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CLINICAL RESEARCH ARTICLE

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Types of childhood maltreatment as predictors of posttraumatic stress disorder severity and complex posttraumatic stress disorder in patients with substance use disorders

Sera A. Lortye [a], Joanne P. Will[a], Sophie A. Rameckers [b], Loes A. Marquenie [a], Anna E. Goudriaan [a,c,d], Arnoud Arntz [b] and Marleen M. de Waal [a,c,d]

[a]Arkin Mental Health Care, Jellinek, Amsterdam Institute for Addiction Research, Amsterdam, The Netherlands; [b]Department of Clinical Psychology, University of Amsterdam, Amsterdam, The Netherlands; [c]Department of Psychiatry, Amsterdam UMC location University of Amsterdam, Amsterdam, The Netherlands; [d]Amsterdam Public Health Research Institute, Amsterdam, The Netherlands

ABSTRACT

Background: Childhood maltreatment (CM) can be divided into: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). CM is associated with (Complex)Posttraumatic stress disorder (PTSD/CPTSD) and substance use disorder (SUD).
Objective: This cross-sectional study examined the relationships between CM-subtypes with PTSD-severity and CPTSD in patients with SUD-PTSD.
Method: Participants ($N = 209$) were treatment-seeking SUD-PTSD patients who completed the Childhood Trauma Questionnaire-short form, the Clinician-Administered PTSD Scale for DSM-5 and the International Trauma Questionnaire. Regression analyses and a model selection procedure to select an optimal model were used to examine CM-subtypes as predictors of (C)PTSD, adjusted for sex and age.
Results: Total CM and all CM-types significantly predicted PTSD-severity in the univariate regression analysis, with EA begin the strongest predictor. In the multiple regression only SA predicted PTSD-severity. Subsequently, model selection indicated that the optimal model to predict PTSD-severity included EA and SA. In the univariate analyses total CM, EA, and PN significantly predicted CPTSD-classification, and total CM and all CM-types significantly predicted CPTSD-severity. In the multiple regression for CPTSD-classification only EA and PA were significant predictors and for CPTSD-severity EA, PA and SA were significant predictors. In post-hoc multiple regression analyses, only EA was a significant predictor of CPTSD-classification and CPTSD-severity. Finally, in the model selection the most parsimonious model only included EA for both CPTSD-classification and CPTSD-severity. Sex was not a moderator in the relationship between CM and PTSD, nor in CM and CPTSD.
Conclusions: These findings indicate that for SUD-PTSD patients, several CM-types have predictive value for (C)PTSD-severity, however SA and especially EA appear to contribute to these complaints. Since EA does not constitute an A-criterion, it is generally more overlooked in PTSD treatment. Its impact should therefore be underlined, and clinicians should be attentive to EA in their treatment.

Tipos de maltrato infantil como predictores de la gravedad del trastorno de estrés postraumático y el trastorno de estrés postraumático complejo en pacientes con trastornos por uso de sustancias

Resumen: El maltrato infantil (MI) se puede dividir en tipos: abuso emocional (AE), abuso físico (AF), abuso sexual (AS), negligencia emocional (NE) y negligencia física (NF). El MI está asociado con el trastorno de estrés postraumático (TEPT), el trastorno de estrés postraumático complejo (TEPT-C) y el trastorno por uso de sustancias (TUS). El MI incluye: abuso emocional (AE), abuso físico (AF), abuso sexual (AS), negligencia emocional (NE) y negligencia física (NF).
Objetivo: Este estudio de corte transversal examinó las relaciones entre los subtipos de MI con la gravedad del TEPT y el TEPT-C en pacientes con TEPT y TUS.
Método: Los participantes ($N = 209$) eran pacientes en busca de tratamiento con TEPT y TUS coexistentes que completaron el Cuestionario de Trauma Infantil-forma breve (CTQ-sf, por sus siglas en inglés), la Escala de TEPT Administrada por el Clínico para el DSM-5 (CAPS-5, por sus siglas en inglés) y el Cuestionario Internacional de Trauma (ITQ, por sus siglas en inglés). Se utilizaron análisis de regresión múltiple y un procedimiento de selección de modelo para identificar un modelo óptimo para examinar los subtipos de MI como predictores del TEPT y TEPT-C, ajustados por sexo y edad.

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Posttraumatic stress disorder (PTSD); complex posttraumatic stress disorder (CPTSD); substance use disorder (SUD); childhood maltreatment (CM); emotional abuse (EA); sex

PALABRAS CLAVE
Trastorno de estrés postraumático (TEPT); trastorno de estrés postraumático complejo (TEPTC); trastorno por uso de sustancias (TUS); maltrato infantil (MI); abuso emocional (AE); sexo

HIGHLIGHTS
- All types of Childhood Maltreatment are associated with PTSD severity.
- Emotional Abuse and Sexual Abuse are most predictive for PTSD severity.
- Emotional Abuse is most predictive for CPTSD classification and symptom severity.

