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Potentially Traumatic Event Exposure, Posttraumatic Stress Disorder, and Axis I and II Comorbidity in a Population Based Study of Norwegian Young Adults

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Abstract

Purpose—Epidemiologic research on traumatic stress is limited in Norway. Prevalence and correlates of exposure to potentially traumatic events (PTEs) and Posttraumatic stress disorder (PTSD), and patterns of comorbidity with DSM-IV Axis I and II disorders were examined in an epidemiologic sample.

Methods—Demographics, PTEs, and resulting PTSD, and comorbid DSM-IV diagnoses were assessed in 2,794 members of the Norwegian Institute of Public Health Twin Panel. The sample was 37% male, with an average age of 28.2 years (SD=3.9).

Results—Approximately one-quarter of participants had lifetime PTE exposure; most PTEs were more common in men than in women. Lifetime prevalence of PTSD was 2.6%, and was significantly more common in women than men. Being female and type of PTE (both interpersonal and accidental traumatic events) were associated with increased PTSD symptoms, whereas higher education was associated with lower symptoms. PTSD was related to increased odds of most Axis I and II conditions.

Conclusions—PTE exposure and PTSD prevalence were lower than in the US, but comparable to other European countries. Sex differences replicated previous research. The relationship between PTSD and Borderline Personality Disorder was significantly stronger than the relationship between PTSD and any other Axis II conditions.

Keywords

traumatic stress; posttraumatic stress disorder; comorbidity; Axis I; Axis II

Although the epidemiologic literature on potentially traumatic event (PTE) exposure and posttraumatic stress disorder (PTSD) prevalence is not as plentiful in Western European countries as it is in the United States (US), notable differences in prevalence have been

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reported in different countries. The recent cross-national European Study of Epidemiology of Mental Disorders [ESEMEd; 1] surveyed adults from Spain, Italy, Germany, the Netherlands, Belgium, and France regarding their lifetime exposure to 28 PTEs, and past-year PTSD symptoms [2]. 63.6% of respondents endorsed exposure to at least one PTE during their lifetime [2]. Although lifetime prevalence of PTSD was not determined, past-year prevalence in the full sample was 1.1% (.5% of men and 1.7% of women), with some variability by country, ranging from .56% in Spain to 2.63% in the Netherlands. This study also demonstrated that PTSD was associated with increased odds of many Axis I conditions [3]. Numerous other studies focusing on specific countries or cities have been conducted. For example, in a study of Munich young adults 26% males and 17.7% of females reported exposure to a traumatic event [4], with lifetime PTSD criteria met by less than 1% of males and 2.2% of females. In another recent representative study conducted in the Netherlands, exposure to traumatic events was 80.7%, with a lifetime PTSD prevalence of 7.4% and a past year prevalence of 3.3% [5].

Population based studies documenting the prevalence and correlates of exposure to PTEs are plentiful in the US, and suggest that upwards of 89% of individuals in the US have been exposed to at least one PTE in their lifetime; [6–9]. Lifetime prevalence of PTSD in the US has been estimated to be 7.8%, with nearly twice as many women meeting criteria as men [6]. In the National Comorbidity Study (NCS) and National Comorbidity Study-Replication (NCS-R) conducted in the US, PTSD has been associated with increased odds of mood, anxiety, and substance use disorders [6,10]. PTSD has also been associated with personality disorders (PD) in US samples, most commonly antisocial and borderline PD.

These differing prevalence estimates of PTE exposure and PTSD by country suggest the need for further research in countries such as Norway that have not had large-scale epidemiologic studies to estimate traumatic stress and its correlates. This study is based on the Norwegian Institute of Public Health Twin Panel [NIPHTP; 11], a population based sample of young adults. The aim of this paper is to present data on the prevalence and correlates of PTE exposure and PTSD, the factor structure of PTSD in this sample, as well as the patterns of comorbidity between PTSD and DSM-IV Axis I and II conditions. Significant revisions have been proposed for the diagnosis of PTSD in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-V), and given the lack of latent structure examinations of PTSD in non-US samples, this study also aimed to examine the factor structure of PTSD.

