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RESEARCH ARTICLE

Using Norwegian National Patient Registry data to understand associations between potentially traumatic life experiences and mental health care use in adolescence

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Abstract

Exposure to potentially traumatic experiences (PTEs) is common among children and adolescents and associated with an increased risk of psychiatric diagnoses. This study aimed to ascertain how the number of PTEs differed across adolescent psychiatric diagnoses. Data on PTE exposure were derived from the youth@hordaland survey, and Axis 1 data were from the linked Norwegian National Patient Registry (NPR). Among 10,257 total adolescents, 9,555 (age range: 16–19 years, 53.9% female) consented to register linkage, 8,845 of whom were included in the analyses. Having contact with Child and Adolescent Mental Health Services (CAMHS) predicted more PTEs (estimated marginal mean [EMM] = 1.04, *SE* = 0.05) and exposure to two or more PTEs compared to having no CAMHS contact (EMM = 0.60) after adjusting for age, ethnicity, sex, and parental education. Adolescents diagnosed with attention-deficit/hyperactivity disorder, depression, trauma-related disorders, conduct disorder, and anxiety experienced significantly more PTEs (EMMs = 0.90–1.63) than those with no CAMHS contact (EMM = 0.57, *SE* = 0.01). All diagnostic categories except psychosis, autism spectrum disorders, and eating disorders had a significantly higher rate of PTEs compared with adolescents with no CAMHS contact. The study highlights the potential role of exposure to multiple PTEs as a transdiagnostic risk factor, although the level of risk varies between diagnoses.

Potentially traumatic experiences (PTEs) can be defined as direct or witnessed exposure to death, threatened death, serious injury, or sexual violence, or the loss of a parent, sibling, or close friend (Phoenix Australia Centre for Posttraumatic Mental Health, 2013). Children and adolescents subjected to PTEs are at an elevated risk of developing psychopathology during their adolescent years compared to their unexposed counterparts (Lewis et al., 2019). Although the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013) includes exposure to PTEs as part of the diagnostic criteria for acute and posttraumatic stress disorders, numerous studies have linked PTEs to other psychiatric conditions during adolescence, such as depression, conduct disorder,

generalized anxiety disorder, eating disorders, attention-deficit/hyperactivity disorder (ADHD), psychosis, and autism (Bernhard et al., 2018; Brewerton et al., 2021; Croft et al., 2019; Groth et al., 2019; Humphreys et al., 2019; Lewis et al., 2019; Peterson et al., 2019; Szymanski et al., 2011; Vibhakar et al., 2019; Warrier et al., 2021).

A critical question is whether PTE exposure represents a transdiagnostic risk factor for mental health problems in general or if PTEs selectively increase the risk for a circumscribed set of disorders. Recent research using Danish datasets has indicated that most PTEs, barring those related to pregnancy, are linked with all categories of psychiatric diagnoses (Gradus et al., 2022). This finding suggests that PTEs might be viewed as general risk determinants. However, nuances exist. For instance, several different types of PTEs have been found to increase the risk of conduct disorder, oppositional defiant disorder, major depressive disorder, and dysthymia, whereas a very limited subset of PTEs have been shown to increase the risk for disorders such as ADHD, agoraphobia, and social phobia (Tiet et al., 2001).

This brings up another important question, which is whether the driving risk factor linking PTEs to psychopathology is the cumulative burden of exposure to multiple different types of PTEs or whether exposure to specific PTE types selectively enhances the risk for particular disorders (Felitti et al., 1998; Khan et al., 2015). Of interest are recent findings that the cumulative severity levels of PTE exposure in childhood differ across mental disorders in adulthood (Gu et al., 2022).

Studies examining early experiences as potential risk factors for psychopathology are remarkably heterogeneous, differing in types of exposure (e.g., PTEs, maltreatment, poverty discrimination), the gamut of psychiatric disorders investigated, age range, the nature of the sample (e.g., convenience, representative, population), and outcome measures (e.g., prevalence, odds ratios, severity scores). The present study was designed to address a significant gap in understanding in several ways. First, we focused on adolescence, which is both the developmental period that confers the highest risk for exposure to many types of PTEs and the peak or median period of the onset of psychopathology (McLaughlin et al., 2013; Solmi et al., 2022). Hence, a detailed understanding of the association between adversity and the onset of psychopathology during adolescence may be most germane to efforts aimed at prevention or preemption. Second, to better understand the interrelationship from a cumulative burden perspective, we selected as our outcome measure the mean number of different types of PTEs observed across a broad array of diagnostic categories. Although many studies have examined the number of different types of PTEs as a risk factor, we are unaware of any studies that have compared trauma load between diagnostic groups using the mean number of different types of PTEs as the outcome measure. Further, this association was explored through the collection of exposure and psychopathology data in a large population-based survey that was linked to Norwegian National Patient Registry (NPR) data to compare participants who did or did not receive help within Child and Adolescent Mental Health Services (CAMHS). Diagnoses within the registry were formulated by clinicians providing standard clinical care, which increases the generalizability of the findings.

