure to PA (22.5%) and SA (21.9%).

In an attempt to account for the high comorbidity among disorders, we used SEM to analyze whether the significant risk factors of the final multivariable model (i.e., gender, childhood SA and PA) are unique to PTSD or shared among anxiety and depressive disorders in the 2,301 participants with complete CIDI, CTQ, and CTI data. Because 94.3% of people with DYS had comorbid MDD, DYS was not included as a dependent variable in the model. The model of the direct effect of gender and childhood sexual and physical trauma on 5-year recency DSM-IV-TR diagnoses (MDD, GAD, SAD, PD, AGO, PTSD) showed an excellent fit to the data, CFI = .99, TLI = .96, RMSEA = .03, CI = .02–.04 (see Fig. 1 for the loadings, [residual] correlations, and standardized probit regression coefficients of this model. Residual correlations among disorders and nonsignificant pathways are not depicted for sake of clarity of presentation.)

Table 3
Descriptives for multivariable significant risk factors of comorbidity with PTSD among various psychopathology groups.

Variables	No disorder (n = 761)	Disorder (n = 1641)	Individual disorders (n = 1641)						
			Dys (n = 470)	MDD (n = 1286)	GAD (n = 575)	SAD (n = 751)	PD (n = 711)	AGO (n = 341)	PTSD (n = 160)
Female gender (n/%)	467 (61.4)	1127 (68.7)	295 (62.8)	889 (69.1)	377 (65.6)	509 (67.8)	498 (70.5)	233 (68.3)	131 (81.9)
PA (M/SD)	.52 (.10)	.59 (.17)	.64 (.20)	.60 (.17)	.61 (.18)	.61 (.18)	.60 (.18)	.60 (.17)	.68 (.22)
PA (n/%)	22 (2.9)	173 (10.5)	82 (17.4)	147 (11.4)	74 (12.9)	98 (13.0)	85 (12.0)	39 (11.4)	36 (22.5)
SA (M/SD)	.53 (.10)	.59 (.16)	.61 (.18)	.59 (.16)	.60 (.17)	.60 (.17)	.60 (.18)	.61 (.18)	.68 (.23)
SA (n/%)	41 (5.4)	203 (12.4)	67 (14.3)	162 (12.6)	74 (12.9)	105 (14.0)	93 (13.1)	48 (14.1)	35 (21.9)

Note: PTSD, post-traumatic stress disorder; MDD, major depressive disorder; SAD, social anxiety disorder; PD, panic disorder with/without agoraphobia; GAD, generalized anxiety disorder; DYS, dysthymia; AGO, agoraphobia without panic; PA, physical abuse; SA, sexual abuse; M (mean) and SD (standard deviation) are for 10 log transformed factor scores for PA and SA; n and % based on positive cases on both Childhood Trauma Interview (score of at least 'once') and Childhood Trauma Questionnaire (CTQ) (a score of at least '8' for PA and at least '5' for SA); Individual disorders do not add up to 1641 because of comorbidity among disorders (only 477 (29.1%) of the 1641 participants had a single disorder).

Firstly, PA not only had a significant effect on PTSD (.16), but also on each of the other five disorders except AGO (range of regression coefficients: .10–.19). Secondly, SA has a significant effect on PTSD (.16) and AGO (.12), PD (.10), MDD (.10) and SAD (.10). Thirdly, gender has a significant effect on PTSD (.15) and MDD (.06). Finally, moderately high correlations between SA and PA (.44) and between most of the DSM-IV-TR disorders were found. PTSD had the following residual correlations: MDD: .44; SAD: .35; GAD: .27; AGO: .25; PD: .27, indicating that the relations between PTSD and other disorders are only partially accounted for by gender, SA, and PA as predictor variables.

We also examined whether the association of childhood SA and PA with PTSD in adulthood was due to those persons, who indicated childhood SA or PA as the most bothersome traumatic event in their lives and still suffered from its consequences. We repeated the SEM above excluding the 33 persons who indicated PTSD with childhood trauma as A1 event and the 14 persons of which the A1 event could not be dated. The model still showed an excellent fit, CFI = .99, TLI = .96, RMSEA = .04, CI = .03–.05, and PA remained a significant predictor of each of the six disorders except AGO, including PTSD (.13). SA, however, no longer predicted PTSD (.04), although its impact on AP, PD, MDD, and SAD remained significant.