CONTACT Marleen M. de Waal m.m.dewaal@amsterdamumc.nl Amsterdam UMC, location University of Amsterdam, Department of Psychiatry Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands

Resultados: El MI total y todos los tipos de MI predijeron significativamente la gravedad del TEPT en el análisis de regresión univariada, siendo el AE el predictor más fuerte. Sin embargo, en la regresión múltiple solo el AE y el AS predijeron independientemente la gravedad del TEPT. Posteriormente, la selección de modelos indicó que el modelo óptimo para predecir la gravedad del TEPT incluía tanto al AE como al AS. En los análisis univariados, el MI total, el AE y la NF predijeron significativamente la clasificación de TEPT-C, y mientras que el MI total y todos los tipos de MI predijeron significativamente la gravedad del TEPT-C. En la regresión logística múltiple para la clasificación del TEPT-C, solo el AE y el AF fueron predictores independientes significativos. En el análisis de regresión múltiple para la gravedad del TEPT-C, el AE, AF y el AS fueron predictores independientes significativos. En los análisis post-hoc de regresión múltiple, solo el AE fue un predictor independiente significativo de la clasificación de TEPT-C y la gravedad del TEPT-C. Finalmente, en la selección de modelos, el modelo más parsimonioso solo incluyó el AE tanto para la clasificación de TEPT-C como para la gravedad del TEPT-C. El sexo no medió ni moderó la relación entre el MI y el TEPT, ni entre el MI y el TEPT-C.
Conclusiones: Estos hallazgos indican que en pacientes con TEPT y TUS, varios tipos de MI tienen valor predictivo para la gravedad del TEPT y TEPT-C, sin embargo, el AS y especialmente el AE parecen contribuir a estas quejas. Dado que el AE no constituye un criterio A, generalmente es un aspecto más pasado por alto en el tratamiento del TEPT. Por lo tanto, se debe subrayar el impacto del AE, y los clínicos deben estar atentos al AE en su tratamiento.

1. Introduction

Childhood maltreatment (CM) encompasses five different types, namely sexual abuse (SA), physical abuse (PA), emotional abuse (EA), emotional neglect (EN) and physical neglect (PN) (World Health Organization, 1999). Prevalence rates vary across different studies, with higher prevalence rates for self-report studies than for informant-based studies (Stoltenborgh et al., 2011, 2013a, 2013b, 2015). CM is associated with several mental disorders (Gruhn & Compas, 2020; Humphreys et al., 2020; McKay et al., 2021; Struck et al., 2020), including substance use disorder (SUD) (Kristjansson et al., 2016; Schwandt et al., 2013) and posttraumatic stress disorder (PTSD) (Brewin et al., 2000; Rameckers et al., 2021). The risk of these mental health problems is higher in patients with multiple types of CM (McKay et al., 2021) and psychological treatment response of patients with CM is poorer in comparison to those without CM (Teicher et al., 2022). Within treatment-seeking SUD patients, CM rates in both men and woman are higher than in the general population (Belfrage et al., 2023), with the occurrence of adverse childhood experience ranging from >70% to 100% (Leza et al., 2021; Tang et al., 2021).

The association between CM and PTSD is a topic of debate due to narrow diagnostic standards for PTSD given in the 5th edition of the Diagnostic and Statistical Manual (DSM-5). The DSM-5 requires PTSD to result from the experience of a traumatic event meeting the A-criterion, defined as 'actual or threatened death, injury or act of sexual violence' (American Psychiatric Association, 2013). Of the five CM types, only PA and SA fulfil this A-criterion. Previous studies have mainly focused on these CM types and found that both are associated with PTSD and PTSD symptom severity (G. Andrews et al., 2004; Cougle et al., 2010). However, several recent studies have directly compared the impact of all five types of CM and have consistently found that EA was most strongly associated with PTSD symptom severity compared to the other types (Hoeboer et al., 2021; Nöthling et al., 2019; Rameckers et al., 2021)(Rameckers et al., 2021).

Besides the DSM-5, there is another diagnostic framework, the 11th version of the International Classification of Diseases (ICD-11), developed by the World Health Organization (WHO). The ICD-11 distinguishes two conditions: PTSD and complex PTSD (CPTSD). The latter encompasses PTSD symptoms along with disturbances in self-organization (DSO), which include 'affective dysregulation, negative self-concept and disturbances in relationships' (Karatzias & Levendosky, 2019). Cumulative CM appears to increase the risk of CPTSD symptoms (Cloitre et al., 2019; Hyland et al., 2017). Therefore, it seems important to also examine CPTSD and its association with CM.

Interestingly, many studies found the prevalence of both PTSD and CPTSD to be about twice as high in women as in men (Cloitre et al., 2019; Driessen et al., 2008; Hyland, Murphy, et al., 2017; Tolin & Foa, 2006). The risk of developing PTSD among LGBTQ people is even higher, especially for transgender people, since due to transphobia/homophobia individuals within sexual minority groups continue to face a heightened risk of experiencing trauma including childhood abuse (Marchi et al., 2023; Roberts et al., 2012). Nevertheless, there are conflicting findings in studies; some report a sex-specific risk for PTSD but not for CPTSD (Hyland, Shevlin, et al., 2017; McGinty et al., 2021), while others found this neither for PTSD nor for CPTSD (Cloitre et al., 2013; Wolf et al., 2015). Consequently, the influence of sex on the relationship between CM and both PTSD and CPTSD remains unclear.

Since CM is more prevalent in a population with SUD compared to the general population (Gerhardt et al., 2022), and 46% of the patients with PTSD also suffer from SUD (Pietrzak et al., 2011), it is important to examine the effect of CM in a population with both PTSD and SUD. To our knowledge, it is unknown which types of CM are related to PTSD in a population with both PTSD and SUD, due to the fact that patients with SUD are usually excluded in research on PTSD (Leeman et al., 2017). Given that CM is a preventable risk factor for triggering a sequence of molecular and neurobiological (Teicher et al., 2022), as well as psychological alterations (Gruhn & Compas, 2020), more awareness about the importance of CM in patients with both PTSD and SUD can help clinicians to take CM more seriously. Results of studies on CM might therefore help to improve treatment development in a group of patients that are more difficult to treat than patients with either PTSD or SUD alone (Najavits, 2002).

