Regular Article

Childhood maltreatment and internalizing/externalizing disorders in trauma-exposed adolescents: Does posttraumatic stress disorder (PTSD) severity have a mediating role?

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Abstract

Childhood maltreatment is associated with wide-ranging psychopathology at all stages of life. In the current study, we investigated whether posttraumatic stress disorder (PTSD) severity mediated the association between childhood maltreatment and internalizing and externalizing disorders among 262 South African trauma-exposed adolescents (aged 12–18 years). Childhood maltreatment and PTSD symptom severity were assessed using the Childhood Trauma Questionnaire and the Child PTSD Checklist, respectively. Psychiatric disorders were assessed utilizing the Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime version and were grouped into internalizing or externalizing disorders. Hierarchal logistic regression was used to assess the association of childhood maltreatment subtype with internalizing and externalizing disorders, controlling for age and gender, with PTSD symptom severity added to the final model. We found that sexual abuse was significantly associated with internalizing disorders, although this effect was no longer significant when PTSD was added to the model demonstrating that PTSD mediated the association between sexual abuse and internalizing disorders. Physical abuse, but not PTSD, was associated with externalizing disorders. Physical abuse, emotional neglect, and PTSD were associated with comorbid internalizing and externalizing disorders. These findings have implications for intervention and prevention strategies targeted at trauma-exposed adolescents with a history of childhood maltreatment.

Keywords: childhood maltreatment; child abuse; externalizing disorders; internalizing disorders; posttraumatic stress disorder

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Introduction

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5) describes trauma as exposure to actual or threatened death, serious physical injury, or sexual violence (American Psychiatric Association, 2013). Studies have shown that South African adolescents in low-income settings are commonly exposed to direct and/or indirect forms of trauma across various contexts including the home, school, and community (Kaminer et al., 2013; Sui et al., 2021). Adolescents living in contexts with high levels of violence and exposed to various traumatic events, referred to as trauma-exposed adolescents for the purpose of the current study, may also be exposed to adverse experiences during childhood, including maltreatment (Cecil et al., 2014). Childhood maltreatment refers to both abuse and neglect and is defined as any overt actions, words, or acts of omission, by a parent or caregiver, that causes harm or is potentially harmful to a child (Leeb, 2008). Africa, compared to other continents, has the highest prevalence rates of childhood physical abuse (reported among 51% of girls and 60% of boys), and one of the highest rates of childhood neglect (among 42% of girls and 39% of boys; Moody et al., 2018). Additionally, South African adolescents with multiple exposure to trauma (particularly child abuse and neglect and other stressful life events during adolescence) were found to have a greater severity of PTSD (Schwartz et al., 2021; Suliman et al., 2009).

A recent review of quasi-experimental studies found a small causal relationship between childhood maltreatment and internalizing and externalizing disorders (Baldwin et al., 2023). Internalizing disorders, characterized by high levels of negative affectivity, include depressive disorders, anxiety disorders, obsessive-compulsive and related disorders, trauma and stressor-related disorders, and dissociative disorders (Frye et al., 2018; Regier et al., 2013). Externalizing disorders, typified by antisocial behaviors, include substance-related and addictive disorders as well as disruptive, impulse control, and conduct disorders (Krueger, 1999; Regier et al., 2013). Exposure to childhood traumas has been shown to increase the risk for many internalizing and externalizing behavior problems in adolescence (Brown et al., 2021; McLaughlin et al., 2012; Wei & Lü, 2023). A study by Carliner et al. (2017) found that adolescents with prior childhood trauma have a greater likelihood of developing externalizing disorders such as substance use disorder and conduct disorder. Another study (Negriff, 2020) reported that child maltreatment, particularly emotional abuse and neglect, was associated with depressive, anxiety, and PTSD

symptoms, as well as externalizing behaviors in adolescence. Although PTSD has generally been conceptualized as an internalizing disorder, it also has components of externalizing dimensions (e.g., anger, aggression, and risk-taking behavior). Studies have found that some patients with PTSD may have a more externalizing phenotype and that PTSD covaries with both internalizing and externalizing dimensions (Forbes et al., 2010; Panuccio et al., 2022; Wolf et al., 2010).

PTSD can play a facilitating role in the development of internalizing and externalizing disorders following childhood maltreatment. According to the developmental traumatology model, PTSD symptom severity may be a potential modifier as PTSD symptoms typically occur in response to traumatic stressors (De Bellis, 2001). The developmental traumatology model posits that the presence of PTSD symptoms following childhood trauma could increase the risk of developing severe PTSD and other psychopathology (i.e., internalizing and externalizing disorders; De Bellis, 2001). According to the model, childhood maltreatment and accompanying PTSD symptoms can diminish a child's ability to self-regulate emotions and behaviors, resulting in behavioral problems such as depression, conduct disorder, and substance abuse (De Bellis, 2001). PTSD as a mediator of the relationship between childhood maltreatment and internalizing and externalizing disorders has been assessed in previous international studies. For example, in a Canadian study with children under the age of 6, higher PTSD symptom scores mediated the association between childhood maltreatment and higher internalizing and externalizing behavioral problem scores (Milot et al., 2010). Another study examined this relationship in adolescents and found that posttraumatic stress symptoms (PTS) mediated the relationship between childhood maltreatment and internalizing, but not externalizing, behavior problems (Yoon et al., 2016). Conversely, according to a previous review, not all forms of childhood maltreatment result in PTSD, but the likelihood of developing various other internalizing and externalizing disorders is high (Dvir et al., 2014). It is likely that there are multifactorial mechanisms through which PTSD may influence the association between childhood maltreatment and the development of other psychopathology (Bryant, 2022).

Furthermore, research has largely examined the relationship between childhood maltreatment and internalizing and externalizing disorders separately (Achenbach et al., 2016; Magalhães & Camilo, 2023). However, evidence suggests that adolescents exposed to childhood maltreatment may be at risk of comorbid psychopathology (Chung & Chen, 2017; Duprey et al., 2020; Macdonald et al., 2010). For example, a previous longitudinal study found that adolescents with greater severity of childhood sexual and physical abuse were more likely to have higher levels of comorbid internalizing and externalizing disorders, and that comorbidity mediated the association between sexual abuse and suicidal ideation and behaviors (Duprey et al., 2020).

The association between childhood maltreatment and internalizing and externalizing behavior problems is found to be moderated by gender. For example, a study assessing the impact of child sexual abuse on internalizing and externalizing problems from age 4 to 16 years found that externalizing problems were greater in boys compared to girls, while internalizing problems increased with age in girls but not boys (Lewis et al., 2016). Other studies have yielded contrasting findings: in one study, adolescent girls exposed to emotional maltreatment had greater levels of internalizing symptoms compared to boys, but no gender differences were found for externalizing symptoms (Hagborg

et al., 2017). Another study (Van der Put et al., 2015) found no significant gender differences in the association between child maltreatment and internalizing or externalizing problems. But rather, different types of maltreatment predicted internalizing and externalizing problems in both boys and girls.