Methods

Sample and Assessment Methods

Overview of the NIPHTP—The Norwegian National Medical Birth Registry, established on January 1, 1967, receives mandatory notification of all live-births. The NIPHTP identified and recruited twins for this cross-sectional study through the registry, and participants in the current study completed a self-report questionnaire component (conducted in 1998) and a diagnostic interview (initiated in 1999). Twins who were born between 1967–1979 were eligible for the study, and they were sent a questionnaire in 1998. Altogether, 12,698 twins received this questionnaire, and 8,045 (3,334 pairs and 1,377 single responders) responded after one reminder (cooperation rate 63%). Diagnostic interviewing was initiated in 1999, outlined in detail elsewhere [12], with 6,442 eligible participants, defined as the 3,153 complete pairs where both members completed the questionnaire and agreed to be contacted again, as well as 68 pairs unintentionally drawn directly from the NIPHTP due to technical problems. Altogether 2,794 twins (44% of those eligible) were interviewed and provided data for the current study. Non-cooperation was predominately the result of non-response to the written invitation as active refusals were rare

[0.8%; 12]. Approval was received from the Norwegian Data Inspectorate and the Regional Ethical Committee, and written informed consent was obtained from all participants after complete description of the study.

Of those interviewed, there were N=1022 males (37%) and N=1772 females (63%). Participant ages ranged from 19 to 36 years (Mean = 28.2, SD = 3.9). The mean total years of education in the sample was 14.9 years (SD=2.6). The demographics for twins reporting at least one type of traumatic event were: males N=324 (44%) and females N=413 (56%), mean age 28.3 years, (SD=4.0), and mean total years of education 14.7 years (SD=2.7).

Interviewers were largely senior clinical psychology students at the end of their 6-year training course (including at least 6 months of clinical practice), and psychiatric nurses with years of clinical experience. They were trained by professionals with extensive previous experience with the instruments, and for assessment of axis I disorders they received a standardized training program by teachers certified by the WHO. The interviews, mostly face-to-face, were carried out between 6/99 and 5/04. For practical reasons, 231 interviews (8.3%) were done by phone. Each twin in a pair was interviewed by a different interviewer.

Axis I disorders were assessed using a Norwegian computerized version of the Munich-Composite International Diagnostic Interview (M-CIDI)[13]. CIDI is a comprehensive structured diagnostic interview assessing DSM-IV axis I disorders, and has been shown to have good test-retest and inter-rater reliability [14,15]. Twelve Axis I disorders were included in these analyses: PTSD, major depression, dysthymia, panic disorder, agoraphobia, specific phobia, social phobia, generalized anxiety disorder, eating disorders, somatoform disorder, alcohol abuse or dependence, and illicit drug abuse or dependence. Pertinent to the present focus, in the PTSD module participants were asked if they had personally experienced any of the following traumas: 1.) a terrible experience at war, 2.) serious physical threat (with a weapon), 3.) rape, 4.) sexual abuse as a child, 5.) a natural catastrophe, 6.) a serious accident, 7.) being imprisoned, taken hostage, or kidnapped, or 8.) another event. They were also asked if they witnessed any of the listed events happening to another person.

A Norwegian version of the Structured Interview for DSM-IV Personality [SIDP-IV; 16] was used to assess all 10 DSM-IV personality disorders. The DSM-III-R and DSM-IV versions of this interview have been used previously in large-scale studies in Norway [17,18]. The SIDP-IV, a comprehensive semistructured diagnostic interview for the assessment of DSM-IV personality disorders, contains nonpejorative questions organized into topical sections rather than by individual personality disorder, thereby improving the interview flow. Although both conducted within the same interview session, the SIDP-IV interview was conducted after the M-CIDI. Therefore, interviewers were aware of the temporal order of Axis I symptoms and disorders, which helped to distinguish long-standing behaviors from temporary states resulting from Axis I disorders. The SIDP-IV uses the “5-year rule,” meaning that behaviors, cognitions, and feelings that predominated for most of the past 5 years are judged to be representative of an individual’s personality. Each DSM-IV criterion is scored on a 4-point scale (0=absent, 1=subthreshold, 2=present, or 3=strongly present). To keep results consistent with other personality disorders, we examined only the criterion A (e.g., deceitfulness, violation of rights of others, impulsivity) for antisocial personality disorder and not the other criterion (e.g., prior diagnosis of conduct disorder). We previously reported the high interrater reliability for the assessed personality disorder obtained by two raters scoring 70 audiotaped interviews [19; intraclass correlations for number of endorsed criteria ranged from 0.81 to 0.96].

