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RESEARCH ARTICLE

Investigating the dissociative subtype of post-traumatic stress disorder in single- and multi-event trauma-exposed youth: Prevalence, course, prognosis, severity and functional impairment

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Abstract

Objectives: This study aimed, following both single- and multi-event trauma, to ascertain prevalence and course of the dissociative subtype of post-traumatic stress disorder (PTSD-DS) in youth; how well early PTSD-DS predicts later PTSD; and whether dissociation accounts for unique variance in post-traumatic stress symptoms (PTSS) and functional impairment over and above the effect of other post-trauma cognitive processing factors and PTSS respectively.

Design and Methods: This study is a secondary analysis of data from the Acute Stress Programme for Children and Teenagers study ($n = 234$) and the Coping in Care After Trauma study ($n = 110$) in which children had experienced single- and multi-event trauma respectively.

Results: PTSD-DS diagnosis was common in children with PTSD regardless of trauma experienced (>39.0%). PTSD-DS showed a similar trajectory of natural recovery to PTSD, and it was similarly predictive of later PTSD following single-event trauma. Finally, dissociation was a significant factor in PTSS and functional impairment.

Conclusions: These results should be viewed in the context of several limitations including narrow sample of

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participants which reduces the generalizability of results, concerns around children's ability to conceptualize challenging concepts such as dissociation and the use of self-report measures to form diagnostic groups. The PTSD-DS diagnosis may offer clinical utility to the extant PTSD diagnosis in children and adolescents, as dissociation has been shown to be a contributory factor in the maintenance of both PTSS and functional impairment. Further research is required to inform further editions of the DSM and other diagnostic systems.

KEYWORDS
post-traumatic, prevalence, prognosis, stress disorders

Practitioner points

- The dissociative subtype of post-traumatic stress disorder diagnosis was prevalent
- The subtype showed a similar trajectory of natural recovery to post-traumatic stress disorder (PTSD)
- The subtype was similarly predictive of later PTSD following single-event trauma
- Dissociation was a significant factor in post-traumatic stress symptoms
- Dissociation was a significant factor in functional impairment

INTRODUCTION

Single- and multi-event traumatic exposure in youth is common (Copeland et al., 2007), where the former follows a discrete incident, whereas the latter follows a prolonged period of maltreatment, abuse or exposure to violence. Furthermore, around 16% of children exposed to trauma develop post-traumatic stress disorder (PTSD; Alisic et al., 2014). PTSD is characterized in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) by four core symptom clusters: intrusions such as nightmares or flashbacks; avoidance of thoughts or feelings related to the trauma; negative alterations in cognitions and mood; and alterations in arousal and reactivity (American Psychiatric Association, 2013).

The DSM-5 also defines a dissociative subtype of PTSD (PTSD-DS) where, in addition to meeting the criteria for PTSD, individuals must demonstrate symptoms of depersonalization and or derealization. Depersonalization encompasses 'persistent or recurrent experiences of feeling detached from, and as if one were an outside observer of, one's mental processes or body', whereas derealization entails 'persistent or recurrent experiences of unreality of surroundings' (DSM-5, 2013, p. 272). It is important to consider both single- and multi-event trauma in the context of PTSD-DS, as cumulative childhood chronic maltreatment is associated with more complex PTSD symptomology and dissociation (Bernier et al., 2013; Hagenaars et al., 2011; van der Kolk et al., 2009). To date, investigation of PTSD-DS has mostly been conducted in adults, and our understanding of this subtype in children and adolescents has largely been neglected; a recent meta-analysis of 49 studies highlights that only five exclusively sampled children and adolescents. This is problematic, as dissociative symptoms may be more common during childhood and disagreement exists as to which domains of dissociation are pathological across development (Silberg & Dallam, 2009). It is therefore important to develop a more robust evidence base surrounding PTSD-DS in children and young people following various forms of trauma.

Studies investigating adolescents in the juvenile justice system (Bennett et al., 2015; Kerig et al., 2016; Modrowski & Kerig, 2017) as well as a recent meta-analysis (White et al., 2022) suggest that the prevalence of PTSD-DS is higher in children than adults and that levels of post-traumatic dissociation are higher in children who have suffered prolonged interpersonal trauma (such as sexual and physical abuse instigated by caregivers). The relatively high prevalence in children appears incongruous with the premise that PTSD-DS occurs in a small proportion of individuals with PTSD (Lanius et al., 2012). The prevalence of this relatively new subtype of PTSD therefore warrants further investigation, in addition to understanding the course and natural progression of PTSD-DS over time. There is evidence that significant natural recovery in PTSD occurs for children during the first few months after single-event trauma (Hiller et al., 2016; Meiser-Stedman et al., 2017). In adults, the frequency of dissociative experiences also reduces over time following a traumatic experience (Carlson et al., 2012), correlating with natural reduction in post-traumatic stress symptoms (PTSS; Blanchard et al., 1996; Riggs et al., 1995; Rothbaum et al., 1992). However, this needs to be examined in populations of children as the prevalence of PTSD-DS may similarly reduce over time in children as natural recovery occurs.