Research has primarily been conducted in high-income countries with few studies assessing these associations in low- and middle-income countries (LMICs) where the prevalence of childhood maltreatment and other trauma exposure is particularly high (Bauta & Huang, 2022; Curran et al., 2016; Keyes et al., 2012; Moylan et al., 2011). As childhood maltreatment has been shown to lead to an array of developmental and behavioral problems throughout the life cycle (Al Odhayani et al., 2013; Panuccio et al., 2022; Russotti et al., 2021), improving our understanding of the association of childhood maltreatment with internalizing/externalizing disorders in adolescents in LMICs can inform the development of targeted treatment and prevention strategies. Therefore, the aims of the current study were to assess the association of childhood maltreatment subtypes with internalizing disorders, externalizing disorders, and comorbid internalizing and externalizing disorders in trauma-exposed adolescents, and to assess whether PTSD symptom severity is a possible mediator of these associations.

Methods

Study design

This study involved secondary data analysis of data obtained in an ongoing study of traumatized, treatment-seeking adolescents in the Cape Town metropolitan area in South Africa. We conducted a cross-sectional analysis of the association of childhood maltreatment subtype with internalizing and externalizing disorders in 262 trauma-exposed adolescents using data collected between 1998 and July 2016.

Participants

The study population consisted of adolescents who had experienced at least one PTSD-qualifying traumatic event, as defined by DSM-IV criteria (American Psychiatric Association, 1994). Participants were recruited and assessed from 1998 up until July 2016. Criteria for inclusion were age 12–18 years, ability to obtain informed assent from participants and informed consent from a parent or legal guardian, at least 6 years of formal education, and proficiency in Afrikaans or English. Exclusion criteria were known intellectual disability; current use of sedative psychotropic medication, traumatic brain injury with loss of consciousness or any serious medical illness that precluded participation in the study.

Study procedures

Ethical approval was granted by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences at Stellenbosch University. Permission to conduct the study was also obtained from the Western Cape Department of Education. Participants were recruited through schools, clinics, and non-governmental organizations, mostly in low-income areas and informal settings surrounding the Bathuthuzele Youth Stress Clinic at the Department of Psychiatry, University of Stellenbosch, Cape Town, South Africa. Referring agents completed a referral form indicating current symptomatology in adolescents being referred (i.e., emotional and/or behavioral problems following

trauma exposure), nature of trauma exposure, duration of the symptoms, and contact details. Referred participants were telephonically screened for eligibility based on inclusion and exclusion criteria. Participants who were excluded were referred for further care, as appropriate. Eligible participants were invited to attend the clinic. Prior to enrollment, written informed consent was obtained from parents or guardians and assent was obtained from participants. At the clinic, questionnaires were administered to obtain socio-demographic and childhood maltreatment information. A semi-structured diagnostic interview was then administered by a clinical psychologist to assess for internalizing and/or externalizing disorders. Several clinical psychologists conducted the diagnostic interviews over the study period, due to the long study duration. As they did not conduct interviews concurrently, inter-rater reliability could not be established. Participants who required further management were appropriately referred. All assessments were free of charge and participants were reimbursed for their travel expenses to and from the clinic.

Measures

Clinical diagnoses were evaluated using the Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime version (K-SADS-PL) (Kaufman et al., 1997). The K-SAD-PL is a semi-structured interview used to determine current and lifetime history of psychiatric disorders, subthreshold disorders, as well as symptom severity in children and adolescents (Kaufman et al., 1997). The K-SADS-PL is based on DSM-IV diagnostic criteria. The K-SADS-PL can be used to diagnose several psychiatric disorders (e.g., PTSD, mood disorders, anxiety disorders, psychotic disorders, eating disorders, behavioral disorders, substance abuse, stress disorders, adjustment disorders, etc.). Trauma exposure was assessed on the PTSD module of the K-SADS.

The K-SADS-PL has shown outstanding reliability and validity (Kaufman et al., 1997). Both clinical and subthreshold diagnoses on the K-SADS-PL were used to determine individual disorder status. The sample was grouped in two ways; firstly, any participants with an internalizing disorder were grouped into internalizing disorders and compared to the remainder of the sample, secondly, any participants with an externalizing disorder were grouped into externalizing disorders and compared to the remainder of the sample (Figure 1). PTSD was not included among the internalizing disorders group as PTSD symptom severity was included as an independent variable in the models.

The Childhood Trauma Questionnaire-Short Form (CTQ-SF) was used to assess exposure to five different types of childhood maltreatment. The CTQ-SF is a validated 28-item, retrospective, self-report questionnaire (Bernstein & Fink, 1998) comprising twenty-five core items and three validity items. The CTQ-SF elicits experiences of abuse and neglect before the age of 18 on a 5-point Likert scale, ranging from "never true" to "very often true." Apart from an overall severity score, ranging from 25 to 125, the CTQ-SF also distinguishes between five subtypes of childhood maltreatment (sexual abuse, physical abuse, emotional abuse, physical neglect, and emotional neglect), with severity scores ranging from 5 to 25 for each subscale. We utilized subscale severity scores in our analyses. The subscales have shown acceptable to good internal consistency in previous South African studies (Hogarth et al., 2019; Spies et al., 2019). Cronbach's alpha values in the current sample were acceptable to excellent, ranging from .77 (emotional abuse) to .90 (sexual abuse), except for physical neglect which showed poor internal consistency ($a = .52$).

The Child PTSD Checklist (CPC) was used to assess PTSD symptomatology (Amaya-Jackson et al., 1995). The CPC is a 28-item self-report questionnaire that measures the current or past-month severity of PTSD and is keyed to the 17 symptom criteria of PTSD according to the DSM-IV. All 28 items are rated on a 4-point Likert scale, with possible answers ranging from "not at all" to "all the time". The CPC has shown acceptable reliability in South African adolescent populations (Estehuyse et al., 2007; Frank-Schultz et al., 2012). The Cronbach's alpha coefficient in the current sample was .94, indicating excellent internal consistency. The kappa statistic for agreement of a PTSD diagnosis on the K-SADS-PL and the CPC was low to moderate ($\kappa = 0.316$, $p < 0.001$).