Other factors that can affect prevalence rates and exposure levels are ethnicity (Pumariega et al., 2022), sex (Dfalsgaard et al., 2020; Perkonigg et al., 2000), and socioeconomic status (SES; Bøe et al., 2018; Evans, 2004; Mock & Arai, 2011). Hence, the overall aim of this study was to compare the rate of PTEs among adolescents who had been in contact with CAMHS to those who had no CAMHS contact and, further, to compare how the rate of PTEs was distributed over a broad range of psychiatric diagnoses while accounting for the possible confounding effects of age, ethnicity, sex, and SES.

METHOD

Participants and procedure

This study used data from a Norwegian population-based epidemiological study of adolescents in Hordaland County, Norway, the youth@hordaland survey (Hysing et al., 2022; Sivertsen et al., 2017), which includes information on child and adolescent mental health, lifestyle, school performance, and use of health services. The questionnaire covered demographic characteristics, daily life functioning, use of health care and social services, and a broad range of mental health issues. During the first month of 2012, all adolescents born between 1993 and 1995 were invited to participate in the survey (N = 19,439). Participants in upper secondary school received study information via school email, and information was sent by postal mail to adolescents who were not in school. The questionnaire was web-based, and one school hour was assigned for its completion. In the survey, adolescents could also give their consent for data to be linked to registry data. For adolescents who consented, data from the youth@hordaland survey was subsequently linked to the NPR, which is the official national registry for specialist mental health care services and includes information about the use of child and adolescent mental health services (i.e., CAMHS), including Axis 1 psychiatric diagnoses, using the participant's personal identification number. The registry owner at the Norwegian Directorate of Health conducted the linkage.

A total of 10,257 adolescents aged 16–19 years agreed to participate in the survey. Out of the total sample, 9,555 provided consent for linking the data from the epidemiological youth@hordaland survey with the NPR/CAMHS registry. Adolescents were removed from the sample if they had missing information on all the variables assessing PTEs as well as if they reported being older when the event happened than their actual age at the time of participation. The final sample size for the present study included 8,845 adolescents (92.6% of consenting adolescents). In the final sample, 905 adolescents (10.2%) had at least one registration in NPR/CAMHS of an Axis 1 psychiatric diagnosis (World Health Organization [WHO], 2016), whereas 7,940 adolescents were not registered in CAMHS.

A previous study on the linkage between NPR/CAMHS and youth@hordaland found that participants who did not consent to the linkage were somewhat older, had a higher mean number of self-reported conduct problems, and had somewhat higher frequencies of high-level alcohol consumption, but the effect sizes of these differences were small (ds = 0.09–0.26; Heradstveit et al., 2019). In the present study, there was no significant difference in PTE exposure between participants in the youth@hordaland survey who consented to registry linkage compared to those who did not consent ($M_{\text{difference}} = 0.02$), $p = .335$, $d = -0.024$.

In previous research on the linkage between NPR/CAMHS and the youth@hordaland survey, two thirds (66.4%) of the total sample was found to have been in contact with CAMHS before the onset of youth@hordaland, 24.8% were in contact during the data collection period, and 8.8% initiated contact after participating in the youth@hordaland survey (Hysing et al., 2022).

Following regulations from the Norwegian health authorities and REC, adolescents aged 16 years and older can make decisions regarding their health, including participation in health studies, and, thus, gave consent themselves to participate in the current study and for registry linkage. Parents or guardians of participants younger than 18 years of age received information about the study but did not decide if the teenager could participate. The Regional Committee for Medical and Health Research Ethics (REC) in Western Norway (2012/1467/REK Vest) and NSD (371 974 and 259 631) approved the study.