Post-traumatic stress disorder can significantly impair day-to-day functioning (APA, 2013), and dissociation in the context of PTSD may be associated with greater functional impairment (Boyd et al., 2018, 2020; Evren et al., 2011; Stein et al., 2013). Thus, there is a need to evaluate whether a diagnosis of PTSD-DS is more predictive of PTSD longitudinally than a diagnosis of PTSD and whether persistent dissociation is associated with greater PTSS and functional impairment in children.

The relationship among trauma, PTSD and dissociation is complex, and multiple models and explanations of these phenomena have been proposed. The mediation model of dissociation described by Dalenberg and Carlson (2012) suggests that dissociation could be a prerequisite for PTSD and may be a clinical marker for a more severe pathology (Lanius et al., 2012; Stein et al., 2013; Wolf et al., 2012). Associations between dissociation and PTSS have been reported (Bennett et al., 2015; Kadak et al., 2013), and dissociation and PTSS follow a similar pattern following treatment (Carlson et al., 2012). Other commentators have proposed that dissociation serves as a coping mechanism (Foa & Hearst-Ikeda, 1996; van der Kolk & Fisler, 1995), or is indicative of an individual's difficulties in forming a coherent memory of a trauma (Murray et al., 2002). It has also been noted that dissociation may be a normative phenomenon, and can occur after pleasant as well as aversive events (Bedard-Gilligan & Zoellner, 2012).

Ehlers and Clark (2000), in their cognitive model of PTSD, acknowledge the role of dissociation in the maintenance of the disorder. They note not only that dissociation may 'impede the elaboration of the trauma memory and its integration into the autobiographical memory knowledge base' (p. 330) but also that dissociation may reflect difficulties in encoding the trauma memory. Numerous groups have found that other types of post-trauma cognitive processing are associated with the maintenance of PTSD in children and adolescents, including negative trauma-related appraisals, data-driven processing, memory quality relating to the trauma and rumination (Hiller et al., 2019, 2021; McKinnon et al., 2008; Meiser-Stedman et al., 2019; Mitchell et al., 2017; Reed et al., 2023). This emerging evidence base is consistent with the broader key proposals of Ehlers and Clark's (2000) cognitive model of PTSD, which posits three core psychological processes that maintain PTSS: negative appraisals about the trauma regarding self and the world; disjointed and disorganized memories of the trauma that are rich with emotional and sensory aspects but lacking in semantic and contextual information; and maladaptive forms of coping, such as cognitive avoidance and thought suppression. Comparatively, there is limited research investigating whether persistent post-traumatic dissociation is associated with the maintenance of PTSD in children and adolescents, and how this process might have an effect alongside other maladaptive cognitive processes.

The present study sought to address the lack of research into child and adolescent PTSD-DS using evidence from children exposed to both single- and multi-event trauma. First, it was sought to ascertain the prevalence of PTSD-DS following both single- and multi-event trauma. Second, the aim was to determine the course of PTSD-DS in the first months following single-event trauma. Third, it was sought to investigate how well early PTSD-DS predicts later PTSD following single-event trauma to ascertain

if PTSD-DS may be an early indicator of a more severe PTSD in general. Given the lack of understanding around the impact of PTSD-DS in youth, a final aim was to investigate whether dissociation accounted for unique variance in PTSS over and above the effect of other post-trauma cognitive processing factors and accounted for unique variance in functional impairment over and above the effect of PTSS, both following single- and multi-event trauma. Finally, it was aimed to conduct an exploratory investigation of whether PTSD-DS, non-dissociative PTSD (PTSD-ND) and no-diagnosis groups differed in demographic and trauma variables in youth exposed to single-, multi-event and mixed trauma, to ascertain if there are key risk or maintenance factors that can be identified. Similar measures were used in both the single- and multi-event studies, which allowed for direct comparisons to be made and for the merging of the single- and multi-event trauma samples for these latter analyses.

MATERIALS AND METHODS

This study took the form of a secondary analysis of data from a prospective longitudinal study of youth attending an Emergency Department following single-event traumas (Acute Stress Programme for Children and Teenagers study [ASPECTS]; Meiser-Stedman et al., 2017) and from a longitudinal study of children in care (Coping in Care After Trauma study [C-CATS]; Hiller et al., 2021).