Taken together, the abuse types of CM have most consistently been related to PTSD severity. Moreover, recent studies indicate that particularly EA is strongly related to PTSD severity. However, associations of CM types with PTSD severity and CPTSD in a SUD-PTSD population are unknown. Furthermore, the influence of sex remains unclear. Considering these previous findings, the aims of this study were fourfold. First, we separately examined the relationships between the severity of total CM and five different types of CM (i.e. SA, EA, PA, PN and EN) and PTSD severity, classification of CPTSD and CPTSD severity. We hypothesized that severity of total CM and all types of CM were predictive for PTSD severity, classification of CPTSD and CPTSD severity. Second, we examined the independent predictive value of the five different types of CM and PTSD severity, classification of CPTSD and CPTSD severity. We hypothesized that only the CM abuse types (i.e. PA, SA and EA) would be independent predictors, and not the neglect types (i.e. PN and EN). Third, we expected EA to be most predictive of PTSD severity, classification of CPTSD, and CPTSD severity in the model selection to select the most parsimonious model. All regression analyses were adjusted for sex and age. Finally, we explored whether sex was a moderator of the relationships between: CM and PTSD severity, CM and classification of CPTSD, and CM and CPTSD severity.

2. Method

2.1. Participants and procedure

This cross-sectional study used the baseline data from the TOPA study, a Dutch randomized controlled trial to test the effectiveness of three types and two timings of PTSD treatment in patients with both SUD and PTSD (Lortye et al., 2021). The 209 participants were recruited between September 2019 and May 2022 at addiction care facility Jellinek in Amsterdam and Utrecht, the Netherlands. The inclusion criteria were (a) aged ≥ 18 years; (b) SUD(s) according to the DSM-5 (American Psychiatric Association, 2013) criteria, with a primary diagnosis involving one of the following substances: alcohol, cannabis, cocaine (snorting), amphetamine, benzodiazepine, opioid; (c) PTSD according to the DSM-5 criteria; (d) sufficient understanding of the Dutch language. All patients attending an intake at Jellinek were screened for PTSD and, if screened positive, invited for PTSD assessment. All those with PTSD were informed about the study and invited for an interview in which eligibility criteria were checked by a researcher with a master's degree in psychology. For all patients who fulfilled the eligibility criteria and had provided written informed consent, a baseline assessment was planned. All data used in the current study was collected during this baseline assessment, which took place prior to randomization. Abstinence was not a requirement for the assessment, however, if participants were too intoxicated for the assessment to take place, appointments were rescheduled. However, in none of the cases this was necessary. For the full details on study procedures and the trial, see 'Nederlands Trial Register' (NTR L7885) and Lortye et al. (2021).

The sample size was calculated for the main research questions of the trial (Lortye et al., 2022). For the current study, our sample size of $N = 209$ gives 80% power to detect a small to medium effect size of $r = .19$ with two-sided testing at a significance level of .05.

2.2. Measures

2.2.1. Demographics

Sociodemographic characteristics were collected during the baseline assessment and are presented in Table 1. The main SUD diagnosis was retrieved from the electronic patient file.

Childhood maltreatment. The Dutch version of the Childhood Trauma Questionnaire short form (CTQ-sf) was used to measure CM. The CTQ-sf has five subscales, each assessing a different type of CM. Total sum scores as well as sum scores of the five CM types were used. Validity and reliability are well-established, however, the internal consistency of PN (.61 to .78) is only satisfactory (Bernstein et al, 2003; Thombs et al, 2009). In our study, the internal consistency of the CTQ-SF subscales was satisfactory to strong, with.86 for EA, .87 for PA, .91 for SA, .90 for EN, and .64 for PN.

PTSD. The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) was used to assess the severity of PTSD symptoms. The CAPS-5 a structured interview that follows the construction of the DSM-5. Each item is scored from 0 'absent' to 4 'extreme, incapacitating'. Therefore, the maximum severity score on the CAPS-5 is 120. The minimum score on the CAPS-5 for a diagnosis of PTSD is 26. Higher scores indicate higher severity of PSTD symptoms (Weathers et al., 2018). In our study, the internal consistency for the CAPS-5 total score was acceptable (.73).

CPTSD. The International Trauma Questionnaire (ITQ) was used to assess CPTSD symptoms. It is a self-reported questionnaire which consists of 2 parts. The first part assesses PTSD symptoms, whereas the second part asks about CPTSD symptoms. In this study, only part two of the ITQ is assessed, as the diagnosis of PTSD is already determined with the CAPS-5. Part two exists of two questions for all three clusters and three questions about limitations due to these complaints. All questions are measured with a 5-point Likert scale ranging from 0 'not at all' to 4 'extremely'. From all three clusters and the question about limitations, two questions must be positive to meet the criteria for CPTSD according to the ICD-11 (Cloitre et al., 2018). This Dutch version of the questionnaire is currently subject to psychometric evaluation and only a provisional diagnosis can be made, therefore we both looked at classification of CPTSD (yes/no) and at the sum score (CPTSD-severity) (Eidhof et al., 2018). Internal consistency for the ITQ part 2 was good (.82).

Table 1. Sociodemographic Sample Characteristics ($N = 209$).