Measures

Sociodemographic characteristics

Date of birth and sex were obtained from the personal identity number in the Norwegian NPR. Participant age at the time of survey administration was calculated using the time interval between the date of birth and the date of participation. Parental educational attainment was used as a proxy for SES (Assari, 2020; Erola et al., 2016). Maternal and paternal educational attainment were reported separately by adolescents and categorized as primary school, secondary school, or college or university. Ethnicity was based on self-reported country of origin of the participant and their parents and categorized as Norwegian-born or foreign-born.

PTEs

Self-report data from the youth@hordaland survey was used to obtain information on adolescent PTE exposure. The items chosen to measure PTEs have been used in other youth@hordaland studies (Bøe et al., 2018; Skandsen et al., 2023) and were based on the Nord-Trøndelag Health Study (HUNT-3) negative life events checklist, which was included in a Norwegian population-based study (Krokstad et al., 2013).

A total of eight PTEs derived from five items were included to assess whether the adolescents ever experienced (a) "a catastrophe or serious accident," (b) "violence from a grown-up," (c) "witness[ing] someone [they] care about being exposed to violence from a grown-up," and (d) "unwanted sexual actions." For these items, response options were either "no, never," "yes, once," "yes, sometimes," and "yes, several times" or "no, never," "yes, once," and "yes, more than once." The list also included an item about experiencing the "death of someone close to you," which, if confirmed (i.e., a response other than "no, never"), included these response options: (e) "parent/guardian," (f) "sibling," (g) "close friend," and (h) "girlfriend/boyfriend;" thus, multiple responses were accordingly possible for this item. All responses except "no, never," were collapsed to indicate PTE exposure. We did not have information on the timing of the PTE exposure, other than 8.8% of the participants having been in contact with CAMHS after the youth@hordaland survey, which indicated PTE exposure prior to mental health problems. The item related to the death of a loved one did not assess whether the death was expected or sudden, as the death of nearly anyone close to an adolescent, apart, perhaps, from a grandparent, could be considered a PTE. Death of a grandparent was accordingly omitted from the analysis The items aligned with the Child and Adolescent Trauma Screen–2 (CATS-2; Sachser et al., 2022) but did not include the same level of detail as the CATS-2, which is a 15-item structured checklist used to assess PTE exposure. As opposed to the CATS-2, our survey did not include questions covering community violence, bullying, war, or medical trauma.

Psychiatric disorders and referrals

Psychiatric disorder data were obtained using Axis 1 clinical diagnoses, ascertained using criteria in the *International Classification of Diseases and Disorders* (10th ed.; WHO, 2016), from the NPR, coded by clinicians working in CAMHS. A total of 133 adolescents had psychiatric diagnoses from more than one of the specified diagnostic categories and were assigned to multiple diagnostic categories, whereas 329 participants did not receive any Axis 1 psychiatric diagnosis (Heradstveit et al., 2019). The latter group was in contact with CAMHS, but their mental health concerns were not sufficient to fulfill the criteria for any Axis 1 psychiatric diagnosis; hence, they were excluded from the analyses on register-based diagnoses. Data from the NPR spanned January 2008 to March 2018. Participants were included in the youth@hordaland at the age of 16–19, and the data obtained from CAMHS spanned from ages 12 to 19 years. We collapsed diagnoses into eight broader diagnostic categories: anxiety disorders, mood disorders, trauma-related disorders, eating disorders, autism spectrum disorders (ASDs), conduct disorders, ADHD, and psychotic disorders (Heradstveit et al., 2019).

Data analysis

Descriptive analyses were performed on demographic characteristics, stratified by CAMHS contact status. Chi-square tests were used to examine the differences between groups on categorical variables. Subsequently, a negative binomial regression analysis was conducted to examine if contact with CAMHS was associated with the mean number of reported PTEs in a crude model and a model adjusted for age, ethnicity, sex, and parental educational attainment. Due to overdispersed count data, negative binomial regression analyses were conducted to assess differences in the average number of PTEs between the nine different diagnostic categories compared to a reference group and are reported as estimated marginal means (EMMs).

RESULTS

Sample characteristics

In the total sample ($N = 8{,}845$), 53.9% of participants were girls. There were significantly more girls in the CAMHS contact group compared to the no CAMHS contact group. The average participant age was 17.4 years in the total sample, 17.3 in the CAMHS contact group, and 17.4 in the no CAMHS contact group. The parents of adolescents who were in contact with CAMHS had lower levels of educational attainment compared to those with no CAMHS contact. There was no significant difference in ethnic background between participants in contact with CAMHS compared to those with no contact (see Table 1 for full participant characteristics).