Participants

ASPECTS

The first part of the analysis longitudinally investigated children who had experienced a single-event trauma and completed an assessment around 2 weeks ($n = 226$) and 9 weeks ($n = 208$) post-trauma. The second part of the analysis investigated children who completed the Children's PTSD Symptom Scale (CPSS) at the 9-week assessment, regardless of measure completion at the 2-week assessment ($n = 234$; see Table 1). There were no significant differences between children who did or did not complete the CPSS at 9 weeks in terms of age, sex, ethnicity, days since trauma or PTSS (as measured by CPSS at 2 weeks; all $ps > .07$).

C-CATS

Hiller et al. (2021) reported longitudinal data focusing on children who had been removed from their family homes and were under the care of a local authority. All had past experience of abuse or neglect and were in the care of a non-biological foster carer, kinship care or residential care homes ($n = 110$; see Table 1). Only

TABLE 1 Sample demographics for ASPECTS and C-CATS.

	ASPECTS (single-event; $n = 234$)	C-CATS (multi-event; $n = 110$)
Age in years, *M* (*SD*)	14.0 (3.0)	13.4 (2.1)
Female	42.3%	51.8%
Ethnic minority	6.0%	9.1%
Days since trauma, *M* (*SD*)	67.3 (11.2)	1735.6 (1307.0)
Index trauma		
Assault	15.8%	–
Sexual abuse	–	42.7%

Abbreviations: *M*, mean; *SD*, standard deviation.

baseline assessment information was used in this study because the longitudinal elements of the current research focussed on course and predictive ability based on clinical interview data, and the Hiller et al. (2021) study exclusively used child- and carer-report questionnaires to assess for PTSD and PTSD-DS. While the Hiller et al. (2021) study included 120 participants, data were missing from 10 children, and these were set aside from the analysis. There were no differences between children who did or did not have missing data at baseline in terms of sex, ethnicity and number of days since trauma (all $ps > .28$). Children were more likely to be older in the missing data group compared to the complete data group ($p = .005$).

Measures

Unless otherwise specified, all measures were child self-reported.

ASPECTS

The Children's PTSD Inventory (CPTSDI; Saigh et al., 2000) is a structured interview assessing DSM-IV PTSD (APA, 1994). Additional items were used to diagnose DSM-5 PTSD (see Supplementary Material S1).

The Children's PTSD Symptom Scale (CPSS; Foa et al., 2001) assesses PTSS mapping onto the DSM-IV diagnostic criteria for PTSD (APA, 1994). Additional items were added to account for new symptoms in DSM-5, and for persistent dissociation where items indexed the domains of emotional numbness, reduced awareness of surroundings, depersonalization and derealization (Meiser-Stedman et al., 2019; see Supplementary Material S1). In addition to providing a PTSS score, a 'probable PTSD' diagnosis was derived from the CPSS if the required number of symptoms were met according to DSM-5 criteria; a symptom was deemed present if it was demonstrated at least '2 to 4 times a week/half the week'. The two items indexing depersonalization and derealization were used to derive a 'probable PTSD-DS' diagnosis.

The Trauma Memory Quality Questionnaire (TMQQ; Meiser-Stedman et al., 2007) was used to assess trauma memory characteristics, referring to visual quality, non-visual sensory qualities, temporal context and degree to which the memory was in a verbally accessible format. The items were designed to focus on the memory quality, rather than the frequency of memories (Meiser-Stedman et al., 2007).

The Children's Post-Traumatic Cognitions Inventory (CPTCI; Meiser-Stedman et al., 2009) was used to assess negative trauma-related maladaptive appraisals. The CPTCI is based on the adult Post-Traumatic Cognitions Inventory (Foa et al., 1999) where items were adapted to be suitable for children. Additional items were added focussing on negative appraisals of traumatic stress symptoms following research investigating cognitive models of PTSD (Steil & Ehlers, 2000).

Self-blame was assessed by a novel two-item scale (Meiser-Stedman et al., 2019; see Supplementary Material S1), focusing on the extent to which a child felt responsible for the event, and that it was their fault.

Functional impairment was measured by relevant items on the CPSS, that is, did they endorse ('yes' or 'no') on a list of six areas of their life (i.e., 'fun and hobby activities', 'relationships with your friends', 'schoolwork', 'relationship with your family', 'chores and duties at home' and 'general happiness with your life'). A continuous impairment score was formed by summing the number of 'yes' answers (range 0–6).

C-CATS

The Child and Adolescent Trauma Screen (CATS; Sachser et al., 2017) assesses PTSS mapping onto the DSM-5 diagnostic criteria for PTSD (APA, 2013). A 'probable PTSD' diagnosis was derived from the CATS if the required number of symptoms was met according to the DSM-5 criteria; a symptom

deemed present if it was demonstrated at least 'half the time'. Depersonalization and derealization were measured via the same two items used in the single-event trauma study (i.e., CPSS and ASPECTS); however, items in the multi-event trauma study (C-CATS) were phrased in the first person and each item rated on a subtly different scale (see Supplementary Material S1).