Data analyses

Medians and percentages were derived for demographic characteristics and for outcome, predictor, control, and moderator variables. Association statistics (i.e., chi-square tests for categorical variables and Mann-Whitney U tests for continuous variables) were used to compare the groups with and without internalizing and externalizing disorders on demographic and clinical parameters. We built hierarchical logistic regression models with internalizing and externalizing disorders, respectively, as the dependent variables and included age, gender, and the five CTQ-SF subscale severity scores in the model. PTSD symptom severity was entered in the second step to assess whether PTSD severity significantly influenced the model. If PTSD severity significantly influenced the model we performed further mediation analysis utilizing Model 4 of the PROCESS macro for SPSS (Hayes, 2022). To account for comorbidity of internalizing and externalizing disorders we also conducted multinomial regression analysis with internalizing disorders only, externalizing disorders only, and having no disorders, compared to having comorbid internalizing and externalizing disorders. We conducted post-hoc sensitivity analyses where we also controlled for the number of types of traumas exposed to on the K-SADS-PL (excluding sexual and physical abuse) and where we repeated analyses with the CTQ total score instead of the subscale scores. An alpha value of $p < .05$ was used for all analyses.

Results

Demographic characteristics

Table 1 shows the demographic characteristics of the sample. The sample consisted of more females (62.6%) than males (37.4%) and the majority were of colored (South African mixed ancestry) ethnicity (82.5%). Participants had a median age of 15 years (ranging from 12 to 18).

Approximately half the sample (52.7%) was diagnosed with an internalizing disorder, 21.4% were diagnosed with an externalizing disorder and 13.4% of participants were diagnosed with both internalizing and externalizing disorders. The percentage of participants without internalizing or externalizing disorders was 39.3%. Internalizing and externalizing disorders were not significantly associated with each other ($\chi^2 = 2.76$, $p = .097$). Figure 1 shows the prevalence of internalizing and externalizing disorders.

Childhood maltreatment and trauma in our sample

Table 2 shows Spearman correlations of the childhood maltreatment variables. All maltreatment variables were significantly

Table 1. Demographic description of the sample and group comparisons

	All participants (N = 262)		Int. disorder (n = 138)		No int. disorder (n = 124)		Group comparisons			Ext. disorder (n = 56)		No ext. disorder (n = 206)		Group comparisons		
	n	(%)	n	(%)	n	(%)	χ^2	df	p	n	(%)	n	(%)	χ^2	df	p
Gender	262		138		124		8.8	1	0.003*	56		206		3.6	1	0.059
Male	98	(37.4)	40	(29.0)	58	(46.8)				27	(48.2)	71	(34.5)			
Female	164	(62.6)	98	(71.0)	66	(53.2)				29	(51.8)	135	(65.5)			
Ethnicity[a]	257		135		122		1.2	2	0.553	55		202		4.2	2	0.121
Colored (mixed)[b]	212	(82.5)	114	(84.4)	98	(80.3)				48	(87.3)	164	(81.4)			
African	28	(10.9)	12	(8.9)	16	(13.1)				2	(3.6)	26	(12.9)			
White	17	(6.6)	9	(6.7)	8	(6.6)				5	(9.1)	12	(5.9)			
Caretaker	262		138		124		1.2	3	0.761	56		206		1.8	3	0.622
Both parents	59	(22.5)	30	(21.7)	29	(23.4)				15	(26.8)	44	(21.4)			
Single parent	148	(56.5)	82	(59.4)	66	(53.2)				28	(50.0)	120	(58.3)			
Other family	34	(13.0)	16	(11.6)	18	(14.5)				7	(12.5)	27	(13.1)			
Not family	21	(8.0)	10	(7.2)	11	(8.9)				6	(10.7)	15	(7.3)			
Orphan[a,c]	261		137		124		0.2	1	0.653	56		205		0.9	1	0.339
No	199	(76.2)	106	(77.4)	93	(75.0)				40	(71.4)	159	(77.6)			
Yes	62	(23.8)	31	(22.6)	31	(25.0)				16	(28.6)	46	(22.4)			
	Mdn	(IQR)	Mdn	(IQR)	Mdn	(IQR)	U	Z	p	Mdn	(IQR)	Mdn	(IQR)	U	Z	p
Age	15	(14; 17)	15	(14; 17)	15	(13; 16)	7082	−2.41	0.016*	15	(14; 16)	15	(14; 17)	5197	−1.14	0.256
Current grade	9	(7; 10)	9	(8; 10)	8	(7; 9)	6377	−2.78	0.005*	8	(7; 9)	9	(8; 10)	4421	−1.88	0.059
Abuse & neglect[d]																
Physical abuse	7	(5; 11)	7	(5; 12)	6	(5; 9)	7459	−1.87	0.062	8	(5; 13)	6	(5; 9)	4802	−2.00	0.045*
Emotional abuse	11	(7; 15)	12	(9; 16)	9	(5; 13)	6222	−3.83	<0.001***	12	(8; 16)	11	(7; 15)	5258	−1.02	0.308
Sexual abuse	5	(5; 10)	6	(5; 13)	5	(5; 8)	6230	−4.15	<0.001***	5	(5; 8)	5	(5; 11)	5199	−1.24	0.216
Physical neglect	8	(5; 11)	9	(6; 11)	8	(5; 11)	7723	−1.38	0.168	9	(6; 12)	8	(5; 11)	4970	−1.61	0.108
Emotional neglect	12	(8; 16)	12	(8; 17)	12	(7; 15)	7656	−1.47	0.140	13	(9; 18)	11	(8; 15)	5003	−1.53	0.127
Total score	47	(38; 58)	51	(40; 61)	43	(33; 55)	6231	−3.80	<0.001***	51	(42; 60)	46	(36; 57)	4923	−1.68	0.093
PTSD severity[e]	32	(19; 46)	40	(29; 52)	21	(12; 37)	4304	−6.95	<0.001***	32	(19; 46)	32	(19; 46)	5739	−0.06	0.954

Int. Disorder = Internalizing Disorder; Ext. Disorder = Externalizing Disorder; PTSD = posttraumatic stress disorder.
[a]Missing data.
[b]The term Colored is a demographic marker that historically denotes South Africans of African, European and/or Asian ancestry.
[c]Orphanhood based on one or both parents deceased.
[d]Scores for the five subscales and the total trauma load on the Childhood Trauma Questionnaire.
[e]Score on the Child PTSD Checklist.
*$p < .05$; **$p < .01$; ***$p < 0.001$.