With traditional cutoff scores, too few individuals met full DSM-IV criteria for the 10 personality disorders for statistical analysis [20–22]. We therefore created 10 ordinal variables, one for each of the personality disorders, representing the number of positively endorsed criteria, including subthreshold endorsement. This approach is justified by results from previous studies of these 10 personality disorders [20–22] in which, using a multiple-threshold model, it was shown that the four response options, for each of the individual PDs, scored as successive integers were consistent with indicating varying levels of “severity” on a continuum of liability for each of the disorders. Because few individuals endorsed most of the criteria for individual PDs, high symptom counts were infrequent and were collapsed so that each of the 10 individual PDs were scored with 0–5 categories. This reduced the number of null cell problems (e.g., instead of a possible range of 0–9 for borderline personality disorder, for which there may be few cases endorsing the higher ends of the criterion count range, the “tail” of the distribution was collapsed). We re-examined the validity of this scoring approach by examining the fit of the multiple-threshold model, which asks whether the number of endorsed criteria reflects differences of severity on a single normal continuum of liability for each PD. This assumption was supported in the separate analyses for each of the 10 PDs [20–22], and following, for each of the 10 PD variables the 0–5 ordinal variable was used.

Statistical Analysis

Generalized estimating equation (GEE) regression models were used in all analyses to estimate population averaged parameter estimates with robust standard errors to account for the non-independence of the twin clustering. A series of GEE logistic regressions were performed to determine the relationship between basic demographic characteristics (sex, age, education) and the likelihood of experiencing various forms of PTEs. To examine the underlying structure of the individual 17 PTSD symptom criteria data an Exploratory Factor Analysis (EFA) was conducted in Mplus version 6.0 [23]. The weighted least squares mean and variance adjusted (WLSMV) robust estimation method was used to model the dichotomously scored items. Fit criteria were based on the recommendations of Hu and Bentler [24], where a Root Mean Square Error of Approximation (RMSEA) of less than .08 indicates reasonable model fit, and .05 or less is considered to be a good model fit. The RMSEA is an index of “close” fit. It acknowledges that models can never be exact in representing observable phenomena [25]. Other omnibus fit indexes such as the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) are relative goodness-of-fit values that can also be considered when evaluating model-data fit. However, RMSEA appears to be a more reliable index of fit, especially with the WLSMV estimation method [26]. CFI and TLI range from 0 to 1, with higher values indicating better fit [25]. A CFI or TLI above .95 is considered very good [24]. Based on the EFA results, a GEE multivariate linear regression model was fit to the trauma exposed subsample to examine the relation between demographic characteristics and type of trauma (interpersonal versus accidental) on the PTSD symptom count. The main set of analyses consisted of a series of GEE logistic regressions to determine if PTSD was associated with an increased likelihood of Axis I diagnoses, controlling for sex and education. We also conducted GEE ordinal regressions, controlling for sex and education, that modeled the relationship between PTSD and the ordered personality disorder count variables (as previously discussed). Axis II disorders served as the dependent measures.

Results

Prevalence and Correlates of PTEs

As shown in Table 1, within the full sample 26.5% of respondents reported exposure to at least one type of PTE (n=737). PTE types were categorized as “interpersonal” (combat,

physical threat, rape, childhood sexual abuse, hostage/kidnapped, or witnessed one of these events) versus “accidental” exposures (natural disaster, accident, “other” trauma, or witnessed one of these events); 11.5% (n=320) of the sample reported at least one accidental traumatic event, and 18.2% (n=505) reported exposure to at least one form of interpersonal traumatic event exposure. Of the 737 participants who reported exposure to at least one type of PTE, 77.2% (n=568) reported exposure to only one event type, 18.3% (n=135) reported exposure to two event categories, 3.4% (n=25) reported exposure to three event types, and 1.0% (n=8) reported exposure to four or more event categories.

To examine the relationship between demographic characteristics and likelihood of exposure to each of the three summarized PTE categories (any PTE, any interpersonal PTE, any accidental PTE) three separate GEE logistic regressions were conducted with the PTE category as the dependent variable, and age, sex, and education as the independent variables. Sex was a significant predictor of exposure to all PTE types with the exception of natural disaster. In comparison to women, men were more likely to have a lifetime history of any PTE (OR=1.55, 95% C.I. 1.29–1.85, $p<.001$), any interpersonal PTE (OR=1.29, 95% C.I. 1.04–1.59, $p<.05$), and any accidental PTE (OR=2.00, 95% C.I. 1.57–2.55, $p<.001$).