The same measures were used in the single-event trauma study (ASPECTS) to assess post-trauma cognitive processing (i.e., the TMQQ, CPTCI and the self-blame items).

Functional impairment was measured by relevant items on the CATS, that is, was there interference ('yes' or 'no') with a list of five areas of their life (i.e., 'getting along with others', 'hobbies/fun', 'school or work', 'family relationships' and 'general happiness'). A continuous impairment score was formed by summing the number of 'yes' answers (range 0–5).

Procedure

Approval for ASPECTS was given by the UK National Research Ethics Service, Cambridgeshire 1 Research Ethics Committee (10/H0304/11). Approval for C-CATS was given by the University of Bath and Social-Care Research Ethics Committees (16/IEC08/0025), and additionally by participating Local Authorities.

Statistical analyses

The first part of the data analysis centred around investigating the prevalence of PTSD-DS in both single- and multi-event trauma samples (ASPECTS & C-CATS). Both absolute and relative prevalence statistics were reported for PTSD-DS, the former being the proportion of participants with PTSD-DS within the sample who experienced trauma, and the latter the proportion of participants with PTSD that have PTSD-DS.

The course and predictive value of PTSD-DS were investigated longitudinally between 2 and 9 weeks post-trauma with the frequency of diagnoses as determined by structured interview (i.e., the CPTSDI) using the single-event trauma dataset (ASPECTS).

The predictive ability of PTSD-DS at 2-week assessment was compared to that of PTSD using positive and negative predictive values, sensitivity and specificity statistics, and logistic regression modelling. To make a valid comparison between 2- and 9-week assessments, a diagnosis of 'two-week PTSD' ignored the duration Criterion F (APA, 2013; Brewin et al., 2003; Meiser-Stedman et al., 2005).

The second part of the analysis involved hierarchical regression modelling, using both single- and multi-event trauma data, which was used to assess the predictive ability of dissociation on PTSS over and above other post-trauma cognitive processing factors, and the predictive ability of dissociation on functional impairment over and above PTSS. Scatterplots were used to visualize the relationship between independent and dependent variables. Assumption of multivariate normality was supported by checking residuals were normally distributed. Due to evidence of heteroscedasticity, non-parametric adjustments were made using bootstrapping (Chernick, 2008), where 2000 re-samples were used. There was no evidence of multicollinearity (no tolerance statistics <.259 and no variance inflation factors >3.865), following inspection of the collinearity statistics for each model.

Finally, a cross-sectional exploratory comparison was conducted among PTSD-DS, PTSD-ND and no-diagnosis groups. Data from ASPECTS (9 weeks post-trauma) and C-CATS (baseline) studies were used both independently and when the data were combined to create a 'mixed' trauma sample (for variables where the same outcome measure was used between studies). To make comparisons between the single- and multi-event trauma studies, and in order to combine the data to form a mixed trauma dataset, 'probable PTSD-ND/PTSD-DS' diagnoses were determined by self-report measures only (CPSS, CATS and CPSS dissociation items). Due to the skewed nature of the data, non-parametric (Kruskal–Wallis *H*) tests were used for between-group comparisons, regarding demographic and trauma factors.

TABLE 2 PTSD and PTSD-DS prevalence at 2 and 9 weeks following single-event trauma (ASPECTS).

Diagnosis	Two weeks post-trauma ($n = 226$)			Nine weeks post-trauma ($n = 208$)			McNemar test
	n	Absolute %	Relative %	*n*	Absolute %	Relative %	
PTSD	41	18.1	–	20	9.6	–	$p = .002$
PTSD-DS	16	7.1	39.0	8	3.8	40.0	$p = .02$

Note: PTSD statistics were previously reported by Meiser-Stedman et al. (2017). Absolute prevalence is the proportion of participants with PTSD-DS within the sample who have experienced trauma, whereas relative prevalence refers to the proportion of participants with PTSD who have PTSD-DS.

Mann–Whitney *U* tests (with *p* values adjusted for multiple comparisons via the Holm–Bonferroni method) were used to ascertain any significant differences. Chi-squared tests were used to make comparisons between categorical data; inspection of residuals indicated where significant differences could be found, again adjusting for multiple comparisons. A power test confirmed that two-tailed between-group comparisons between diagnostic groups were not adequately powered to detect even a large effect (Cohen's $d = .8$; $a = .05$, achieved power 33.0%–66.0%). Effect sizes for all comparisons were calculated (see Table S5). Non-statistically significant comparisons yielded medium-to-large effect sizes, suggesting a lack of power that may have skewed the findings.

RESULTS

Prevalence

The prevalence of PTSD and PTSD-DS at 2 and 9 weeks following single-event trauma (ASPECTS) is presented in Table 2. The relative prevalence of PTSD-DS as a proportion of PTSD was 45.0%, whereas the absolute prevalence of PTSD-DS as a proportion of those who have suffered trauma was 8.2%, at baseline following multi-event trauma in the C-CATS study (based on self-report rather than diagnostic structured interview).