correlated ($p < .01$). Physical, emotional, and sexual abuse types showed stronger correlations with each other than with neglect. Noteworthy was the strong correlation between physical and emotional abuse ($r_s = .624$). Neglect (i.e., physical, emotional) also showed a stronger mutual correlation than with abuse. PTSD symptom severity was significantly correlated with all maltreatment types and had the strongest correlation with emotional abuse ($r_s = .502$). Supplementary Table 1 demonstrates exposure to all trauma types. Being confronted with traumatic news was the most frequent trauma exposure (56.9%), followed by witnessing a violent crime (49.6%).
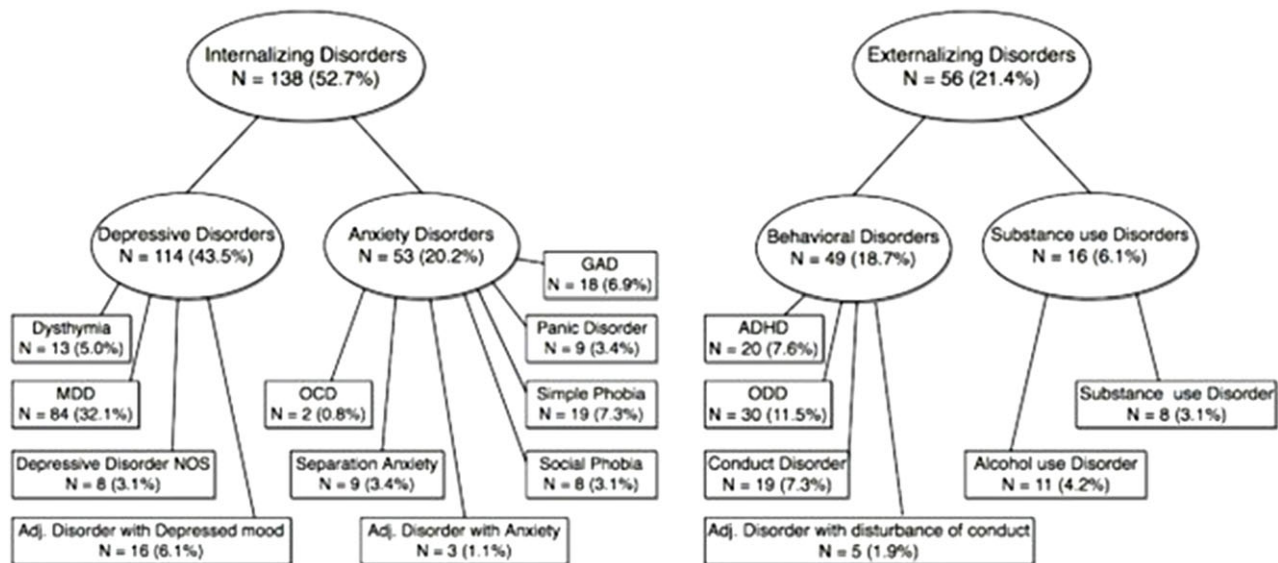
Internalizing disorders

Females (59.8%) were more likely ($p = .003$) than males (40.8%) to be diagnosed with an internalizing disorder. Participants with

internalizing disorders were significantly older ($p = .016$) and in a higher grade ($p = .005$) than participants without internalizing disorders. There were no significant associations between other demographic variables and internalizing disorders (see Table 1). Adolescents with internalizing disorders had significantly greater severity of emotional abuse ($p < .001$), sexual abuse ($p < .001$), total childhood maltreatment ($p < .001$), and PTSD symptoms ($p < .001$) than those without. For all types of trauma exposure (Supplementary Table 1), adolescents with internalizing disorders were more likely to have been exposed to an accident ($p = .043$) and sexual abuse ($p = .003$). They also had exposure to a greater number of different trauma types ($p = .005$), however, this was not significant when abuse (sexual and physical) was excluded ($p = .090$).

Table 3 shows the results of the regression model for internalizing disorders. Control variables (gender and age) were

Table 2. Correlation coefficients of childhood maltreatment variables

	Physical abuse	Emotional abuse	Sexual abuse	Physical neglect	Emotional neglect
Physical abuse	–				
Emotional abuse	.624**	–			
Sexual abuse	.378**	.388**	–		
Physical neglect	.307**	.302**	.221**	–	
Emotional neglect	.221**	.254**	.161**	.553**	–
PTSD severity	313**	502**	405**	.213**	163**

**Significant at $p < 0.01$.

Figure 1. Prevalence of internalizing & externalizing disorders. PTSD was present in 56.1% of the sample, and in 68.1% and 48.2% of those with internalizing and externalizing disorders respectively. MDD = Major Depressive Disorder; Adj. Disorder = Adjustment Disorder; OCD = Obsessive-Compulsive Disorder; GAD = Generalized Anxiety Disorder; ADHD = Attention Deficit Hyperactivity Disorder; ODD = Oppositional Defiant Disorder.

entered in the first block of the regression model (Model 1). Male sex (OR = 0.49, 95% CI [0.29,0.82], $p = .007$) and age (OR = 1.18, 95% CI [1.02,1.36], $p = .029$) were both significant in this model. For Model 2, childhood maltreatment subtype severity scores were entered. In this model, only sexual abuse (OR = 1.08, 95% CI [1.02,1.14], $p = .007$) was significantly associated with internalizing disorders. For Model 3, PTSD symptom severity was added and was the only factor significantly associated (OR = 1.05, 95% CI [1.03,1.07], $p < .001$) with internalizing disorders. We then tested whether PTSD severity mediated the relationship between sexual and emotional abuse severity and internalizing disorders, with the other variables retained in the model as covariates (Figure 2). Sexual abuse severity (Figure 2a) was a significant predictor of PTSD severity ($b = 0.54$, $SE = 0.19$, 95% CI = 0.16; 0.93). PTSD severity was a significant predictor of an internalizing disorder ($b = 0.05$, $SE = 0.01$; 95% CI = 0.03; 0.07). When PTSD severity was added to the model sexual abuse was no longer a significant predictor of internalizing disorder demonstrating mediation. The indirect effect was tested using a bootstrap estimation with 5000 samples and 95% CI and was significant ($b = 0.03$, $SE = 0.01$, 95% CI = 0.01; 0.05). Similarly, emotional abuse severity (Figure 2b) was a significant predictor of PTSD severity ($b = 1.13$, $SE = 0.27$, 95% CI = 0.60; 1.65). PTSD severity was a significant predictor of an internalizing disorder ($b = 0.05$, $SE = 0.01$; 95% CI = 0.03; 0.07).

When PTSD severity was added to the model emotional abuse was no longer a significant predictor of internalizing disorder demonstrating mediation.

Post hoc sensitivity analyses

Results remained unchanged when we controlled for number of trauma types exposed to in sensitivity analyses, number of trauma types was not associated with internalizing disorders (OR = 1.23, 95% CI [0.97,1.55], $p = .086$) in the final model with all variables included.