PTEs and CAMHS contact

There were more participants without PTEs in the no-CAMHS group (60.6%) compared to the CAMHS group (43.5%). The groups had similar exposure rates in terms of one PTE, but the results diverged from two PTEs and upward, with adolescents in the CAMHS contact group reporting exposure to more PTEs than those in the no contact group. See Figure 1 for details.

Contact with CAMHS significantly predicted the average number of endorsed PTEs after adjusting for age, ethnicity, sex, and parental educational attainment, $B = 0.55$ ($SE = .05$), $p < .001$. On average, adolescents who had been in contact with CAMHS reported exposure to 1.04 PTEs, 95% confidence interval (CI) [0.95, 1.14], whereas those with no CAMHS contact reported exposure to an average of 0.6 PTEs, 95% CI [0.58, 0.62].

PTEs according to diagnostic category

Compared to the mean number of PTEs in the reference group (EMM = 0.57), adolescents diagnosed with anxiety (EMM = 0.90), ADHD (EMM = 1.09), conduct disorder (EMM = 1.60), depression (EMM = 1.17), and trauma-related disorders (EMM = 1.63) had been exposed to significantly more PTEs after adjusting for age, ethnicity, sex, and parental educational attainment. There was no significant difference in PTE exposure between the reference group and participants with psychosis, ASDs, and eating disorders (see Table 2).

DISCUSSION

Our study of a large sample of adolescents in the youth@hordaland study linked to national registry data showed that adolescents who had been in contact with CAMHS had experienced more PTEs than those with no contact. Compared to adolescents with no CAMHS contact, those who had been diagnosed with anxiety, ADHD, conduct disorder, depression, and trauma-related disorders reported having experienced significantly more PTEs after adjusting for age, ethnicity, SES, and sex. Adolescents diagnosed with trauma-related disorders and conduct disorders reported experiencing approximately 3 times as many PTEs as adolescents in the reference group, whereas

TABLE 1 Demographic characteristics across Child and Adolescent Mental Health Services (CAMHS) contact groups.

Variable	Total (n = 8,845)		CAMHS contact (n = 905)		No CAMHS contact (n = 7,940)		p	ϕ
	M	*SD*	*M*	*SD*	*M*	*SD*		
Age (years)	17.4	0.84	17.3	0.83	17.4	0.84	.522[a]	.14[b]
	n	%	*n*	%	*n*	%		
Adolescent ethnicity							.215	.01
Norwegian	8,269	93.5	838	92.6	7,431	93.6		
Foreign	576	6.5	58	6.0	518	6.1		
Maternal ethnicity							.085	−.02
Norwegian	8,075	91.3	839	92.7	7,236	91.1		
Foreign	761	8.6	64	7.1	697	8.8		
Paternal ethnicity							.576	.01
Norwegian	7,940	89.8	807	89.2	7,133	89.8		
Foreign	873	9.9	94	10.4	779	9.8		
Sex							.001	−.06
Girls	4,771	53.9	562	62.1	4,209	53.0		
Boys	4,074	46.1	343	37.9	3,731	47.0		
Maternal educational attainment							.001	.08
Primary	681	7.7	96	10.6	585	7.4		
Secondary	2,788	31.5	258	28.5	2,530	31.9		
College/university	3,272	37.0	279	30.8	2,993	37.7		
Unknown	2,045	23.1	267	29.5	1,778	22.4		
Paternal educational attainment							.001	.10
Primary	704	8.0	85	9.4	619	7.8		
Secondary	3,051	34.5	282	31.2	2,769	34.9		
College/university	2,823	31.9	206	22.8	2,617	33.0		
Unknown	2,188	24.7	325	35.9	1,863	23.5		

Note: Significance was calculated using chi-square tests unless otherwise noted.

[a]Calculated using *t* tests.

[b]Cohen's *d*.