Course

Absolute prevalence of both PTSD and PTSD-DS as a proportion of those who have suffered trauma approximately halved from 2 to 9 weeks post-trauma, whereas relative prevalence of PTSD-DS as a proportion of PTSD remained similar over time (39.0% and 40.0%, respectively; see Table 2).

Predictive value

The degree to which a diagnosis of 'two-week PTSD-DS' predicted a diagnosis of PTSD at 9 weeks following single-event trauma can be seen in Table 3. Regression statistics indicate 'two-week PTSD-DS' was significantly predictive of later PTSD ($\chi^2 = 14.65$, $p < .0001$, odds ratio = 10.71). The positive predictive value, negative predictive value and specificity were similar for 'two-week PTSD-DS' compared to 'two-week PTSD', however, the sensitivity was considerably lower for 'two-week PTSD-DS'.

PTSS and functional impairment

Significant predictors of PTSS and functional impairment were assessed via hierarchical regression modelling where predictor variables were entered in two steps (see Tables 4 and 5) to test

TABLE 3 Positive and negative predictive values, sensitivity and specificity of 2-week diagnosis to predict 9-week PTSD diagnosis following single-event trauma (ASPECTS).

Two-week predictor	Nine-week outcome	Positive predictive value	Negative predictive value	Sensitivity	Specificity	Percentage correctly identified
'Two-week PTSD'	PTSD	.41	.97	.75	.88	87.0
'Two-week PTSD-DS'	PTSD	.44	.93	.35	.95	89.4

Note: PTSD statistics were previously reported by Meiser-Stedman et al. (2017).

whether dissociation plays a significant role over and above the impact of other post-traumatic cognitive processing and PTSS in driving PTSS and functional impairment respectively. Both dissociation and post-trauma cognitive processing accounted for considerable variance in PTSS for both the single-event trauma (ASPECTS; 9 weeks post-trauma) and multi-event trauma (C-CATS; baseline) studies, where persistent dissociation accounted for considerably more variance than other post-trauma cognitive processing (41% and 49%, respectively, for single- and multi-event trauma). However, beta coefficients at the final step suggest that persistent dissociation played less of a role than negative appraisals for single-event trauma and less of a role than both memory quality and negative appraisals for multi-event trauma. In the final step, only self-blame did not account for unique variance in PTSS.

Dissociation and PTSS accounted for considerable variance in functional impairment for both the single-event trauma (ASPECTS; 9 weeks post-trauma) and multi-event trauma (C-CATS; baseline) studies. For single-event trauma, persistent dissociation accounted for considerably more variance than PTSS in functional impairment, whereas the opposite was true for multi-event trauma where at the final step persistent dissociation did not account for unique variance in functional impairment. Crucially, beta coefficients at the final step suggest that persistent dissociation played less of a role than PTSS.

Significant predictors of early PTSS and functional impairment were additionally assessed cross-sectionally at 2 weeks, and longitudinally with predictor variables at 2 weeks predicting dependent variable at 9 weeks, via hierarchical regression modelling of the single-event trauma data only (see Tables S6–S9). Very similar results were produced, where dissociation, post-trauma cognitive processing and PTSS accounted for considerable variance in PTSS and functional impairment, respectively, where persistent dissociation consistently accounted for more variance than in other steps. However again it is important to stress that at the final step, the beta coefficients would suggest that persistent dissociation plays a less significant role when compared to other variables such as memory quality, negative appraisals and PTSS. Once again, self-blame was the only predictor variable to not account for unique variance in PTSS.

Impact of demographic and trauma factors on dissociation

Demographic and trauma factors, differentiated by diagnostic category, across single- (ASPECTS), multi-event (C-CATS) and mixed trauma (ASPECTS & C-CATS) samples, are shown in Table 6. Demographic variables were not significantly related to diagnostic group in all comparisons except sex, where there was a higher proportion of females in the PTSD-ND group compared to the PTSD-DS and no-diagnosis groups following multi-event (C-CATS) and mixed trauma (ASPECTS & C-CATS). Levels of assault were highest in the PTSD-ND group compared to the PTSD-DS and no-diagnosis groups following single-event trauma.

Post-hoc bootstrapped comparisons (2000 resamples used) were made to assess whether outliers or the distribution of data may have influenced the differences between PTSD-ND and PTSD-DS groups. However, the results were very similar following these *post-hoc* analyses, indicating that outliers and data distribution did not significantly impact the findings.

TABLE 4 Hierarchical regression model predicting PTSS (CPSS & CATS) considering persistent dissociation and post-trauma cognitive-processing factors, following single- and multi-event trauma.