Given these sex differences for the summary PTE variables, 9 separate GEE regressions were conducted to examine demographic characteristics in relation to each specific form of PTE. Men were more likely than women to have been exposed to combat (OR=11.73, 95% C.I. 3.44–39.98, $p<.001$), to have experienced a physical threat with a weapon (OR=2.12, 95% C.I. 1.61–2.81, $p<.001$), to have experienced a serious accident (OR=2.48, 95% C.I. 1.83–3.36, $p<.001$), to have been kidnapped or taken hostage (OR=3.60, 95% C.I. 1.47–8.72, $p<.01$), to have witnessed a traumatic event happening to another person (OR=2.46, 95% C.I. 1.75–3.46, $p<.001$), and to have reported being exposed to a PTE that did not fit in any of the aforementioned categories (OR=1.44, 95% C.I. 1.00–2.06, $p=.05$). Women were more likely than men to have experienced rape (OR=17.57, 95% C.I. 4.02–76.78, $p<.001$) and childhood sexual abuse (OR=4.81, 95% C.I. 2.51–9.20, $p<.001$).

Years of education was only significantly related to the likelihood of experiencing an interpersonal traumatic event (OR=.94, 95% C.I. .90–.98, $p<.01$), and more specifically, rape (OR=.82, 95% C.I. .75–.90, $p<.001$) and childhood sexual abuse (OR=.90, 95% C.I. .82–1.00, $p<.05$). Specifically, higher educational attainment was associated with lower likelihood of exposure to these types of trauma. Age at time of interview was unrelated to reporting exposure to any of the PTE categories.

Prevalence and Correlates, and Structure of PTSD

Within the full sample, 2.6% met DSM-IV criteria for PTSD. When not including the functional impairment criteria, 2.8% of the sample met criteria for PTSD. The conditional probability of PTSD given PTE exposure was 9.8%, with a significant sex difference (3.7% of men, 14.5% of women; Wald $\chi^2=11.54$, $p<.01$, OR=2.94, 95% CI 1.58–5.48). Of those exposed to at least one PTE, the range of PTSD symptoms was 0–17, with an average of 3.05 (S.D.=4.14).

Results from the EFA revealed that a single dimension adequately accounted for the association among the individual PTSD symptom criterion. The first Eigen value for the tetrachoric correlation matrix of the 17 binary coded PTSD symptom criteria was very large (14.2) relative to the second (0.66). The fit indexes obtained from the EFA solution for a single factor were very good (CFI=.99, TLI=.99, RMSEA = 0.028). The largest item residual variance was 0.2. Thus, the 17 binary PTSD criteria in this sample of Norwegian twins formed a unidimensional structure.

Given this unidimensional structure of the set of PTSD criteria, a GEE linear regression modeling framework can be used to model the PTSD symptom count variable. Among the subsample that was exposed to at least one PTE, a linear regression model with total PTSD symptom count as the dependent variable was conducted (See Table 2). Zygosity and age were unrelated to PTSD symptoms, years of education were negatively related to PTSD symptoms, female sex was positively related to symptom count, and both interpersonal traumatic event count and accidental traumatic event count were positively related to PTSD symptoms.

Relationships Between PTSD and Axis I Disorders

To address the question of whether the likelihood of different DSM-IV Axis I diagnoses were increased by PTSD diagnosis (binary), a series of GEE logistic regressions controlling for sex and education were conducted (see Table 3). Two sets of ORs are reported: one in the full sample and one in the trauma-exposed subsample. These analyses were conducted in the full sample to capitalize on the population-based representative nature of the data, and to incorporate both stages of the PTSD phenomena (in that the ORs reflects the likelihood of trauma exposure and PTSD conditional upon trauma exposure, whereas the OR in the trauma-exposed subsample only reflects the likelihood PTSD). PTSD diagnosis was associated with an increased risk of all Axis I conditions in the full sample. The strongest relationships were found with lifetime Agoraphobia (OR=10.19), MDD (OR=7.85), Illegal Drug Use (OR=7.79), and Panic Disorder (OR=7.64). These GEE logistic models were conducted again in the PTE exposed subsample in order to examine the specific effect of the diagnosis on likelihood of Axis I conditions. In the trauma-exposed subsample, PTSD status was associated with an increased risk of all disorders except eating disorders. The patterns of findings were consistent with those of the full sample, with the strongest associations for PTSD being with Agoraphobia (OR=6.62), MDD (OR=5.43), and Panic Disorder (OR=5.48). To test the hypothesis that the strength of the OR of PTSD prediction Axis I conditions is significantly different between males and females, regression models including the interaction term of PTSD and sex were conducted in the full sample and the trauma-exposed subsample. The interactions (not shown) were not significant for any of the models.