Supplementary Table 2 shows the results of the regression model for internalizing disorders using CTQ total score entered in Model 2. In this model, male sex (OR = 0.58, 95% CI [0.34,0.98], $p = .042$) and CTQ total severity (OR = 1.02, 95% CI [1.01,1.04], $p = .011$) were significantly associated with internalizing disorders. For Model 3, PTSD symptom severity was added and was the only factor significantly associated (OR = 1.05, 95% CI [1.03,1.07], $p < .001$) with internalizing disorders. We then tested whether PTSD severity mediated the relationship between CTQ total severity and internalizing disorders, with the other variables retained in the model as covariates (Supplementary Figure 1). CTQ total severity was a significant predictor of PTSD severity ($b = 0.40$, $SE = 0.06$, 95% CI = 0.28; 0.52). PTSD severity was a significant
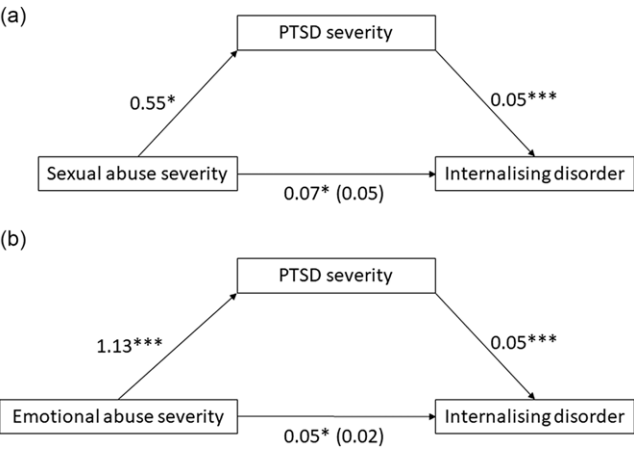
Figure 2. (a) Mediating effect of PTSD on the relationship between sexual abuse and internalizing disorders. Standardized regression coefficients for the relationship between sexual abuse severity and internalizing disorders as mediated through PTSD severity. The regression coefficient between sexual abuse and internalizing disorders, controlling for PTSD severity is in parenthesis. *p < 0.05; **p < 0.01; ***p < 0.001. (b) Mediating effect of PTSD on the relationship between emotional abuse and internalizing disorders. Standardized regression coefficients for the relationship between emotional abuse severity and internalizing disorders as mediated through PTSD severity. The regression coefficient between emotional abuse and internalizing disorders, controlling for PTSD severity is in parenthesis. *p < 0.05; **p < 0.01; ***p < 0.001.

predictor of an internalizing disorder ($b = 0.05$, $SE = 0.01$; 95% CI $= 0.03$; 0.07). When PTSD severity was added to the model CTQ total severity was no longer a significant predictor of internalizing disorder demonstrating mediation. The indirect effect was tested using a bootstrap estimation with 5000 samples and 95% CI and was significant ($b = 0.02$, $SE = 0.01$, 95% CI $= 0.01$; 0.03).

Externalizing disorders

None of the demographic variables were significantly associated with a diagnosis of an externalizing disorder (see Table 1). Adolescents with an externalizing disorder had a significantly greater severity of physical abuse ($p = .045$) than those without. PTSD severity did not differ significantly between the groups ($p = .954$). For all types of trauma exposure (Supplementary Table 1), adolescents with externalizing disorders were more likely to have been exposed to an accident ($p = .045$) only. Number of different trauma types was not associated with having an externalizing disorder ($p = .083$), including when abuse (sexual and physical) was excluded ($p = .078$).

Table 4 shows the results of the regression analysis for externalizing disorders. For Model 1, the control variables (gender and age) in the first block were not significant. In Model 2, childhood maltreatment severity scores were added, and only physical abuse was significantly (OR $= 1.10$, 95% CI [1.01,1.19], $p = .029$) associated with externalizing disorders. When PTSD symptom severity was added, physical abuse (OR $= 1.10$, 95% CI [1.01,1.19], $p = .029$) remained significantly associated with externalizing disorders and PTSD severity did not significantly change the model ($p = .945$). There were no significant interactions between maltreatment subtype severity scores and PTSD symptom severity.

Table 3. Logistic regression with internalizing disorder as outcome variable

	B	(SE)	Wald	p	Odds ratio	(95% CI)
Model 1						
Constant	−2.07	(1.14)	3.32	0.069	0.13	
Male sex	−0.71	(0.26)	7.37	0.007**	0.49	(0.29–0.82)
Age	0.16	(0.07)	4.77	0.029*	1.18	(1.02–1.36)
Model 2						
Constant	−2.61	(1.21)	4.69	0.030	0.07	
Male sex	−0.38	(0.28)	1.76	0.184	0.69	(0.39–1.20)
Age	0.11	(0.08)	1.95	0.163	1.12	(0.96–1.30)
Physical abuse	−0.05	(0.04)	1.76	0.185	0.95	(0.88–1.03)
Emotional abuse	0.07	(0.04)	3.66	0.056	1.07	(1.00–1.16)
Sexual abuse	0.08	(0.03)	7.16	0.007*	1.08	(1.02–1.14)
Physical neglect	−0.01	(0.05)	0.04	0.850	0.99	(0.91–1.09)
Emotional neglect	0.02	(0.03)	0.58	0.445	1.02	(0.97–1.09)
Model 3						
Constant	−2.01	(1.26)	2.53	0.112	0.14	
Male sex	−0.20	(0.30)	0.43	0.515	0.82	(0.45–1.49)
Age	0.02	(0.08)	0.07	0.798	1.02	(0.87–1.20)
Physical abuse	−0.05	(0.04)	1.51	0.219	0.95	(0.88–1.03)
Emotional abuse	0.02	(0.04)	0.21	0.651	1.02	(0.96–1.09)
Sexual abuse	0.05	(0.03)	2.93	0.087	1.05	(0.99–1.12)
Physical neglect	−0.01	(0.05)	0.09	0.763	0.99	(0.90–1.08)
Emotional neglect	0.02	(0.03)	0.46	0.498	1.02	(0.96–1.09)
PTSD severity	0.05	(0.01)	22.97	<0.001***	1.05	(1.03–1.07)

Model 1: $\chi^2(2) = 13.72$ ($p = .001$**); Nagelkerke $R^2 = 0.068$.
Model 2: $\chi^2(7) = 28.28$ ($p < 0.001$***); Nagelkerke $R^2 = 0.137$; Block: $\chi^2(5) = 14.56$ ($p = 0.012$*).
Model 3: $\chi^2(8) = 55.23$ ($p < 0.001$***); Nagelkerke $R^2 = 0.245$; Block: $\chi^2(1) = 26.95$ ($p < 0.001$***).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Post hoc sensitivity analyses

Results remained unchanged when we controlled for number of trauma types exposed to on sensitivity analyses, number of trauma types was not associated with externalizing disorders.