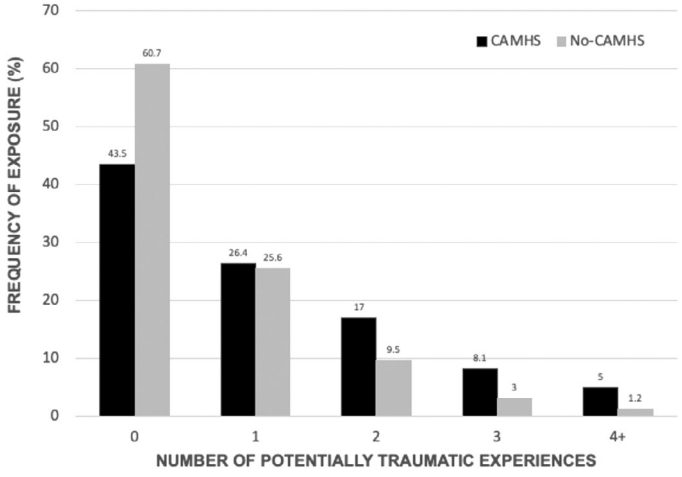

FIGURE 1 Number of potentially traumatic events among participants with child and adolescent mental health services (CAMHS) contact compared to those with no CAMHS contact.

TABLE 2 Average number of potentially traumatic experiences (PTEs), by diagnostic group.

		Mean number of PTEs				
NPR diagnosis	***n***	**EMM**	***SD***	***B***	***SE B***	***p***
Reference group (no CAMHS contact)	7,759	0.57	0.01			
Anxiety disorders	165	0.90	0.11	0.45	0.11	< .001
ADHD	153	1.09	0.11	0.65	0.11	< .001
Conduct disorders	32	1.60	0.23	1.03	0.23	< .001
Depression	227	1.17	0.09	0.72	0.09	< .001
Trauma-related disorders	82	1.63	0.14	1.05	0.14	< .001
Psychosis	20	0.76	0.34	0.29	0.34	.387
Autism spectrum disorders	49	0.56	0.25	−0.01	0.25	.962
Eating disorders	55	0.74	0.20	0.26	0.20	.202

Note: Adjusted for age, ethnicity, socioeconomic status, and sex. EMM = estimated marginal means; CAMHS = Child and Adolescent Mental Health Services; NPR = National Patient Registry; ADHD = attention-deficit/hyperactivity disorder.

those diagnosed with ADHD and depression had experienced approximately twice as many PTEs. There was no significant difference in PTE exposure between the no CAMHS contact group and participants with psychosis, ASDs, and eating disorders.

The study supports previous findings that adolescents who experience PTEs have an increased risk of psychopathology in adolescence compared to their peers with no PTE exposure, particularly when there has been exposure to several PTEs (Gradus et al., 2022; Lewis et al., 2019). In line with a recent Danish population-based study (Gradus et al., 2022), we observed stronger associations between PTEs and certain diagnoses; however, the associations between PTEs and different diagnoses had a wider spread (standardized morbidity ratios = 1.9–5.2) in that study compared with ours. Even as both studies measured associations between diagnoses, they differ in that we measured the rate of PTEs within diagnostic categories, whereas Gradus et al. assessed the probability of a diagnosis after PTE exposure. The difference in findings could also be due to the different age range of the study samples. Our study measured PTE exposure and Axis 1 disorder diagnoses in adolescence only, whereas the other study included participants that ranged in age from 0 to 108 years old. Differences in spread regarding the associations between PTEs and different diagnoses could also be because we adjusted for the possible confounders of age, ethnicity, sex, and parental educational attainment, which Gradus and colleagues did not do.

To our knowledge, our study was the first to examine cumulative associations between PTEs and psychopathology in adolescence across the diagnostic spectrum by using national registry data. The heightened level of trauma exposure across several disorders supported the notion of PTEs as a transdiagnostic risk factor (Gradus et al., 2022). We did not investigate the potential mechanisms of this association in the current study, but there are several possible pathways between PTE exposure and psychopathology. A biopsychosocial model by McLaughlin and Lambert (2017) views disruptions in threat processing as a key neurodevelopmental mechanism underlying the associations between childhood trauma and the onset of psychopathology. Enhanced threat processing occurs at multiple levels, including information processing biases, altered emotional learning, enhanced emotional reactivity, and poor emotion regulation. The biopsychosocial model is supported by the findings of Teicher et al. (2020) that PTEs may lead to biological changes, such as an overactive amygdala, that may lead to impaired affect regulation and, in turn, cause adolescents to overreact to stressful situations. This can include graded reductions in hippocampal volume, which affects learning and memory, and decreased volume in the prefrontal cortex, which could lead to more difficulty controlling urges, increased impulsivity, and impaired rational decision-making. Impaired affect regulation, poorer learning and memory, and increased impulsivity and poor decision-making are characteristic of several psychiatric disorders and could explain some of the mechanisms behind PTEs as a transdiagnostic risk factor.