	N	%
Mean Age (SE)	37.45 (11.99)	
Gender		
Male	112	53.6
Female	97	46.4
Country of birth		
Netherlands	171	81.8
Other European country	9	4.3
Non European country	29	13.9
Country of birth parents		
Both Netherlands	*116*	*55.5*
One Netherlands, one other country	*25*	*12*
Both other countries	*68*	*32.5*
Religion		
None	*124*	*59.3*
Atheist	*16*	*7.7*
Islam	*21*	*10.0*
Roman Catholic	*13*	*6.2*
Christian	*9*	*4.3*
Protestant	*6*	*2.9*
Hinduism	*3*	*1.4*
Buddhism	*3*	*1.4*
Jewish	*1*	*0.5*
Other	*13*	*6.2*
Living situation		
With partner, no children	*30*	*14.4*
With partner and children	*27*	*12.9*
With children, without partner	*17*	*8.1*
Alone	*84*	*40.2*
Community/ rommates	*20*	*9.6*
With parent(s)/caregiver(s)	*23*	*11*
Other	*8*	*4.2*
Education		
No degree, primary school, secondary school lower level	*53*	*25.3*
Secondary school, higher level	*87*	*41.6*
Postsecondary	*66*	*31.6*
Other	*3*	*1.4*
Source of income		
No paid work	*74*	*35.4*
Paid work	*107*	*51.2*
Student without work	*23*	*11*
Other	*5*	*2.4*
Main substance use disorder (SUD)		
Alcohol	*99*	*47.4*
Cannabis	*70*	*33.5*
Cocaine	*21*	*10*
Sedating substances	*7*	*3.3*
Other	*12*	*5.8*
Average amount of SUDs	*Mean = 1.62 (SD = 0.78)*	
Total	209	100

Notes: It is important to note that the official definitions in the Netherlands of ethnicity are based on the country where one was born, as well on the country/countries where one's parents were born. In the Netherlands 'race' is not used and would be considered as based on scientifically unfounded assumptions about genetic differences between humans.

2.3. Data analyses

The data was analysed using SPSS statistics 27.0 and R studio and R4.2.0 multi-model interference from the MuMin package (Barton, 2023). Pearson correlations were calculated to explore the associations between the five different types of CM. To examine the relationship between CM and PTSD, six univariate linear regression analyses were conducted in SPSS to examine the associations between the independent variables total CM and all five types of CM and the continuous dependent variable PTSD severity. A multiple linear regression analysis was conducted in SPSS to determine which CM types were uniquely associated with PTSD severity. Subsequently, we conducted a model selection procedure in R to select an optimal model for PTSD severity. We fitted the models with all possible combinations of CM predictors and ranked them based on the Bayesian Information Criterion (BIC). The model with the lowest BIC value was chosen as best fitting if its BIC was more than 2 points smaller than the second best fitting model. We chose the most parsimonious model if the BIC values were (nearly) equivalent (difference <2) (Neath & Cavanaugh, 2012). Furthermore, to examine the relationship between CM and CPTSD, we conducted similar logistic and linear regression analyses in SPSS with the dependent variables classification of CPTSD (yes/no) and CPTSD severity as dependent variables as well as a model selection procedure in R to select an optimal model for both classification of CPTSD and CPTSD severity. Finally, to explore whether sex is a moderator for the relation between CM and PTSD and/or CM and CPTSD, the interaction between sex and the predictors was included in regression analyses in SPSS. All assumptions for regression analysis were met (i.e. linearity, absence of multicollinearity, homoscedasticity). For all analyses we used an alpha level $p < .05$. Sex and age were included as covariates in all analyses, to adjust for confounding.

3. Results

3.1. Descriptive statistics

Including only moderate and severe scores (Gerhardt et al., 2022; Witt et al., 2017), the highest prevalence was found for EA (67.0%) followed by EN (58.8%),

Table 2. Pearson correlations between subscales of the CTQ ($N = 209$).

	Emotional abuse	Physical abuse	Sexual abuse	Emotional neglect	Physical neglect
Emotional abuse		.609**	.403**	.657**	.551**
Physical abuse			.409**	.470**	.498**
Sexual abuse				.268**	.310**
Emotional neglect					.627**

Note: **Correlation is significant at the 0.01 level (2 tailed).

and SA (53.6%). The lowest prevalence was found for PN (46.9%) and PA (45.0%). The mean PTSD severity score (i.e. mean CAPS-5 total score) was 37.35 (SE = 9.28), comparable to prior Dutch research (Boeschoten et al., 2018). The prevalence of CPTSD in the sample (ITQ-part 2) was found to be 64.6%. The mean CPTSD severity score (ITQ-part 2 total score) was 21.56 (SE = 6.83) for the total group and 25.14 (SE = 4.81) for the group that fulfilled the preliminary diagnosis of CPTSD. Correlations between all subscales are shown in Table 2.

3.2. The association between types of CM and PTSD severity

With six separate univariate linear regression analyses, we examined the association between both total CM as well as the five different types of CM and PTSD severity. We found all predictors to be significantly associated with PTSD severity, with the most explained variance for EA (see Table 3). Then, using a multiple linear regression analysis, we examined which types of CM independently predicted PTSD severity. We found only SA to be significantly associated with PTSD severity independently (see Table 4). In the model selection procedure in R, the two models that had the best fit included either EA and SA, or EN and SA. As the model with EA and SA had the smaller BIC, we selected this model (see Table 4).

3.3. The association between types of CM and classification of CPTSD and CPTSD severity

With six separate univariate logistic regression analyses, we examined the association between both total CM as well as the five different types of CM and classification of CPTSD. We found only total CM, EA, and PN to be significant predictors of classification of CPTSD (see Table 5). With six separate univariate linear regression analyses we examined the association between both total CM as well as the five different types of CM and CPTSD severity. Total CM and all five CM types were significant predictors of CPTSD severity (see Table 5). In the multiple logistic regression analysis for classification of CPTSD only EA and PA were significant predictors. In the multiple linear regression analysis for CPTSD severity EA, PA

Table 3. Results of the six separate univariate linear regression analyses for predicting total PTSD severity (CAPS-5 total score) as dependent variable and total CM and CM types (CTQ sum scores and CTQ subscale scores) as independent variables ($N = 209$).