Supplementary Table 3 shows the results of the regression analysis for externalizing disorders using CTQ total score. In Model 2, CTQ total severity was added, and male sex (OR $= 2.22$, 95% CI [1.16,4.28], $p = .017$) and CTQ total severity (OR $= 1.03$, 95% CI [1.01,1.05], $p = .011$) were significantly associated with externalizing disorders. When PTSD symptom severity was added, male sex (OR $= 2.32$, 95% CI [1.19,4.56], $p = .020$) and CTQ total severity (OR $= 1.03$, 95% CI [1.01,1.05], $p = .015$) remained significantly associated with externalizing disorders and PTSD severity did not significantly change the model ($p = .873$). In Model 4, male sex remained significantly associated with externalizing disorders (OR $= 2.32$, 95% CI [1.19–4.56], $p = .014$).

Table 4. Logistic regression with externalizing disorder as outcome variable

	B	(SE)	Wald	p	Odds ratio	(95% CI)
Model 1						
Constant	−0.36	(1.35)	0.07	0.790	0.70	
Male sex	0.54	(0.31)	3.09	0.079	1.72	(0.94–3.14)
Age	−0.08	(0.09)	0.78	0.377	0.93	(0.78–1.10)
Model 2						
Constant	−0.87	(1.43)	0.37	0.542	0.42	
Male sex	0.64	(0.35)	3.43	0.064	1.91	(0.96–3.77)
Age	−0.13	(1.00)	1.76	0.185	0.88	(0.73–1.06)
Physical abuse	0.09	(0.04)	4.75	0.029*	1.10	(1.01–1.19)
Emotional abuse	0.00	(0.04)	0.00	1.000	1.00	(0.92–1.10)
Sexual abuse	−0.03	(0.03)	0.70	0.403	0.97	(0.91–1.04)
Physical neglect	0.01	(0.05)	0.01	0.911	1.01	(0.91–1.11)
Emotional neglect	0.04	(0.04)	1.50	0.222	1.04	(0.98–1.12)
Model 3						
Constant	−0.87	(1.44)	0.36	0.548	0.42	
Male sex	0.65	(0.35)	3.39	0.065	1.91	(0.96–3.80)
Age	−0.13	(0.10)	1.73	0.189	0.88	(0.73–1.06)
Physical abuse	0.09	(0.04)	4.75	0.029*	1.10	(1.01–1.19)
Emotional abuse	−0.00	(0.04)	0.00	0.986	1.00	(0.92–1.10)
Sexual abuse	−0.03	(0.03)	0.70	0.403	0.97	(0.91–1.04)
Physical neglect	0.01	(0.05)	0.01	0.912	1.01	(0.91–1.11)
Emotional neglect	0.04	(0.04)	1.50	0.222	1.04	(0.98–1.12)
PTSD severity	0.00	(0.01)	0.01	0.945	1.00	(0.98–1.02)

Model 1: $\chi^2(2) = 4.27$ ($p = .119$); Nagelkerke $R^2 = 0.025$.
Model 2: $\chi^2(7) = 15.86$ ($p = .026$*); Nagelkerke $R^2 = 0.091$; Block: $\chi^2(5) = 11.59$ ($p = .041$*).
Model 3: $\chi^2(4) = 15.86$ ($p = .044$*); Nagelkerke $R^2 = 0.091$; Block: $\chi^2(1) < 0.01$ ($p = .945$).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Comorbid internalizing and externalizing disorders

Supplementary Table 1 shows the results of the regression analysis comparing participants with internalizing disorders only ($n = 103$), externalizing disorders only ($n = 21$), and no disorders ($n = 103$) to those with both internalizing and externalizing disorders ($n = 35$). In Model 1, gender, age, and childhood maltreatment severity scores were added and sexual abuse had an overall significant effect ($p = .028$) on the model. Individuals with both internalizing and externalizing disorders had significantly more severe physical abuse than those with internalizing disorders only (OR = 0.88, 95% CI [0.79,0.99], $p = .026$), and more severe emotional neglect than those with internalizing disorders only (OR = 0.90, 95% CI [0.82,0.98], $p = .020$) and externalizing disorders only (OR = 0.86, 95% CI [0.75,0.98], $p = .022$), but not as compared to those without any disorders (OR = 0.91, 95% CI [0.83,1.00], $p = .050$). When PTSD symptom severity was added in Model 2, only PTSD symptom severity had a significant overall effect on the model ($p < .001$). Again, those with both internalizing and externalizing disorders had more severe physical abuse and emotional neglect, demonstrating similar findings to Model 1.

They also had greater PTSD symptom severity than those with externalizing disorders only (OR = 0.94, 95% CI [0.90,0.99], $p = .008$), or those without any disorder (OR = 0.96, 95% CI [0.93,0.99], $p = .003$).

Post hoc sensitivity analyses

Results remained unchanged when we controlled for number of trauma types exposed to in sensitivity analyses. Number of trauma types exposed did not differ between the groups.

Supplementary Table 5 shows the results of the multinomial regression analysis using CTQ total score. In Model 1, gender, age, and CTQ total score were added and CTQ total score ($p = .006$) and sex ($p = .011$) had an overall significant effect on the model. Individuals with both internalizing and externalizing disorders were more likely to be female (OR = 0.37, 95% CI [0.15,0.89], $p = .027$) than those with internalizing disorders only and had significantly more severe CTQ total scores than those with internalizing disorders only (OR = 0.97, 95% CI [0.95,1.00], $p = .027$) and those without any disorders (OR = 0.96, 95% CI [0.93,0.98], $p < .001$). When PTSD symptom severity was added in Model 2, only PTSD symptom severity had a significant overall effect on the model ($p < .001$). Again, those with both internalizing and externalizing disorders were more likely to be female (OR = 0.38, 95% CI [0.15,0.94], $p = .037$) than those with internalizing disorders only and had significantly more severe CTQ total scores than those with internalizing disorders only (OR = 0.97, 95% CI [0.95,1.00], $p = .023$) and those without any disorders (OR = 0.97, 95% CI [0.95,1.00], $p = .039$). They also had greater PTSD symptom severity than those with externalizing disorders only (OR = 0.94, 95% CI [0.91,0.98], $p = .007$), or those without any disorder (OR = 0.96, 95% CI [0.93,0.99], $p = .002$).

Discussion

The current study investigated whether childhood maltreatment was associated with internalizing/externalizing disorders in trauma-exposed adolescents and whether PTSD severity has a mediating role. We found that both emotional and sexual abuse were associated with having an internalizing disorder, but only sexual abuse remained significantly associated on multivariate analyses. However, this association was no longer significant when we added PTSD severity to the model, demonstrating that PTSD mediated the association between sexual abuse and internalizing disorders. Physical abuse severity was significantly associated with having an externalizing disorder and PTSD severity was not associated with having an externalizing disorder in this sample. We also found that physical abuse, emotional neglect, and PTSD severity were associated with having comorbid internalizing and externalizing disorders. Of note, all results remained unchanged when we controlled for number of other trauma types.