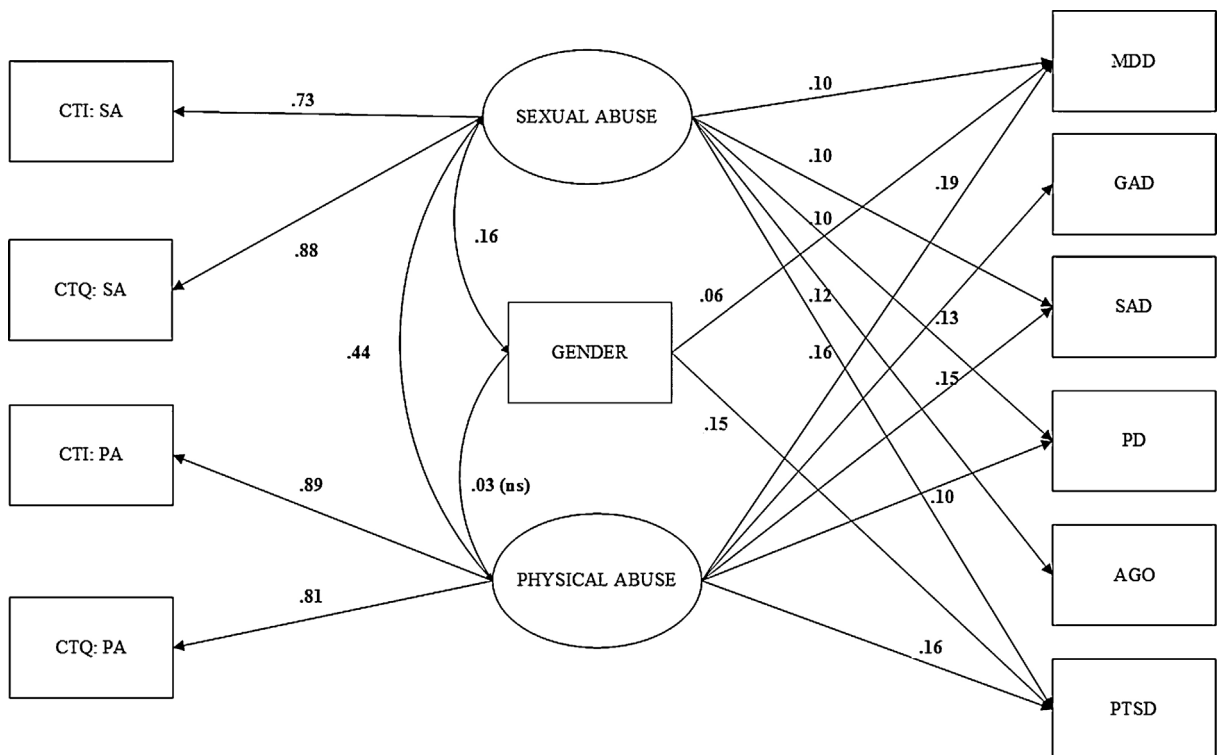


Fig. 1. Parameter estimates for the model of the direct relationships of gender and childhood sexual (SA) and physical (PA) abuse – as assessed with the Childhood Trauma Interview (CTI) and Childhood Trauma Questionnaire (CTQ) – with 5-year recency anxiety and depressive disorders measured with the CIDI at T0, T2 and T4 and 5-year recency PTSD measured with the PSS-I at T4 (only significant standardized probit regression coefficients are depicted) (n = 2301).

Discussion

The first aim of the present study was to examine prevalence rate and characteristics of PTSD in a representative sample of participants with anxiety and depressive disorders. In our study sample, 92.8% of the participants did report a potentially traumatic or bothersome life event compared to 80.7% in the general population in the Netherlands (de Vries & Olf, 2009). Among persons with an anxiety and/or depressive disorder, we found a 5-year prevalence of 9.2%, which is higher than the lifetime prevalence estimate of DSM-IV-TR PTSD of 7.4 and 12-month recency estimate of 3.3% in the general population in the Netherlands (de Vries & Olf, 2009). The rate is more comparable to the rate of 8.6% current PTSD in a representative primary care study (Kroenke et al., 2007). When more leniently rating PTSD symptoms as positive when present *once a week or less* (Foa et al., 1997, 1993), the prevalence was 16.5% and became even somewhat higher than the rate of 12.8 current PTSD found in a large study in unselected psychiatric outpatient samples (Zimmerman et al., 2008). Direct comparisons of study results, however, are hampered by differences in sampling, point versus period prevalence estimates, measurements used, and operationalization of PTSD. Of special note is that the NESDA study focused on the most common anxiety and depressive disorders (Penninx et al., 2008). Thus, participants who initially requested treatment for PTSD were not recruited, which suppressed prevalence rates of PTSD to an unknown extent. On the other hand, using DSM-5 criteria for PTSD (American Psychiatric Association, 2013) will result in somewhat lower estimates as both Composite and Single Event lifetime, past-12-month, and past 6-month PTSD prevalence estimates were slightly lower than their DSM-IV-TR counterparts in a national sample of U.S. adults (Kilpatrick et al., 2013). Notwithstanding these problems inherent in determining *true* prevalence rates, the available data clearly indicate that PTSD constitutes a prevalent comorbid disorder in a representative cohort of persons with depressive and anxiety disorders as primary complaints.