In our study, the cumulative number of PTEs was highest among adolescents with trauma-related disorders, who endorsed, on average, close to two PTEs. The high incidence of PTEs among these disorders is not a surprise given that PTE exposure is part of the diagnostic criteria for trauma-related disorders. In the present sample, 9.8% of adolescents who had CAMHS contact were diagnosed with a trauma-related disorder. The prevalence rate was similar to a twin study by Lewis et al. (2019), who found that 7.8% of the adolescents in their sample met the diagnostic criteria for PTSD by 18 years of age. However, the rates cannot be compared directly because the adolescents in their study

were from the general population, whereas the estimates in our study were based on adolescents who had been in contact with CAMHS.

The PTE exposure rate was lower than the rate (3.35) revealed in a study by Daniunaite et al. (2021) on PTSD and complex PTSD (CPTSD). The difference in cumulative PTEs could reflect measurement differences: Whereas our measure included eight PTE types, the other study measured 14 types. In addition, we used the broader diagnostic category of trauma-related disorders, whereas Daniunaite et al. (2021) examined PTSD and CPTSD only. The studies utilized different means of diagnostic assessment. In our study, diagnosis was determined using Axis 1 diagnoses in the NPR, which were coded by CAMHS clinicians, whereas diagnoses in the other study were based on self-report. If the diagnostic process within CAMHS was more stringent than a self-report measure, there would likely be a difference in how many participants were included in the trauma-related disorder category and, consequently, an impact on the cumulative level of PTE exposure. The narrow diagnostic focus within the PTSD/CPTSD study could strengthen the ability to detect PTSD symptoms. The study utilized measures such as the child and adolescent version of the International Trauma Questionnaire (Cloitre et al., 2018), a validated and recommended measure of PTSD (Kazlauskas et al., 2020). We did not have information on the tools and measures used in the diagnostic process, which could have had an impact on the validity of the diagnostic conclusions.

The level of cumulative PTE exposure was particularly high among adolescents who were diagnosed with conduct disorder. This finding was supported by studies by Lewis et al. (2019) and Bernard et al. (2018), who found a heightened level of conduct disorders among adolescents exposed to PTEs. Our finding that the average level of PTE exposure was heightened in adolescents with conduct disorders compared to the reference group adds to previous knowledge on PTEs and conduct disorders. Trauma effects could help to account for many features of conduct disorder, including impulsivity, anger, a lack of empathy, acting out, and resistance to treatment (Greenwald, 2002). Conversely, the characteristic risk-taking behavior of individuals diagnosed with conduct disorder could also make them more susceptible to PTE exposure (Bernhard et al., 2018). The generalizability of our findings on diagnosed conduct disorders could be limited by the lower registry linkage consent rate among adolescents with self-reported conduct problems. In effect, this could indicate that adolescents with conduct disorders, as well as other diagnoses related to conduct problems, were underrepresented in our clinical sample. The lower consent rate could be due to several factors (e.g., uncooperativeness and defiance in this population of adolescents; WHO, 2016). However, the differences in consent rates were small, with Cohen's *d* effect sizes ranging from 0.09 to 0.26 (Heradstveit et al., 2019).

Our study supports previous findings of heightened PTE levels among adolescents diagnosed with ADHD (Humphreys et al., 2019; Szymanski et al., 2011; Warrier et al., 2021). The findings, nevertheless, differed somewhat from the study by Szymanski et al. (2011) in that the adolescents diagnosed with ADHD in our study had experienced, on average, 1.13 PTEs, whereas adolescents in the Szymanski et al. (2011) study had experienced an average of 2.9 PTEs. The difference in the level of PTE exposure could be because Szymanski et al. examined PTEs in an inpatient population, whereas our study participants included both outpatients and inpatients within CAMHS contact. Different levels of PTE exposure could reflect the higher degree of functional impairment and mental health problems in inpatients and a corresponding heightened number of vulnerability factors in their lives, including PTEs.