	Model		Step		Step 2		
Predictor variable	**Adj. R^2**	***F* test**	**ΔR^2**	***F* test**	***B***	**Bootstrapped 95% CI**	β
Single-event trauma (ASPECTS; 9 weeks post-trauma)							
Step 1: Persistent dissociation	.41	$F_{1,226} = 161.0$*	.41	$F_{1,226} = 161.0$*	**2.22**	**(1.73, 2.71)**	**.34**
Step 2: Post-trauma cognitive processing	.75	$F_{4,223} = 172.4$*	.34	$F_{3,223} = 103.3$*			
Memory quality					**.50**	**(.35, .65)**	**.29**
Negative appraisals					**.32**	**(.26, .39)**	**.43**
Self-blame					.16	(−.23, .55)	.03
Multi-event trauma (C-CATS; baseline)							
Step 1: Persistent dissociation	.49	$F_{1,98} = 96.3$*	.49	$F_{1,98} = 96.3$*	**.89**	**(.14, 1.65)**	**.17**
Step 2: Post-trauma cognitive processing	.75	$F_{4,95} = 76.2$*	.26	$F_{3,95} = 35.6$*			
Memory quality					**.50**	**(.23, .76)**	**.27**
Negative appraisals					**.37**	**(.23, .52)**	**.50**
Self-blame					.23	(−.79, 1.24)	.03

Note: *B* and *β* are regression coefficients. 95% bootstrapped regression coefficients highlighted in bold did not cross zero.

*$p < .001$.

TABLE 5 Hierarchical regression model predicting functional impairment (CPSS & CATS) considering the effect of persistent dissociation and PTSS, following single- and multi-event trauma.

	Model		Step		Step 2		
Predictor variable	**Adj. R^2**	***F* test**	**ΔR^2**	***F* test**	***B***	**Bootstrapped 95% CI**	β
Single-event trauma (ASPECTS; 9 weeks post-trauma)							
Step 1: Persistent dissociation	.26	$F_{1,229} = 81.2$*	.26	$F_{1,229} = 81.2$*	**.14**	**(.02, .25)**	**.15**
Step 2: PTSS	.42	$F_{2,228} = 85.4$*	.16	$F_{1,228} = 66.5$*	**.08**	**(.06, .09)**	**.54**
Multi-event trauma (C-CATS; baseline)							
Step 1: Persistent dissociation	.17	$F_{1,98} = 20.7$*	.17	$F_{1,98} = 20.7$*	−.06	(−.22, .09)	−.09
Step 2: PTSS	.43	$F_{2,97} = 38.1$*	.26	$F_{1,97} = 46.1$*	**.10**	**(.07, .13)**	**.72**

Note: *B* and *β* are regression coefficients. 95% bootstrapped regression coefficients highlighted in bold did not cross zero.

*$p < .001$.

TABLE 6 Demographic and trauma factors by diagnostic group following single- (ASPECTS; 9 weeks post-trauma), multi-event (C-CATS; baseline) and mixed trauma (ASPECTS & C-CATS combined).

			PTSD-DS		PTSD-ND		No diagnosis	
	Trauma type	**Test of significant difference**	***M***	***SD***	***M***	***SD***	***M***	***SD***
Demographic factors								
Age	Single	$H(2) = 1.8, p = .415$	14.6	2.4	15.3	2.3	13.9	3.0
	Multiple	$H(2) = 1.2, p = .560$	13.8	2.9	14.0	2.8	13.2	1.9
	Mixed	$H(2) = 1.8, p = .403$	14.2	2.6	14.5	2.6	13.7	2.8
Ethnic minority, *n* (%)	Single	$\chi^2(2) = .7, p = .693$	1	(10.0%)	0	(0.0%)	13	(6.0%)
	Multiple	$\chi^2(2) = 1.1, p = .584$	1	(14.3%)	2	(18.2%)	7	(8.8%)
	Mixed	$\chi^2(2) = 1.0, p = .596$	2	(11.8%)	2	(11.1%)	20	(6.7%)
Female Sex, *n* (%)	Single	$\chi^2(2) = 2.1, p = .345$	2	(20.0%)	3	(42.9%)	94	(43.3%)
	Multiple	$\chi^2(2) = 11.4, p = .003$	4	(44.4%)[a]	11	(100%)[b]	42	(46.7%)[a]
	Mixed	$\chi^2(2) = 9.2, p = .010$	6	(31.6%)[a]	14	(77.8%)[b]	136	(44.3%)[a]
Trauma type								
Assault (non-sexual), *n* (%)	Single	$\chi^2(2) = 26.9, p < .001$	5	(50.0%)[a]	5	(71.4%)[b]	27	(12.4%)[c]
Sexual abuse, *n* (%)	Multiple	$\chi^2(2) = 1.7, p = .428$	4	(44.4%)	7	(63.3%)	36	(42.9%)

Note: Superscript letters represent significant between-group differences. Single-event trauma study (ASPECTS)—PTSD-DS ($n = 10$), PTSD-ND ($n = 7$) and no diagnosis ($n = 217$). Multi-event trauma study (C-CATS)—PTSD-DS ($n = 9$), PTSD-ND ($n = 11$) and no diagnosis ($n = 90$). Mixed trauma (ASPECTS & C-CATS)—PTSD-DS ($n = 19$), PTSD-ND ($n = 18$) and no diagnosis ($n = 307$). Groups were determined by self-report questionnaires (CPSS for ASPECTS and CATS for C-CATS).