With a prevalence of 26.2%, SA was by far the most prevalent and most bothersome A1 event in our PTSD sample. Moreover, 22.6% of the persons with PTSD mentioned exposure to a traumatic event that occurred before they were 16 years of age, which in 72.7% of the cases involved exposure to childhood SA. Consistent with previous research, the prevalence of traumatic events mentioned as most bothersome showed some gender differences: women with PTSD more often mentioned SA (30.5% of women vs. 6.9% of men; $p < .01$) and PA (18.3% of women vs. 3.4% of men, $p < .05$) as A1 event than men. PTSD symptom severity levels of persons with other A1 events or of males versus females were not significantly different.

The second aim of our study was to identify correlates of the comorbidity of PTSD with anxiety and depressive disorders. Symptom severity levels of depression, anxiety, and phobic avoidance were higher in comorbid cases than in cases without PTSD. Of the (trend) significant sociodemographic and vulnerability factors on the basis of univariable analyses (i.e., gender, SA, PA, EM, neuroticism and extraversion), gender and childhood SA and PA remained significant predictors in multivariable analysis (also after controlling for symptom severity variables). Among the persons with PTSD in our study, 81.9% was female. A predominance of female participants with PTSD has also been found in numerous epidemiological studies of PTSD. This gender difference does not seem to result from female excess risk of exposure to traumatic events in general or the uneven distribution of specific types of events associated with a greater risk for PTSD (e.g., rape or sexual assault). Instead, there is evidence that the gender difference can be traced to the occurrence of PTSD following assaultive violence in particular (Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999). In our sample, women more frequently mentioned physical and sexual assault as their most traumatic event than men. However, in comparing posttraumatic symptom severity among persons identifying different type A1 events, no significant differences emerged.

Childhood SA and PA were the main risk factors predicting comorbidity of anxiety and depressive disorders with PTSD independent of the effect of gender. This result is consistent with previous studies showing that persons who report childhood sexual and physical abuse are more likely to have PTSD in adulthood than those who do not report these trauma types (Cloitre, Scarvalone, & Difede, 1997). Childhood EM, although significantly associated with comorbidity in univariable analysis, did not have an independent additional effect on comorbidity in multivariable analyses after controlling for other childhood trauma types. Apparently, the more severe and overt forms of abuse—which in contrast to EM also qualify as A1 events, according to the DSM-IV-TR—have stronger implications for comorbidity with PTSD. However, as also shown by the relatively high intercorrelations between factor scores for childhood abuse and neglect, children exposed to PA and SA in their youth very frequently experience concomitant EA and EN. Thus, it is imperative to also consider the emotional context in which SA and PA occur (Hart & Brassard, 1987).

Also, neuroticism and extraversion—although significant predictors of comorbidity with PTSD in univariable analyses—were no significant risk factors in the final multivariable analysis, including sociodemographic variables, vulnerability factors, and clinical characteristics. A positive association of PTSD with neuroticism and inverse association with extraversion have been repeatedly found in previous research (for a review, see Jaksic, Brajkovic, Ivezić, Topic, & Jakovljević, 2012). Moreover, neuroticism is a risk factor for anxiety and depressive disorders in general, and extraversion protects for mood disorders and social anxiety disorder in particular (for reviews, see Klein, Kotov, & Bufferd, 2011; Kotov, Gamez, Schmidt, & Watson, 2010). It is possible that both personality traits have less specificity in predicting comorbid PTSD than gender, SA, and PA because of their more transdiagnostic relation with psychiatric disorders in general.

We conclude that gender, SA, and PA are the most relevant multivariable risk factors for comorbid PTSD, although they are not unique for PTSD alone. The proportion of women and the rates of SA and PA may be key factors in explaining variations in PTSD comorbidity rates between studies with samples consisting of proportionally more women and sexually and abused persons showing higher PTSD comorbidity rates. Moreover, we expect that the importance of these risk factors will not be diminished by the recent changes in diagnosing PTSD. The new DSM-5 PTSD criteria (American Psychiatric Association, 2013)

define a broad versus narrow PTSD construct as among others reflected in the new symptom cluster of negative alterations in cognition and mood. New symptoms in this cluster, such as persistent distorted blame of self or others or persistent negative emotional states, will show overlap with other disorders which are more prevalent in women and associated with childhood trauma such as depression and possible result in higher comorbidity rates.