Variable	B (SE)	*t*	*P*	Adjusted R^2	95% CI of B
Sum score CTQ	.17 (.03)	5.73	**<.001**	.15	[0.11, 0.23]
CTQ_EA	.53 (.11)	4.98	**<.001**	.12	[0.32, 0.75]
CTQ_PA	.39 (.12)	3.36	**.001**	.06	[0.16, 0.62]
CTQ_SA	.46 (.10)	4.55	**<.001**	.10	[0.26, 0.65]
CTQ_EN	.49 (.11)	4.37	**<.001**	.09	[0.27, 0.71]
CTQ_PN	.66 (.17)	3.84	**<.001**	.08	[0.32, 0.99]

Notes: CAPS-5: Clinician-Administered PTSD Scale for DSM-5; CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. Associations are adjusted for age and sex.

Table 4. Results of multiple linear regression analysis for predicting total PTSD severity (CAPS-5 total score) by CM types (CTQ subscale scores), and the best fitting models from the model selection procedure ($N = 209$).

Variable	*B (SE)*	*T*	*P*	95% CI of B
Full model				
CTQ-EA	0.28 (.16)	1.72	.087	[−0.41, 0.60]
CTQ-PA	−0.09 (.15)	−0.57	.572	[−0.38, 0.21]
CTQ-SA	0.32 (.11)	2.86	**.005**	[0.10, 0.53]
CTQ-EN	0.20 (.16)	1.24	.218	[−0.12, 0.51]
CTQ-PN	0.12 (.22)	0.52	.604	[−0.33, 0.56]
Age	−0.12 (.05)	−2.34	**.020**	[−0.22, −0.02]
Sex	−1.31 (1.28)	−1.03	.306	[−3.82, 1.20]
Post-hoc full model without PA	*B (SE)*	*T*	*P*	95% CI of B
CTQ-EA	0.25 (.15)	1.63	.105	[−0.05, 0.54]
CTQ-SA	0.30 (.11)	2.81	**.005**	[0.09, 0.51]
CTQ-EN	0.19 (.16)	1.22	.225	[−0.12, 0.51]
CTQ-PN	0.09 (.22)	0.43	.669	[−0.34, 0.53]
Age	−0.12 (.05)	−2.32	**.021**	[−0.22, −0.02]
Sex	−1.15 (1.24)	−0.93	.356	[−3.59, 1.30]
Top models and BIC	*BIC*			
CTQ-EA + CTQ-SA	1518.5			
CTQ-EN + CTQ-SA	1519.3			
CTQ-EA + CTQ-EN + CTQ-SA	1521.4			
CTQ-EA	1521.5			
CTQ-EA + CTQ-PN	1522.8			
CTQ-EA + CTQ-PA + CTQ-SA	1523.8			
CTQ-PN + CTQ-SA	1523.8			
Final model	*B (SE)*	*T*	*P*	95% CI of B
CTQ-SA	0.31 (.12)	2.89	**.004**	[−0.21, −0.01]
CTQ-EA	0.40 (.12)	3.50	**.001**	[−3.65, 1.22]
Age	−0.11 (.05)	−2.12	**.036**	[0.10, 0.52]
Sex	−1.22 (1.24)	−0.98	.327	[−3.65, 1.22]

Notes: CAPS-5: Clinician-Administered PTSD Scale for DSM-5; CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. Associations are adjusted for age and sex (coded 1 male, 2 female).

Table 5. Results of the six separate univariate logistic regression analyses for predicting classification of CPTSD and six separate univariate linear regression analysis for predicting CPTSD severity (ITQ score) as dependent variable and total CM and CM types (CTQ sum scores and CTQ subscale scores) as independent variables ($N = 209$).

	Classification of CPTSD				CPTSD severity				
Variable	Nagelkerke R square	B (S.E)	P	95% CI of B	B (S.E)	t	R^2	P	95% CI of B
Sum score CTQ	.07	0.02 (.01)	**.009**	[1.01, 1.04]	.14 (.02)	6.37	.18	**<.001**	[0.09, 0.18]
CTQ_EA	.11	0.10 (.03)	**<.001**	[1.05, 1.17]	.53 (.08)	7.08	.21	**<.001**	[0.38, 0.68]
CTQ_PA	.02	0.01 (.03)	.688	[0.96, 1.07]	.22 (.09)	2.48	.05	**.014**	[0.04, 0.39]
CTQ_SA	.04	0.04 (.03)	.099	[0.99, 1.10]	.29 (.08)	3.83	.09	**<.001**	[0.14, 0.43]
CTQ_EN	.05	0.05 (.03)	.051	[1.00, 1.11]	.47 (.08)	5.84	.16	**<.001**	[0.31, 0.62]
CTQ_PN	.07	0.12 (.05)	**.007**	[1.03, 1.32]	.57 (.12)	4.57	.11	**<.001**	[0.32, 0.81]

Notes: ITQ: International Trauma Questionnaire; CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. *P*-values indicating significance at the .05 level are shown in bold. Associations are adjusted for age and sex.

and SA were significant predictors. However, since in both multiple regression analyses, PA was significantly negatively associated (see Tables 6 and 7), which seems an artefact of the inclusion of multiple predictors, we also repeated these analyses without PA in SPSS. In these post-hoc analyses, for both classification of CPTSD as well as for CPTSD severity, only EA was a significant predictor (see Tables 6 and 7). For classification of CPTSD, the two models with the best fit in R had a small difference in BIC values (EA and PA vs EA) and the coefficient of PA was also negative in this model. Therefore, the most parsimonious optimal model included only EA (see Table 6). For CPTSD severity, six models with a small difference in BIC values had the best fit in R. Here also the most parsimonious optimal model included only EA (see Table 7).