The cumulative number of PTEs endorsed was significantly higher among adolescents diagnosed with depression compared to those in the reference group. Our finding on the association between PTEs and depression is somewhat in line with studies by Warrier et al. (2021), Lewis et. al. (2019), and Vibhakar et al. (2019), which showed a higher likelihood of depression among individuals exposed to PTEs. However, Lewis et al. (2019) and Vibhakar et al. (2019) measured specific associations with depression rates among participants exposed to PTEs, whereas we assessed PTE exposure in participants diagnosed with depression. Our study adds knowledge of depression relative to other CAMHS diagnoses in terms of average PTE levels and how these levels differ from other diagnoses.

Cumulative PTEs were significantly higher among adolescents with anxiety compared to the reference group, which corresponds with previous findings of an association between anxiety and PTEs (Lewis et al., 2019). Compared to the reference group, cumulative PTEs were not significantly higher among adolescents with psychosis, which is contrary to the findings from the Avon Longitudinal Study (Croft et al., 2019) and a gene-environment study by Warrier et al. (2021). Nevertheless, the differences in findings could be due to a statistical power issue in our study because of the low number of participants in this diagnostic category, as well as the inclusion of different covariates such that parent ethnicity and parental educational attainment were not included as covariates in the Avon Longitudinal Study (Croft et al., 2019).

We did not find a significant difference in PTE exposure among adolescents with eating disorders compared to the reference group. Our findings differ from clinical studies by Groth et al. (2019) and Brewerton et al. (2021), who found an association between PTEs and eating

disorder symptoms. This difference in findings could be due to several factors, such as statistical power and the differences in PTEs utilized. In addition, the clinical studies examined PTEs in adolescence relative to eating disorders only, whereas we compared the rates of PTEs in a clinical group of adolescents with eating disorders to a nonclinical group of adolescents. A high percentage of adolescents with eating disorders may have experienced PTEs but not at a level high enough to significantly differentiate the level of PTE exposure from a nonclinical sample.

We did not find a significant difference in PTE exposure for adolescents with ASDs compared to the reference group. Thus, our findings do not support the suggestion by Peterson et al. (2019) that adolescents with developmental disabilities such as ASDs may have up to a 3-fold increased risk of trauma exposure compared to their typically developing peers. The discrepancy in findings could be due to differences in the types of PTEs and the number of PTEs assessed. It could also be an indication that even if adolescents with other developmental disabilities have an increased risk of trauma exposure, this does not necessarily apply to ASDs.

Overall, the differences in findings relative to other studies may be due to the different types of PTEs and the severity of PTEs included in the assessments, as well as methodological issues, such as the utilization of different diagnostic instruments and covariates. In addition, PTE exposure in our study was measured by comparing the rate between specific diagnoses and a reference group, whereas some studies on PTE exposure levels have been based on measures administered within clinical groups or community samples. It is difficult to make conclusions regarding the direction of the associations in our study, as participants with higher levels of PTE exposure may be more vulnerable to the development of different psychopathology or those with psychopathology may be at a higher risk of experiencing PTEs. In addition, pre-, peri-, and posttraumatic risk factors other than PTE exposure in itself might impact some of the variation in the association between PTEs and different diagnoses (Claxton et al., 2021). A final point is that as many as 39.6% of adolescents in the reference group (i.e., no CAMHS contact) had experienced PTEs, and within this group, adolescents had been exposed to an average of 0.5 PTEs. Hence, within any group of adolescents, some level of PTE exposure can be expected. Researchers conducting studies on PTE exposure within specific diagnostic categories or diagnoses are, consequently, advised to employ a comparison group given it is the difference in PTE exposure that is of interest and most meaningful for interpretation.

The main strength of our study was the use of assessments of both PTE exposure and psychopathology within the developmental stage of childhood and adolescence. In addition, our study consisted of survey information and national registry data from CAMHS from many participants across a nonclinical and clinical population of adolescents, adjusted for the possible confounders of age, ethnicity, sex, and parental educational attainment. This allowed for the comparison of PTE exposure in a clinical and nonclinical population as well as comparisons between diagnoses for adolescents in contact with CAMHS. Diagnoses were set by professional practicing clinicians within CAMHS, and we had information about all diagnostic categories, which strengthened the ecological validity of the study. This gave us the opportunity to compare different rates of PTE exposure across the diagnostic spectrum and provide further insight and support for PTEs as a transdiagnostic risk factor.