Relationships Between PTSD and Axis II Disorders

Given the low prevalence of Axis II disorders in this sample, rescaled DSM-IV criteria counts for each of the personality disorders were created resulting in ordinal variables scored with 0–5 categories. To determine if the likelihood of Axis II criteria were increased by PTSD status, a series of GEE ordinal regressions controlling for sex and education were conducted, again in the full sample and the PTE exposed sub-sample (see Table 4). PTSD status was associated with an increased risk of all 10 of the DSM-IV Axis II conditions in the full sample. PTSD was most strongly associated with subthreshold criteria counts of Borderline Personality Disorder (OR=13.46), Schizotypal Personality Disorder (OR=4.63), Antisocial Personality Disorder (OR=4.21), and Paranoid Personality Disorder (OR=3.79) in the full sample. Results from the PTE exposed subsample indicated that PTSD was also associated with symptoms of all of the 10 Personality Disorders. Similar to the full sample, the strongest relation was found between PTSD and symptoms of Borderline Personality Disorder (OR=7.12), Schizotypal Personality Disorder (OR=2.75) and Antisocial Personality Disorder (OR=2.61). It is notable that the 95% CIs for Borderline Personality Disorder from the full sample and trauma-exposed subsample do not overlap with any of the other ORs and CIs for the other nine Personality Disorders.

Discussion

This study marks the first population-based study in Norway that estimates lifetime PTE exposure and PTSD prevalence, as well as demographic correlates and comorbidity patterns. Approximately one quarter of participants (26.1%) in the present study had a lifetime history of exposure to a PTE, a figure much lower than US studies (e.g., [6,7], and some European countries (e.g., 81% in the Netherlands) [5]. Another key difference from US studies is that of those exposed to at least one PTE, about 80% of the sample was exposed to only one event, which is in contrast to US studies in which the majority of participants have experienced multiple forms of PTEs [27–29]. Individuals exposed to multiple traumatic events are also at greater risk for PTSD than those exposed to a single stressor [27–29]. Notably, a meaningful percentage of individuals experience events that occur repeatedly over time (e.g., physical abuse by parents, domestic violence by dating partner or spouse); such chronicity of exposure likely leads to greater severity of symptoms and a more complex clinical picture, and assessment of chronicity is an important future direction in this line of research.

With regard to sociodemographic characteristics relating to PTE exposure and PTSD, the current results are in agreement with European and US studies with regard to sex differences [30,6,10,2]. Men were more likely to be exposed to most PTEs than women, although, women were more likely than men to be victims of rape and childhood sexual assault. Further, women were more likely to have a lifetime history of PTSD than men (14.5% vs. 3.7%), despite their lower likelihood of exposure to most forms of traumatic events assessed in this study. Additionally, in this study higher education was associated with a decreased likelihood of being exposed to an interpersonal PTE. Age was unrelated to likelihood of PTE exposure.

The lifetime prevalence of PTSD was 2.6%, a figure broadly consistent with the overall European lifetime estimate of 1.9% [31], but far lower than the 7.8% prevalence estimate in the US [6]. Higher educational attainment was associated with lower PTSD symptoms. Female sex, as well as both interpersonal and accidental PTE exposure was related to higher symptoms; indeed, 3.7% of men, 14.5% of women exposed to a PTE had PTSD. Our data supported a one-factor solution for PTSD, a finding consistent with US studies of epidemiologic samples of slightly younger age [32].