Table 6. Results of the multiple logistic regression analyses for predicting classification of CPTSD (ITQ-part 2) by CM types (CTQ subscale scores), and the best fitting models from the model selection procedure ($N = 209$)

Variable	*B (SE)*	Wald Z	*p*	95% CI of B
Full model				
CTQ-EA	0.16 (.05)	3.40	**.001**	[1.07, 1.29]
CTQ-PA	−0.12 (.04)	−2.88	**.004**	[0.82, 0.96]
CTQ-SA	0.02 (.03)	0.79	.428	[0.97, 1.09]
CTQ-EN	−0.05 (.04)	−1.15	.251	[0.88, 1.04]
CTQ-PN	0.12 (.06)	1.85	.065	[0.99, 1.27]
Age	−0.02 (.01)	−1.76	.078	[0.95, 1.00]
Sex	−0.45 (.33)	−1.35	.176	[0.33, 1.22]
Post-hoc full model without PA	*B (SE)*	Wald Z	*p*	95% CI of B
CTQ-EA	0.10 (.04)	6.61	**.010**	[1.02, 1.20]
CTQ-SA	0.00 (.03)	0.01	.929	[0.95, 1.06]
CTQ-EN	−0.04 (.04)	1.19	.276	[0.88, 1.04]
CTQ-PN	0.08 (.06)	1.64	.200	[0.96, 1.21]
Age	−0.02 (.01)	2.48	.115	[0.96, 1.01]
Sex	−0.23 (.32)	0.51	.474	[0.43, 1.48]
Top models and BIC	*BIC*			
CTQ-EA + CTQ-PA	275.4			
CTQ-EA	276.4			
CTQ-EA + CTQ-PA + CTQ-PN	278.3			
CTQ-EA + CTQ-PA + CTQ-SA	279.9			
CTQ-EA + CTQ-EN + CTQ-PA	280.6			
CTQ-EA + CTQ-PN	280.9			
Final model	*B (SE)*	Wald Z	*p*	95% CI of B
CTQ-EA	0.10 (.03)	3.53	**<.001**	[0.05, 0.16]
Age	−0.02 (.01)	−1.50	.135	[−0.05, 0.01]
Sex	−0.27 (.31)	−0.86	.391	[−0.88, 0.34]

Notes: ITQ: International Trauma Questionnaire; CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. *P*-values indicating significance at the .05 level are shown in bold. Associations are adjusted for age and sex (coded 1 male, 2 female).

3.4. Association between sex and PTSD severity, classification of CPTSD and CPTSD severity

All analyses described in the previous section were adjusted for confounding by sex and age. The relationships between sex and PTSD severity, CPTSD classification, and CPTSD severity were non-significant in the different models (see Tables 4, 6, and 7). Sex was not a significant moderator of the relationship between CM and PTSD severity (Table 8), nor of the relationships between CM and CPTSD classification and CM and CPTSD severity (Table 9).

3.5. Association between age and PTSD severity, classification of CPTSD and CPTSD severity

Age was generally significantly associated with PTSD severity in the different models, with lower age having more PTSD severity (see Table 4). Age was generally non-significantly related to CPTSD classification and severity, across the different analyses, except for a significant relationship in the multiple regression analysis for CPTSD severity in which PA was included (see Tables 6 and 7).

4. Discussion

This study aimed to examine the relationships between CM and PTSD in a group of patients with co-occurring SUD and PTSD. Furthermore, we examined the relationships between CM and classification of CPTSD (yes/no) and CPTSD DSO symptom

Table 7. Results of the multiple linear regression analyses for predicting CPTSD severity (ITQ-part 2 sum score) by CM types (CTQ subscale scores), and the best fitting models from the model selection procedure ($N = 209$).

Variable	*B (SE)*	*T*	*p*	95% CI of B
Full model				
CTQ-EA	0.49 (.11)	4.31	**<.001**	[0.26, 0.71]
CTQ-PA	−0.31 (.10)	−2.99	**.003**	[−0.52, −0.11]
CTQ-SA	0.16 (.08)	2.12	**.036**	[0.01, 0.31]
CTQ-EN	0.19 (.11)	1.73	.085	[−0.03, 0.41]
CTQ-PN	0.10 (.16)	0.65	.514	[−0.21, 0.41]
Age	−0.08 (.04)	−2.11	**.036**	[−0.15, −0.01]
Sex	−1.23 (.88)	−1.39	.165	[−2.98, 0.51]
Post-hoc full model without PA	*B (SE)*	*T*	*p*	95% CI of B
CTQ-EA	0.36 (.11)	3.39	**.001**	[0.15, 0.57]
CTQ-SA	0.11 (.08)	1.40	.162	[−0.04, 0.26]
CTQ-EN	0.18 (.11)	1.59	.113	[−0.04, 0.40]
CTQ-PN	0.02 (.16)	0.13	.898	[−0.29, 0.33]
Age	−0.07 (.04)	−1.95	.053	[−0.14, 0.00]
Sex	−0.64 (.88)	−0.73	.465	[−2.38, 1.09]
Top models and BIC	*BIC*			
CTQ-EA	1372.0			
CTQ-EA + CTQ-PA	1372.5			
CTQ-EA + CTQ-PA + CTQ-SA	1373.4			
CTQ-EA + CTQ-EN + CTQ-PA	1373.4			
CTQ-EA + CTQ-EN + CTQ-PA + CTQ-SA	1373.9			
Final model	*B (SE)*	*T*	*p*	95% CI of B
CTQ-EA	0.52 (.08)	7.08	**<.001**	[0.38, 0.68]
Age	−0.06 (.04)	−1.61	.108	[−0.13, 0.01]
Sex	−0.46 (.86)	−0.54	.593	[−2.18, 1.25]

Notes: ITQ: International Trauma Questionnaire; CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. Associations are adjusted for age and sex (coded 1 male, 2 female).

Table 8. Results of five separate regression analyses to examine whether sex is a moderator for the relationship between the five types of CM and PTSD severity ($N = 209$).