Abbreviations: *M*, mean; *SD*, standard deviation.

DISCUSSION

This study is one of the first to investigate PTSD-DS in two child and adolescent populations, across both single-event and multi-event trauma indexes. The first part of the analysis primarily focussed on data from the single-event trauma study to establish the prevalence, course and prognostic ability of PTSD-DS regarding PTSD in youth. While the absolute prevalence rates indicated PTSD-DS is not common following traumatic exposure, a significant proportion of those who went on to meet the threshold for a diagnosis of PTSD also had PTSD-DS. The relative prevalence range of PTSD-DS as a proportion of PTSD of 39%–45% found in this study was higher than the pooled estimate for adults reported by White et al. (2022); although it needs to be re-stated that the prevalence of PTSD-DS calculated from the multi-event trauma data was based on child self-report rather than a structured interview. Additionally, the relative prevalence range of 39%–45% fell within the 95% confidence intervals for the prevalence of PTSD-DS in adults found in White et al. (2022). Nonetheless, the relatively high prevalence rate provides tentative further evidence that PTSD-DS is more common in children and adolescents than adults. This may be because symptoms of dissociation (depersonalization and derealization) stipulated as criteria in the DSM-5 are not specific enough indicators of this subtype in children, in contrast to adults (Kerig et al., 2016). The subtype model was proposed as a way of defining a rare dissociative subgroup (Lanius et al., 2012); however, experiences of depersonalization and derealization may be more common in children (Carlson et al., 2009). The 11th edition of the International Classification of Diseases (ICD-11; World Health Organization, 2019) conceptualizes Complex PTSD as a diagnosis defined by the addition of several symptoms that are indicative of a more complex and specific form of PTSD. Given dissociation is one of the several listed possible more complex symptoms, perhaps the ICD-11 framework for complex PTSD is a more appropriate fit for indexing a subgroup of individuals with a phenomenologically and epidemiologically different form of PTSD. There is evidence, for instance, that individuals with complex PTSD have elevated levels of dissociation (Hyland et al., 2020).

While the relative prevalence of PTSD-DS was higher following multi-event trauma compared to single-event trauma, key differences in how PTSD-DS was assessed may have impacted measured prevalence. Significant recovery was seen in rates of PTSD-DS without intervention following single-event trauma, which lends further evidence that course of dissociative symptoms is consistent with the natural reduction in PTSS over time.

The ability for PTSD-DS at 2 weeks post-trauma to predict PTSD at 9 weeks following single-event trauma was similar to the predictive ability of PTSD, although there was a marked drop-off in sensitivity. This may align with the premise that acute symptoms of dissociation are not predictive of later PTSD (Bryant et al., 2007; Dalgleish et al., 2008; Meiser-Stedman et al., 2005). However, the comparatively low sensitivity could be an artefact of the fact that PTSD-DS represents a subset of those with PTSD by definition (and as found previously around 39%–45% of those with PTSD have PTSD-DS).

The second part of this study, focussing on both data from youth exposed to single- and multi-event trauma, demonstrated that dissociation accounted for unique variance in both PTSS, over and above the variance accounted for by post-trauma cognitive processing factors (i.e., appraisals and memory quality). This held true when analyses were repeated cross-sectionally and longitudinally using 2 weeks post single-event trauma data, and using 2-week predictors and 9-week outcome variables post single-event trauma. Bennett et al. (2015) found in a sample of traumatized detained youth that higher levels of dissociation demonstrated higher levels of PTSS, and in adult populations, Evren et al. (2011) found that dissociation was predictive of impairment in physical functioning, general health and mental health components of quality of life. Perhaps dissociation is a key factor in the maintenance of PTSS and functional impairment, which would offer tentative evidence that a dissociative subtype of PTSD is an appropriate and clinically relevant diagnosis for children and young people.