Several limitations must, nevertheless, be considered when interpreting the current findings. A primary limitation is that we did not have information on the timing of the PTE exposure other than knowing that 8.8% of the participants were in contact with CAMHS after completing the youth@hordaland survey, which indicates PTE exposure prior to mental health problems. It was, nevertheless, decided that the sample was too small to conduct meaningful analyses on temporality. We were, therefore, unable to determine the temporal order between the variables included in the analyses, which could be a source of omitted variable bias. Second, our study examined cumulative PTE exposure only rather than specific associations between PTE types and diagnoses, which entails an assumption that categories of adversity are of equal weight that might not necessarily be the case and could negatively impact the external validity of our findings.

Our PTE categories were not measured by an established PTE scale but rather based on the negative life event questionnaire used in the HUNT-3 study (Krokstad et al., 2013). Even if our PTE items aligned with a PTE screening instrument such as the CATS-2 (Sachser et al., 2022), it did not include the same level of detail.

In addition, PTEs were limited to five categories: a catastrophe or serious accident, violence from a grown-up, witnessing someone the participant cares about being exposed to violence from a grown-up, unwanted sexual actions, and the death of someone close to the participant. Previous studies have varied regarding the number of PTEs and type of PTEs included, which could impact findings (Gradus et al., 2022; Lewis et al., 2019). Even if we had included the most common PTEs, a possible limitation was not including community violence, medical trauma, and exposure to war. We could argue that these PTEs could be placed within the category encompassing a catastrophe or serious accident. However, the lack of specificity could have impacted how many participants identified with the category, thus potentially leading to the underreporting

of these experiences and negatively impacting the external validity of the findings. In addition, it should be noted that we did not include bullying, and acts of violence were limited to exposure from an adult only.

There is a need for additional research that can expand knowledge of the temporal associations and mechanisms between PTE exposure and psychopathology across the diagnostic spectrum, as well as examinations of specific associations between specific PTEs or clusters of PTEs and diagnoses. Such studies are encouraged to follow participants from the date of PTE exposure until their incident of psychiatric disorder while limiting the sample to the child and adolescent population only. Both cumulative PTE rates and associations between specific PTEs or PTE types and specific diagnoses are of interest. Providing findings on the temporal order might give further insight into the question of whether trauma is a risk factor for psychopathology, psychopathology is a risk factor for PTEs, or if the relationship is bidirectional. Future studies are also encouraged to examine if there is a common diagnostic denominator between trauma-related disorders, conduct disorders, ADHD, and depression, which might, to some extent, explain the particularly high number of PTEs within these diagnostic categories; for example, researchers could study specific features of these diagnoses in relation to Teicher et al.'s (2020) research on brain abnormality and psychological consequences after trauma exposure. Warrier et al.'s (2021) recent gene-environment study using Mendelian randomization found support for childhood maltreatment being partly heritable and a primarily bidirectional causal role of childhood maltreatment on mental health, which points to the complexity of examining associations between PTEs and psychopathology and the need for a variety of research methods when trying to disentangle the potential bidirectional association between PTEs and psychopathology.

In conclusion, using data from the population-based youth@hordaland survey in combination with the Norwegian NPR, the present study revealed a higher level of PTE exposure among adolescents with CAMHS contact compared to those with no contact with CAMHS. The findings suggest a need to pay particular attention to exposure to multiple PTEs and the potential of PTE exposure as a transdiagnostic risk factor among adolescents, although the level of risk varies between diagnoses. The key takeaway message for clinicians is that it may be useful to screen for PTEs in adolescents who have had contact with CAMHS or similar services and pay particular attention to those diagnosed with trauma-related disorders, conduct disorders, depression, and ADHD, both with the aim of addressing unresolved trauma and stopping any ongoing trauma in the adolescent's life. Clinicians are also advised to monitor adolescents who have been exposed to more than one PTE, as this might be a distinct transdiagnostic vulnerability factor.

OPEN PRACTICES STATEMENT

Data cannot be shared publicly due to privacy restrictions in accordance with the ethical approval for the Bergen Child Study. Norwegian Health research legislation and the Norwegian Ethics Committees require explicit consent from participants in order to transfer health research data outside of Norway. In this specific case, ethics approval is also contingent on storing the research data in secure storage facilities located in our research institution. Data are from the Norwegian Bergen Child Study, owned by NORCE Norwegian Research Centre. The authors did not have special access privileges to data from the survey. Data are available from the Bergen Child Study Institutional Data Access (contact via bib@norceresearch.no) for researchers who meet the criteria for access to confidential data.

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