In our data, controlling for sex, PTSD was broadly associated with all assessed Axis I and II conditions. Previous population based studies conducted within the US [6,10], as well as other countries [33–35] also suggest that PTSD is highly comorbid with other Axis I conditions, with magnitudes similar to those found in the present analyses. Population-based (as opposed to clinically-based) studies have also found that PTSD is associated with increased likelihood of having PDs [36]. Notably, the magnitude of the relationships between PTSD and Axis I and II conditions was quite similar, a finding consistent with data from the National Comorbidity Study-Replication [30,36]. However, the relationship between PTSD and Borderline Personality Disorder is statistically stronger than the relationship between PTSD and the other Axis I and II conditions. This is consistent with previous research demonstrating that individuals with sub-clinical borderline PD symptoms and those with a diagnosis of borderline PD are more likely to endorse having experienced childhood abuse [37–39]. Additionally, etiologic theories of borderline PD highlight the importance of the role of childhood trauma [40].

Numerous possibilities exist that could account for the high comorbidity rates found in this and other studies. For example, it could be that the relationships between conditions are due to a shared risk factor, such as shared genetic liability or a shared personality trait (e.g.,

neuroticism) that is associated with these conditions. Indeed, behavioral genetic studies suggest a moderate shared heritability between PTSD and other Axis I conditions [e.g., 41,42,43], and neuroticism is a broad risk factor for many psychiatric phenotypes [44,45].

Another possibility for the high comorbidity rates is the overlap between symptoms amongst the disorders. For example, concentration difficulty, loss of interest, sleep disturbance characterize both PTSD and MDD. Yet another possibility for the high comorbidity is that some diagnoses (e.g., substance use disorders) may increase the likelihood of exposure to PTEs, and therefore increase the likelihood of PTSD [46]. Alternatively, PTE exposure and PTSD symptoms may be a risk factor for other Axis I conditions (e.g., the self-medication hypothesis, the avoidance symptoms of PTSD may lead to depressive symptoms) or II conditions [e.g., PTE exposure is thought to be a risk-factor for personality disorders; 47]. Notably, this study is cross-sectional and cannot therefore speak to the order of onset of the disorders. Longitudinal studies that address temporal onset of PTE exposure, PTSD, and comorbid conditions are called for to help inform etiologic models.

There are a few notable differences between this study and previous epidemiologic studies, as well as a few limitations that should be taken into account when interpreting the results. Although the CIDI was used in this study, as well as in most previous population-based studies [1,2,5,30,6], the number and type of PTEs assessed differ across studies. In the present study 7 specific events were queried, along with an “other” event category and a “witnessed” event category, whereas in the NCS 10 specific PTEs were assessed, along with the “other” and “witnessed” [6]. Up to 36 events were queried in the Netherlands study [5], and in the ESEMeD study 28 PTEs were assessed. Following, some of the difference in prevalence rates of PTEs could be due to assessment rather than population differences. Additionally, although the use of “other” trauma categories may assist in obtaining more accurate endorsement rates of trauma, it is unknown if these traumatic events are accidental or interpersonal in nature, therefore introducing a source of error into studies such as this one that attempt to examine correlates of types of events. Second, the present study only assessed one specific form of child abuse, child sexual assault, and did not include assessment of childhood physical abuse or neglect, events associated with high rates of PTSD [7]. Additionally, research on assessment of PTEs suggests that using legal and loaded terminology, like rape, may decrease the incidence of reporting [48]. Assessment using prefacing statements, behaviorally-specific questions that more accurately describe PTEs, and multiple questions for each event have been found to lead to a more sensitive assessment and perhaps more accurate prevalence estimates [e.g., 49]. The CIDI does not implement these strategies, and therefore, estimates may be lower. The PTE assessment did not include queries of the severity of exposure, the number of times per exposure, or age of exposure. Assessing this type of information in future studies could also further this literature. Additionally, the study only assessed lifetime PTSD, and a focus on past year PTSD would be an important future direction. With regard to the sample, the data came from a native-born young adult Norwegian cohort, and therefore, generalization to other ethnic or age groups should be done with caution. There was substantial attrition between the original birth registry and the personal interview wave of data collection used in these analyses. This limitation should be considered when interpreting the results, as bias resulting from attrition could limit generalizability and influence findings. As noted in previous papers using this dataset [50], prediction of nonresponse across waves indicated that sex, zygosity, age, and education, were significant predictors of attrition [12]. Notably, mental health variables were not associated with attrition, and further, there were not differences between the covariance structures for a large number of psychiatric phenotypes between twin pairs who did or did not participate in the interview wave of the study, which is indicative of a lack of a strong bias effect [12]. Lastly, as with all correlational cross-sectional studies such as the present, possible third variable explanations can not be ruled out.