A curious finding was that for multi-event trauma, persistent dissociation accounted for considerably less variance than PTSS in functional impairment, whereas at the final step, dissociation did not account for unique variance in functional impairment. Given cumulative childhood chronic maltreatment has been associated with more complex PTSD symptomology and dissociation (Bernier et al., 2013;

Hagenaars et al., 2011; van der Kolk et al., 2009), it was assumed that this might foster greater functional impairment. However, perhaps young people feel more able to cope with persistent dissociation over longer periods of time comparably to other PTSS, whereas following a single-event trauma, dissociation presents as a more novel and impactful symptom in the early stages of PTSD. It has been suggested that dissociation is a regulatory strategy for those who are emotionally overwhelmed (Waelde et al., 2009) and who have experienced chronic trauma (Lanius et al., 2010), and therefore are more likely to report less emotional distress. Further research is required to elucidate whether dissociation leads to more or less functional impairment following single- and multi-event trauma, over varying timeframes from the index trauma.

The final exploratory analysis was compromised by poor power and small sample size. Nonetheless, the comparisons of mixed trauma samples were more highly powered than those for single- and multi-event trauma only and indicated that female sex was associated with PTSD-ND rather than PTSD-DS. With regard to sex, there is conflicting evidence regarding associations to PTSD-DS: Műllerová et al. (2016) and Stein et al. (2013) found that PTSD-DS was associated with male sex, whereas Hagan et al. (2018) found that there was an association with female sex in a small sample of children. Further research is required to ascertain if sex is a risk factor for PTSD-DS following traumatic exposure using larger sample sizes.

This study has demonstrated that there is significant natural recovery in terms of PTSD-DS following single-event trauma, and therefore clinicians should be cautious about offering an intervention when a period of monitoring might be more beneficial. The dissociative subtype of PTSD at 2 weeks is no more predictive of later PTSD at 9 weeks when compared to early PTSD at 2 weeks. However, dissociation has been shown to be on par with other cognitive mechanisms that maintain PTSD such as fragmented memories and negative appraisals. While this latter cognitive mechanism appears to mediate treatment response (Jensen et al., 2018; Pfeiffer et al., 2017), no such interaction has been found regarding dissociation (Hoeboer et al., 2020). It has been suggested that treatments should be altered for individuals experiencing dissociation symptoms alongside PTSD (Lanius et al., 2010) and clinicians perceive dissociation to be a barrier to PTSD treatment (Becker et al., 2004; Ronconi et al., 2014). Perhaps dissociation does present as a factor in the maintenance of PTSS and promotes greater levels of functional impairment, and clinicians should target dissociation to the same degree as other cognitive processes in psychological therapy.

These results should be viewed in the context of several limitations. First, both single- and multi-event trauma samples were based on predominantly White British children based in two specific regions in the United Kingdom, having been exposed to specific types of trauma. Therefore, the results may not be generalizable. All self-report questionnaires were completed by children, and given that Hiller et al. (2021) reported poor agreement between child- and carer-reported measures of traumatic exposure, this raises questions about accuracy of reporting, where young people likely under-reported symptoms in the multi-event trauma study (C-CATS). Additionally, it must also be questioned whether some of the younger children in both studies had the ability to conceptualize depersonalization and derealization and to articulate changes to perceptions of their reality. Furthermore, self-reported measures were used to diagnose PTSD and PTSD-DS; some measures had been developed specifically for the single-event trauma study (ASPECTS) where construct validity could not be assessed. Finally, several analyses, particularly those presented in Table 6, were underpowered and were therefore unable to detect even large effect sizes or may have led to some bias. Small groups in Table 6 resulted in some chi-squared analyses breaking the assumption that fewer than 20% of cells have an expected count of less than 5. Unfortunately, a Fisher's exact test could not be conducted on account of the analysis being a 3×2 design.

CONCLUSION

The dissociative subtype of PTSD is prevalent in children with PTSD 9 weeks post single-event trauma (40.0%) and following multi-event trauma (45.0%). While PTSD-DS shows a similar trajectory of

natural recovery to PTSD, and it does not appear to be additionally indicative of later PTSD, dissociation has been shown to be a significant factor in PTSS. This study offers tentative evidence, therefore that PTSD-DS is a prevalent disorder in children and young people with PTSD, and dissociation is a factor in the maintenance of both PTSS and functional impairment. PTSD-DS was associated with sex although group comparisons were frustrated by very small sample sizes. Further research is required to inform its future in further editions of the DSM and other diagnostic systems, however, the diagnosis of PTSD-DS in children and young people may be clinically relevant and appropriate.

AUTHOR CONTRIBUTIONS

William F. White: Writing – review and editing; writing – original draft; project administration; formal analysis; investigation; conceptualization; methodology; software. **Aaron Burgess:** Supervision; writing – review and editing. **Tim Dalgleish:** Writing – review and editing; data curation. **Clare Dixon:** Writing – review and editing; data curation. **Sarah Halligan:** Writing – review and editing; data curation. **Rachel Hiller:** Writing – review and editing; data curation; funding acquisition. **Anna McKinnon:** Writing – review and editing; data curation. **Patrick Smith:** Writing – review and editing; data curation. **Richard Meiser-Stedman:** Data curation; software; methodology; conceptualization; validation; supervision; funding acquisition; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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