Variable	B (SE)	*p*	R^2	Adjusted R^2
CTQ-EA * sex	−0.23 (.22)	.298	.13	.12
CTQ-PA * sex	0.10 (.24)	.681	.07	.06
CTQ-SA * sex	0.27 (.20)	.177	.12	.10
CTQ-EN * sex	−0.23 (.23)	.308	.11	.09
CTQ-PN * sex	0.28 (.35)	.419	.09	.07

Notes: CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect. *P*-values indicating significance at the .05 level are shown in bold. Sex is coded 1 (male), 2 (female). Only the statistical parameters of the interaction terms are shown in the Table. All five regression models also included the main effect of the particular CM type, sex and age.

Table 9. Results of five separate regression analyses to examine whether sex is a moderator for the relationship between the five types of CM and classification of CPTSD (ITQ-part 2) and CPTSD severity (ITQ sum score) ($N = 209$).

	B (SE)	*P*		Nagelkerke R^2
Classification of CPTSD				
CTQ-EA * sex	−0.11 (.06)	.057		.13
CTQ-PA * sex	−0.07 (.06)	.236		.03
CTQ-SA * sex	−0.08 (.05)	.138		.05
CTQ-EN * sex	−0.07 (.06)	.225		.06
CTQ-PN * sex	0.05 (.09)	.554		.07
	B (SE)	*p*	R^2	Adjusted R^2
CPTSD severity				
CTQ-EA * sex	−0.17 (.15)	.263	.22	.20
CTQ-PA * sex	−0.01 (.18)	.956	.05	.03
CTQ-SA * sex	0.02 (.15)	.912	.09	.07
CTQ-EN * sex	−0.10 (.16)	.526	.16	.15
CTQ-PN * sex	0.25 (.25)	.330	.12	.10

Notes: CTQ: Childhood Trauma Questionnaire; CTQ_EA: CTQ subscale emotional abuse; CTQ_PA: CTQ subscale physical abuse; CTQ_SA: CTQ subscale sexual abuse; CTQ_EN: CTQ subscale emotional neglect; CTQ_PN: CTQ subscale physical neglect, ITQ: International Trauma Questionnaire. Sex is coded 1 (male), 2 (female). Only the statistical parameters of the interaction terms are shown in the Table. All five regression models also included the main effect of the particular CM type, sex and age.

severity. Finally, we explored the influence of sex in these relationships.

As hypothesized, CM in general, and particularly SA and EA, appeared to have predictive value for PTSD severity. Contrary to our hypothesis, PA appeared to be negatively correlated with PTSD severity in the multiple regression analysis, and in the univariate regression analysis PA had the least significant predictive value of all five types of CM (though positive, as hypothesized), which makes PA possibly a suppressor that at least partially overlaps with EA. This makes it difficult to interpret the results of PA. In the model selection procedure, both EA and SA were included in the optimal model. This is not consistent to our hypothesis that EA would be the most important predictor of PTSD. The fact that not only exposure to EA but also SA is an important predictor of PTSD aligns with recent literature in which SA was found to have an independent association with several psychiatric complaints, even when controlled for genetic and environmental factors (Björk Daníelsdóttir et al., 2024). Our findings regarding EA align with existing literature in PTSD patients without SUD, highlighting the strong role of EA for PTSD severity in comparison to other CM types (Hoeboer et al., 2021; Nöthling et al., 2019; Rameckers et al., 2021). The question therefore emerges how EA correlates to PTSD severity. According to Hoeboer et al. (2021), EA might exert both a direct and indirect effect on PTSD, since independent of the index trauma, EA appeared to be associated with PTSD severity (Hoeboer et al., 2021). However, since EA can officially not lead to a diagnosis of PTSD according to the DSM-5, the majority of existing literature concentrates on the indirect effect of EA on the development of PTSD. Several factors are offered as explanation of this relationship, such as lack of social support (Brewin et al., 2000; Hoeboer et al., 2021; Trickey et al., 2012), emotional dysregulation (Burns et al., 2010; Gruhn & Compas, 2020; Hoeboer et al., 2021), shame (B. Andrews et al., 2000) and dissociation symptoms (Vang et al., 2018). It is beyond the scope of the current study to examine what explains that EA correlates to higher PTSD severity in the population of patients with comorbid SUD and PTSD. More research is needed to determine whether patients who experienced EA but do not fulfil criterion-A trauma meet other PTSD criteria. This could clarify whether EA can be seen more as a precipitating factor for PTSD development or as an independent contributor. Such information could inform discussions on whether there should be a broader definition of the criterion A trauma in future versions of the DSM, or less rigid adherence to the criterion A (Hyland et al., 2021). Nonetheless, even if EA does not directly exacerbate PTSD severity, it is imperative to recognize its potential influence on PTSD severity. Including treatment of EA memories in trauma-focused PTSD treatment could possibly improve treatment outcomes. Although further research is needed to examine whether EA experiences can be effectively treated within PTSD treatment, first findings on this topic with EMDR and Imagery Rescripting are promising (Boterhoven de Haan et al., 2020; Hafkemeijer et al., 2021). Moreover, since Child Protective Services mostly focus on PA and SA and detection and prevention of EA is undervalued, the present results might help increasing attention for prevention and early intervention initiative of Child Protective Services (Christ et al., 2019; Kim et al., 2017). This is particularly crucial given that prevalence of EA is the highest among all forms of CM, not only in our study but also in previous research (Stoltenborgh, Bakermans-Kranenburg, et al., 2013; Stoltenborgh et al., 2015). Although the present results apply to a treatment-seeking co-morbid PTSD-SUD sample and cannot automatically be translated to other populations, the importance of EA has not only been observed in studies on CM and PTSD, but also in research investigating the relationship between CM and depression (Mandelli et al., 2015). However, the relationships between different aspects of CM and indices of psychopathology should also be investigated in nonclinical populations to assess whether or not the effects of EA are limited to clinical populations, or hold in general.