As expected, all types of abuse and neglect were significantly correlated, which is consistent with previous research (Cecil et al., 2017; Herrenkohl & Herrenkohl, 2009; Schilling et al., 2016). After controlling for age, gender, and other maltreatment types, we found that sexual abuse was the only maltreatment type significantly associated with the presence of an internalizing disorder. This finding is consistent with several other studies (Curran et al., 2016; Garcia et al., 2017; Keyes et al., 2012; Lindert et al., 2014; Perales et al., 2013; Sachs-ericsson et al., 2006). In a previous systematic review, sexual abuse was found to be associated with increased levels of depression and anxiety (Lindert et al., 2014). Adolescents who lack social support may

feel stigma or shame from being sexually abused, thus increasing their risk of developing internalizing problems (Nooner et al., 2012). Sexually abused victims may also feel powerless to disclose their abuse, preventing them from seeking help for their emotional problems (Lewis et al., 2016).

We found a significant association between emotional abuse and internalizing disorders only on bivariate analyses, while prior research has found a significant association (Cecil et al., 2017; Curran et al., 2016; Keyes et al., 2012; Mills et al., 2013; Vachon et al., 2015). PTSD severity was significantly associated with the presence of an internalizing disorder and mediated the association between sexual and emotional abuse and total CTQ severity and internalizing disorder. These findings support the developmental traumatology model, which suggests that the presence of PTSD following severe childhood trauma increases the risk for other psychopathology (e.g., internalizing disorders), whereas a lack of PTSD symptoms is associated with lower levels of psychopathology (De Bellis, 2001). The mediating effect of PTSD severity on the relationship between maltreatment and internalizing disorders has also been demonstrated in other literature (Milot et al., 2010; Yoon et al., 2016). These studies, however, did not assess specific types of maltreatment. Other studies among sexually abused youth have similarly found higher rates of internalizing behaviors in sexually abused youths with PTSD versus sexually abused youth without PTSD (McLeer et al., 1988, 1992; Wolfe et al., 1994).

Multiple studies have demonstrated that PTSD is often comorbid with other internalizing disorders, such as depression and anxiety disorders (Brady et al., 2000; Kilpatrick et al., 2003; Spinhoven et al., 2014). PTSD was also categorized as an anxiety disorder in the DSM-IV (American Psychiatric Association, 1994). Some have argued that PTSD and its comorbid disorders should rather be seen as a composite of the somatic, cognitive, affective, and behavioral effects of psychological trauma, rather than as individual disorders (Brady et al., 2000; Keane & Kaloupek, 1997). Others have argued that comorbidity may be explained by "latent liability factors" (Krueger & Markon, 2011). Furthermore, it has been suggested that a number of other psychiatric disorders are risk factors for PTSD, which in turn is a risk factor for other psychiatric disorders, creating a self-exacerbating process (Brady et al., 2000). In two studies, which excluded children exposed to maltreatment, internalizing behaviors were significantly increased in children with PTSD compared to trauma-exposed and trauma-unexposed controls (Saigh et al., 2002, 2015). There were no significant differences between trauma-exposed and trauma-unexposed controls in the studies, suggesting that PTSD rather than trauma exposure contributed to internalizing behaviors.

After controlling for all maltreatment types, age, and gender, we found that physical abuse was associated with externalizing disorders. This is consistent with previous literature (De Venter et al., 2013; Mills et al., 2013; Perales et al., 2013; Petrenko et al., 2012; Vachon et al., 2015; Van der Put et al., 2015; Villodas et al., 2012). Adolescents who have been physically abused may tend to exhibit more aggression (Van der Put et al., 2015), and may be more likely to affiliate with peers who engage in delinquent behaviors, which could lead to externalizing behavior problems. Keyes et al. (2012) showed that physical abuse was associated with externalizing disorders in men but not in women. We did not find an interaction between physical abuse and gender on externalizing disorders. However, consistent with other literature (De Venter et al., 2013; Haahr-Pedersen et al., 2021), we found that, in sensitivity analyses using CTQ total score, males were significantly more likely to have an externalizing disorder than females.

We found that PTSD severity was not associated with externalizing disorders. According to a previous systematic review, PTSD is commonly associated with substance use behaviors (Hawn et al., 2020). The association between PTSD and substance use is often explained as a coping mechanism, such that individuals with PTSD tend to turn to substance use as a way to relieve the painful symptoms of PTSD which in the long run can lead to an exacerbation of the PTSD symptoms (Brady et al., 2000; Haller & Chassin, 2014). It is somewhat surprising, therefore, that we did not find an association between PTSD severity and the presence of externalizing disorders. This could be due to the small sample of adolescents with externalizing disorders ($n = 56$). Another explanation may be that PTSD has a greater association with internalizing symptoms (Wolf et al., 2010). For instance, an epidemiological study in children demonstrated that the association between trauma and psychiatric disorders was stronger in those with PTS, but that this varied by disorder type (Copeland et al., 2007). Further, similar to our study, a previous US study similarly found that PTSD symptom severity did not mediate the association between childhood maltreatment and externalizing disorders (Yoon et al., 2016).

We found that adolescents who had experienced more severe physical abuse had a greater likelihood of exhibiting comorbid internalizing and externalizing disorders than those with internalizing disorders only. Recent studies have yielded similar findings (Duprey et al., 2020). Physical abuse during childhood may disrupt the ability to effectively regulate emotions, which could result in both internalizing and externalizing behavior problems (Heleniak et al., 2016; Kim & Cicchetti, 2010). For example, in a study by Heleniak et al. (2016), adolescents who were physically abused during childhood showed increased emotional reactivity and maladaptive responses to distress, such as rumination and impulsivity. Our results suggest that severity of physical abuse is particularly associated with externalizing features of this comorbidity as the results were significant only when compared to those with internalizing disorders only.

Of note, we found that emotional neglect was associated with the comorbidity of internalizing and externalizing disorders, and this was significant when compared to both internalizing and externalizing disorders only. Insecure parental attachment may play a role in this association. Attachment patterns during childhood impact later affective and social development (Lahousen et al., 2019; Malekpour, 2007). According to Yeo and Chan (2020), insecure parental attachment hinders emotional competence, resulting in internalizing problems such as depression and anxiety. Additionally, children who receive love and affection from their parents also tend to display fewer externalizing problems (Yeo & Chan, 2020). It has been found that adolescents with comorbid internalizing and externalizing problems have greater insecure parental attachment compared to those with internalizing or externalizing problems alone (Tambelli et al., 2012). Poor attachment, in addition to the stressful changes that adolescents undergo during this transition period, is therefore likely to increase psychopathology. Furthermore, crucial developmental areas such as self-esteem, regulation of stress, and empathy, which are typically modeled through parental relationships, are impeded by emotional neglect (Rees, 2008). Self-esteem has been found to mediate the association between emotional neglect and internalizing as well as externalizing disorders among adolescents (Lee & Feng, 2021). It is also possible that the inverse may occur, such that a difficult temperament inherent in a child could lead to emotional neglect from parents (Lahousen et al., 2019).