Despite these limitations, the present study represents the first of its kind to present an estimate of PTE exposure, PTSD, correlates, and comorbidity patterns, in a population-based sample of Norwegian young adults.

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Table 1

Lifetime Prevalence of Exposure to Potentially Traumatic Events by Sex

	Males n=1,022		Females n=1,772		Total n=2,794	
	%	SE	%	SE	%	SE
Any PTE	31.9	.015	23.4	.010	26.5	.008
Any Interpersonal PTE	20.5	.013	16.8	.009	18.2	.007
Any Accidental PTE	16.3	.012	8.8	.007	11.5	.006
Combat	2.0	.004	0.2	.001	0.8	.002
Physical Threat	12.8	.011	6.5	.006	8.7	.005
Rape	0.3	.002	5.0	.005	3.3	.003
Child Sexual Abuse	1.0	.003	4.6	.005	3.3	.003
Natural Disaster	0.6	.002	0.5	.002	0.5	.001
Accident	10.7	.01	4.6	.005	6.8	.005
Hostage/kidnapped	1.4	.004	0.4	.001	0.8	.002
Other Event	6.0	.007	4.2	.005	4.9	.004
Any Witnessed PTE	7.8	.008	3.3	.004	5.0	.004

Table 2

Linear Regression Analysis of the Association between Demographics and PTE Categories in Relation to PTSD Symptoms

	β	95% C.I.	<i>p</i>
Dizygotic (vs. monozygotic)	-.48	-1.05-.09	.10
Years of Education	-.19	-.30 – -.09	<.001
Age	-.06	-.13-.02	.14
Female (vs. male)	2.40	1.86-2.94	<.001
Total Interpersonal PTEs	1.80	1.22-2.37	<.001
Total Accidental PTEs	.87	.19-1.54	<.05

Table 3

Patterns of Axis I Comorbidity In Full Sample and Trauma-Exposed Subsample

	Full Sample n=2,794		Trauma-Exposed Subsample n=737	
	OR	95% C.I.	OR	95% C.I.
MDD	7.85***	4.93–12.50	5.43***	3.29–8.96
Dysthymia	5.39***	2.21–13.16	3.79*	1.22–11.83
Alcohol Use Disorder	3.69***	2.04–6.68	2.84**	1.45–5.59
Illegal Drug Use	7.79***	3.30–18.37	3.19*	1.28–7.92
GAD	5.05***	2.21–11.55	3.35*	1.32–8.52
Panic Disorder	7.64***	3.97–14.72	5.48***	2.55–11.75
Somatoform Disorder	5.50***	3.31–9.16	3.35***	1.91–5.89
Specific Phobia	3.77***	2.39–5.92	2.69***	1.67–4.35
Eating Disorder	2.35*	1.08–5.11	1.87	0.79–4.41
Agoraphobia	10.19***	5.71–18.18	6.62***	3.49–12.55
Social Phobia	6.29***	3.25–12.17	3.97***	1.87–8.46

Note

*
p<.05,**
p<.01,***
p<.001.

Table 4

Patterns of Axis II Comorbidity In Full Sample and Trauma-Exposed Subsample

	Full Sample n=2,794		Trauma-Exposed Subsample n=737	
	OR	95% C.I.	OR	95% C.I.
Paranoid	3.79 ^{***}	2.33–6.17	2.54 ^{***}	1.56–4.13
Schizoid	2.25 ^{***}	1.43–3.55	1.75 [*]	1.07–2.85
Schizotypal	4.63 ^{***}	2.80–7.66	2.75 ^{***}	1.67–4.53
Histrionic	2.66 ^{***}	1.86–3.82	1.90 ^{**}	1.30–2.79
Narcissistic	2.24 ^{***}	1.46–3.44	1.67 [*]	1.06–2.62
Borderline	13.46 ^{***}	8.63–21.00	7.12 ^{***}	4.53–11.17
Antisocial	4.21 ^{***}	2.60–6.81	2.61 ^{***}	1.56–4.37
Avoidant	2.78 ^{***}	1.83–4.23	2.34 ^{***}	1.50–3.64
Obsessive-Compulsive	3.53 ^{***}	2.33–5.37	2.31 ^{***}	1.50–3.56
Dependent	2.50 ^{***}	1.62–3.85	1.95 ^{**}	1.24–3.07

Note

*
p<.05,**
p<.01,***
p<.001.