Our last study aim was to assess whether risk factors for comorbidity with PTSD are unique to PTSD. Using structural equation modeling, we found that PA was a significant risk factor for each of the anxiety and depressive disorders except AGO, while SA was significantly related to PTSD, MDD, SAD, PD, and AGO. Female gender was a risk factor for PTSD and for MDD. These data are consistent with the results of various epidemiological studies showing a higher prevalence of MDD in women than in men (for a review, see Piccinelli & Wilkinson, 2000) and a higher psychiatric comorbidity in women than in men (e.g., de Graaf et al., 2002). Moreover, child SA and PA have been identified as nonspecific risk factors for depressive and anxiety disorders (Gilbert et al., 2009), and SA and PA predict comorbidity of anxiety and depressive disorders (e.g., de Graaf et al., 2002; Lamers et al., 2011). Our results suggest that gender and childhood SA and PA are not risk factors unique for PTSD, but constitute a shared risk factor profile contributing to the high comorbidity rate of PTSD with other disorders. When levels of childhood sexual and physical abuse are high, on top of anxiety and depressive disorders, comorbid PTSD becomes more likely.

Our study results have some clinical implications in showing that PTSD is common in unselected persons with anxiety and depression. In spite of this finding, outpatient mental health and primary care professionals do not consistently apply a trauma perspective focused on diagnosis and treatment of PTSD (Zimmerman & Mattia, 1999). This lack of application may be because PTSD is very frequent a comorbid condition, and therapists often treat depressive or other anxiety disorders first. Thus, they may not be aware of the comorbid PTSD or wait to see whether treating trauma-related symptoms remains necessary in a later phase of treatment. Other reasons may be the resistance of the patient to talk about their traumatic experiences and resistance of the treatment staff in treating the sequelae of trauma (Jacobson & Richardson, 1987). Without sufficient knowledge about PTSD, or a strategy for regularly focusing on trauma, treatment staff may allow a more established diagnosis to come to the forefront (Al-Saffar, Borgia, & Hallstrom, 2002). It seems important to always assess the presence of PTSD in persons with anxiety and depressive disorder. Moreover, because persons with depression, anxiety, and comorbid PTSD often have a history of childhood abuse and neglect, they may require a different or more intensive treatment. Treatment effects may be larger when the treatment is individualized and longer in duration with a greater focus on the therapeutic alliance and the learning of adequate emotion regulation skills (Craighead & Nemeroff, 2005).

Some study limitations have to be acknowledged. Persons specifically requesting treatment for primary PTSD were not recruited in NESDA, which limited our prevalence estimates of PTSD comorbid in primary depressive and anxiety disorders. Because we only collected data about the 5-year prevalence of PTSD, we could not perform a temporal sequencing of disorders in order to evaluate whether PTSD preceded depression and anxiety disorders or vice versa. Moreover, retrospective assessments of childhood maltreatment may be limited by several factors, such as errors in recall because of the passage of time, intentionally false responding, state effects, and the possible inaccessibility of memories for traumatic events. Because we only dated the most bothersome traumatic event, as identified during the interview, we were unable to analyze whether childhood traumata sensitized persons to exposure to matching traumatic events in adulthood or, vice versa, whether trauma exposure in adulthood reactivated traumatic reactions to matching events in childhood. Selective attrition of persons with more severe disorders with a history of childhood trauma limits generalizability of study results.

Strong characteristics of this study were that we used a relatively large cohort of unselected persons with anxiety or depressive disorders, with sufficient numbers of persons per anxiety and depressive disorder. The size and composition of the sample made it possible to assess within a single study design whether risk factors for PTSD are unique or shared among the most prevalent depression and anxiety disorders. Moreover, by using latent factor scores based on an interview and self-report measure for childhood trauma, we were able to study the effect of various childhood trauma types concurrently correcting for measurement error and estimating common and unique variance separately.

In conclusion, our results support a shared vulnerability model for comorbid PTSD in anxiety and depressive disorders. In particular female gender and a history of child sexual and physical abuse may underlie the high comorbidity with PTSD. Routine assessment of PTSD in patients with anxiety and depressive disorders seems warranted to identify persons with PTSD.

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