In sensitivity analyses where we used CTQ total score, we found that individuals with both internalizing and externalizing disorders had greater total childhood maltreatment severity than those with internalizing disorders only and those without any disorders, but not those with externalizing disorders only. These results suggest that evaluating total childhood maltreatment severity can demonstrate a greater effect for overall childhood maltreatment, but may also obscure the effects of individual maltreatment types. Additionally, those with comorbid internalizing and externalizing disorders were more likely to be female, compared to those with internalizing disorders only. Previous studies have largely examined gender differences in internalizing and externalizing disorders separately (e.g., Gutterswijk et al., 2023; Hagborg et al., 2017; Meng & D'Arcy, 2016). However, similar to our findings, one study found that adolescent girls exposed to childhood sexual abuse were more likely to have high comorbidity of internalizing and externalizing disorders than adolescent boys (Duprey et al., 2020). These findings underline the importance of assessing childhood maltreatment and related comorbid psychopathology from a gendered perspective.

Further, we found that adolescents with comorbid internalizing and externalizing disorders had greater PTSD severity compared to those with externalizing disorders only and with no disorder. Similar to our findings, PTSD has been associated with comorbid psychopathology in clinical and non-clinical samples of adolescents (Allwood et al., 2008; Geng et al., 2019). In line with our findings, the developmental traumatology model suggests that greater PTSD severity is associated with greater psychopathology (i.e., comorbidity; De Bellis, 2001). Adolescence is a sensitive developmental period that involves various biological and psychological changes (Duprey et al., 2020), and maltreatment during childhood threatens adolescent development (Dvir et al., 2014). The absence of a safe home environment and parental responsiveness (i.e., neglect) during childhood could impede socioemotional development and disrupt adaptive functioning (Cicchetti & Rogosch, 2002; Dvir et al., 2014) such as the ability to self-regulate behaviors and emotions. Consequently, adolescents may lack the coping skills needed to deal with exposure to traumatic events and thus develop PTSD symptoms. Therefore, it is possible that a greater severity of childhood maltreatment in adolescents exposed to other traumatic events could lead to more severe PTSD symptomatology and the subsequent development of comorbid internalizing and externalizing disorders. This emphasizes the need for interventions targeted at this specific group, as the relationship between childhood maltreatment and comorbid internalizing and externalizing disorders has been linked to suicidality (Duprey et al., 2020), violence and substance use (Dugré et al., 2020) in adolescents.

Limitations

Several limitations are worth mentioning. There was potential recall bias due to the retrospective reporting of childhood maltreatment. Studies have shown that the scoring on childhood maltreatment reports are not stable over time (Femina et al., 1990; Fergusson et al., 2008; Widom & Morris, 1997; Williams, 1995). Investigators have suggested that the prevalence of childhood maltreatment, when measured retrospectively, is likely to be underestimated (Fergusson et al., 2008; Widom & Morris, 1997). Due to the cross-sectional design of the study, we cannot comment on the direction of associations that we found, and the associations could theoretically be explained by reverse causality. For example,

a previous study demonstrated that conduct disorder prevalence in children increased the likelihood of experiencing harsh parenting compared to children without a conduct disorder (Schulz-Heik et al., 2010). Although we utilized mediation analyses, due to the cross-sectional nature of our data, we cannot comment on causality, and bias related to conducting mediation analysis with cross-sectional data may influence the results. Our results should be confirmed by longitudinal studies. Furthermore, we could not control for the timing of childhood maltreatment in this study. The timing of maltreatment may play a role in the risk and type of psychopathology that develops (Ethier et al., 2004; Manly et al., 2001; Trickett et al., 2009). However, internalizing and externalizing psychopathology dimensions have been shown to remain stable over time in adolescent samples (Snyder et al., 2017). For comparability with recent studies, diagnostic measures keyed to DSM-5 criteria are preferred. The varying definitions of what constitutes trauma exposure between DSM-IV and DSM-V may not allow for direct comparisons with recent studies using DSM-5 criteria. Major revisions from DSM-IV to DSM-V include: re-categorization of PTSD from anxiety disorders to trauma and stressor-related disorders, the removal of criterion A2 (subjective response to a traumatic event), and the replacement of three symptom clusters (B, C, D) with four symptom clusters (B, C, D, E) (Pai et al., 2017). Although, concordance between the DSM-IV and DSM-V diagnosis of PTSD has been established among prevalence rates across various samples (Crespo López & Gómez Gutiérrez, 2016; Kuester et al., 2017; Mikolajewski et al., 2017). However, this study commenced when DSM-IV criteria were in use. Finally, our sample size, especially the group of participants with externalizing disorders, may have been too small, contributing to a failure to detect significant associations. The current study should be replicated in future with a larger sample size. Cohort studies mapping longitudinal youth trajectories are needed to assess causal relationships between childhood maltreatment, PTSD, and internalizing and externalizing disorders and their comorbidity.

Implications

These findings contribute to existing literature by highlighting the effect of PTSD severity on the strength of the relationship between childhood maltreatment and internalizing and externalizing disorders during adolescence. Sexual and emotional abuse can lead to the development of internalizing disorders, but this effect may be via the development of PTSD. The strong association found between childhood emotional neglect and comorbid internalizing and externalizing disorders provides opportunities for interventions targeted at emotional neglect, and not only abuse, in trauma-exposed adolescents. The association between physical abuse and externalizing disorders as well as comorbid internalizing and externalizing disorders suggest that these disorders are not mutually exclusive and may co-occur. Future interventions should not only aim to reduce internalizing and externalizing disorders individually, but also target comorbidity. A brief cost-efficient transdiagnostic treatment was found to be effective in reducing symptoms in patients with comorbid anxiety disorders (Riccardi et al., 2017). A treatment such as this could be adapted to target reductions in comorbid internalizing and externalizing disorders in trauma-exposed South African adolescents with a history of childhood maltreatment. The current findings have implications for the prevention of psychopathology in trauma-exposed adolescents. Specifically, prevention programs could target reductions in PTSD symptoms (e.g., teaching effective emotional

regulation strategies) in those at-risk of developing internalizing as well as comorbid internalizing and externalizing disorders.

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