Subsequently, with regard to CPTSD, as hypothesized total CM and all types of CM were predicting CPTSD severity, however contrary to our hypothesis only total CM, EA and PN were predictive for CPTSD classification. As in these analyses PA also switched from a positive predictor in the univariate analyses to a significant negative predictor in the multiple regression analyses, we post-hoc also repeated these analyses without PA. In these post-hoc multiple regression analysis, only EA was a predictive factor. Additionally, the best fitting model for both classification of CPTSD and CPTSD severity only included EA. Since SA was a significant predictor in the multiple regression analysis for CPTSD severity with PA, but disappeared in the analysis without PA, this result should be interpreted with caution. However, in the analyses for CPTSD classification, contrary to our hypothesis, SA was not a unique predictive factor. An explanation for these findings could be that the CTQ-sf does not make a difference between SA by a caregiver and SA by a non-caregiver, whereas only SA by a caregiver was related to CPTSD in a previous study (Cloitre et al., 2019). These findings for the relationship between CM and CPTSD resemble the previous results from the relationship between CM and PTSD severity in which EA also was an important predictive type of CM. However, since analyses for CPTSD are based on self-report questionnaires, these results cannot directly be compared to results with regard to PTSD.

Finally, sex was not a significant moderator for the relationship between both CM and PTSD severity as well as CM and CPTSD. This is also in line with the review of Tolin & Foa in which there were no sex differences in PTSD with regard to SA (Tolin & Foa, 2006). The different results for age regarding PTSD and CPTSD correspond with previous literature on this subject, in which an evident pattern emerged indicating lower rates of PTSD within the older age groups. Also in line with this literature, for CPTSD different patterns are seen across different samples with in some subgroups higher age indicates higher levels of CPTSD (McGinty et al., 2021).

4.1. Strengths and limitations

This study has several strengths. It is the first study to examine the influence of CM on both PTSD and CPTSD in patients with a dual diagnosis of SUD and PTSD. Furthermore, the large sample size allowed for examining the independent predictive value of all five different types of CM in one model.

This study also has some limitations. First, the instruments used to assess CM are retrospective self-report instruments which might cause a recall bias. In general, the agreement between prospective and retrospective assessments of CM is very limited, and they cannot be used interchangeably (Baldwin et al., 2019; Colman et al., 2016). One study found that in people with SUD, the agreement between prospectively assessed CM with the CTQ and abuse prospectively documented in medical records was poorer than in participants without SUD (Löfberg et al., 2023). Although prospective measures are less hampered by recall bias, a limitation of prospective measures is that they only include cases of maltreatment in official records, which may lead to incorrectly classifying cases that were not under the attention of child protection services as absent. This may particularly problematic for some CM subtypes (e.g. emotional neglect). Furthermore, we found a substantially lower internal consistency of the PN subscale of the CTQ, which is a well-known psychometric limitation of this questionnaire (Gil et al., 2009; Humphreys et al., 2020; Paivio & Cramer, 2004). However, the CTQ is well-validated and widely used, therefore the results of this study can more easily be compared to other studies. Second, more detailed information about the maltreatment is absent in this study. For example, information about the relationship to the perpetrator. Third, we did not examine subgroups of SUD. For example, cannabis use disorder appeared to have the highest prevalence and severity of CM compared to other forms of SUD (Gerhardt et al., 2022). However, since in our sample a large proportion of patients (44.0%) suffered from multiple SUDs, including many different combinations of SUDs, our sample was too small to analyse effects in subgroups with specific SUDs. Fourth, patients in this study were not abstinent of substances at the time of the data collection. Their substance use might influence how they reported their symptom severity as well as their memory of CM. However, the latter can also be seen as a strength of the study, since this mirrors daily clinical practice. Furthermore, the participants were not under the influence during the measurement. Fifth, the analyses included only patients, precluding the examination of CM's influence on subclinical PTSD and characteristics of non-help-seeking individuals with PTSD and SUD. Finally, we cannot draw causal conclusions on the associations between CM and both PTSD and CPTSD presented in this study. Therefore, the results should be interpreted with caution. Finally, we interpreted sex as it was described in the participants' passport. Although none of the participants wanted to be referred to another gender, we did not explicitly asked about gender preference or sex at birth.

5. Conclusion

From all CM subtypes, we found SA and EA to be most important for PTSD severity and EA to contribute the most to CPTSD and its severity in patients with PTSD and SUD. Given that SA meets the A-criterion as per the DSM-5, whereas EA does not, it is essential to prioritize attention, particularly towards EA. Clinicians should therefore ask their patients about EA and integrate this in their treatment of PTSD and CPTSD. Further research is needed to examine whether EA is a standalone factor in the development of PTSD and CPTSD or if it modulates the impact of other traumatic events.

Disclosure statement

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Ethical standards statement

Ethics approval and consent to participate in the TOPA study was given by the Medical Ethical Committee of the Amsterdam Academic Medical Centre.

Patient consent statement

Written informed consent from the participants is obtained during the screening process prior to the first assessment.

Clinical trial registration

This study uses baseline data of a trial registered at the 'Nederlands Trial Register' (NTR L7885).

ORCID

Sera A. Lortye http://orcid.org/0000-0003-0155-0496
Sophie A. Rameckers http://orcid.org/0000-0002-4921-7767
Loes A. Marquenie http://orcid.org/0000-0001-5091-9849
Anna E. Goudriaan http://orcid.org/0000-0001-8670-9384
Arnoud Arntz http://orcid.org/0000-0002-7992-2272
Marleen M. de Waal http://orcid.org/0000-0002-3252-6459

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