



# Childhood maltreatment type and severity predict depersonalization and derealization in treatment-seeking women with posttraumatic stress disorder

Christopher D. King<sup>a,\*</sup>, Sarah B. Hill<sup>a</sup>, Jonathan D. Wolff<sup>a</sup>, Cara E. Bigony<sup>a,c</sup>, Sherry Winternitz<sup>a,b</sup>, Kerry J. Ressler<sup>a,b</sup>, Milissa L. Kaufman<sup>a,b,1</sup>, Lauren A.M. Lebois<sup>a,b,1,\*</sup>

<sup>a</sup> McLean Hospital, Belmont, MA, USA

<sup>b</sup> Department of Psychiatry, Harvard Medical School, Boston, MA, USA

<sup>c</sup> Fordham University, The Bronx, NY, USA

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## ABSTRACT

The dissociative subtype of posttraumatic stress disorder (D-PTSD) is estimated to occur in approximately 14% of those with posttraumatic stress disorder (PTSD), and is characterized by clinically significant dissociative symptoms in addition to typical PTSD symptoms. Prior research has found childhood maltreatment contributes to dissociation and D-PTSD susceptibility, but more nuanced questions about the nature of childhood maltreatment remain unexplored. We investigated how childhood maltreatment type and severity are associated with the dissociative symptoms of D-PTSD among women with PTSD ( $N = 106$ ) receiving psychiatric care at a program specializing in trauma-related disorders. Participants completed self-report surveys of psychiatric symptoms and prior trauma exposure including the PTSD Checklist for DSM-5, the Dissociative Subtype of PTSD Scale, and the Childhood Trauma Questionnaire. We used multivariate linear regression to model the association of childhood maltreatment types and dissociation. In our final model childhood emotional abuse and physical abuse significantly predicted the dissociative symptoms of D-PTSD. This suggests childhood maltreatment type and severity, in particular of emotional and physical abuse, are associated with the dissociative symptoms of D-PTSD. This work points toward potential etiological contributions to D-PTSD.

## 1. Introduction

Dissociative symptoms are a common sequelae of trauma and are characterized by a disruption in the typical integration of psychological experience (Dell and O'Neil, 2009). Frequently, dissociative symptoms occur with posttraumatic stress disorder (PTSD). Indeed, a range of studies support the existence of a distinct class of individuals with PTSD who also have elevated dissociative symptoms, including a feeling of detachment from one's sense of self, body, thoughts and emotions (depersonalization), and a sense of detachment from one's environment (derealization).

A recent transdiagnostic meta-analysis of dissociative symptoms found that while these types of symptoms are elevated in all psychiatric disorders, levels of dissociation in the PTSD diagnostic category ranked behind only dissociative disorders (Lyssenko et al., 2018). An international epidemiological study of over 25,000 individuals found that

around 14.4% of individuals with PTSD also had significant depersonalization and derealization (Stein et al., 2013). Neurobiological research has also identified distinct neural activity and connectivity for individuals with PTSD reporting depersonalization and derealization (Daniels et al., 2016; Harricharan et al., 2016; Lanius et al., 2005). Findings from other studies suggest that prominent dissociative symptoms may impact clinical treatment for PTSD to various degrees (Bae et al., 2016; Cloitre et al., 2012; Resick et al., 2012; Wolf et al., 2016). Collectively, these findings have supported the utility of diagnosing and responding to this distinct subgroup of PTSD with specific therapeutic approaches.

Until recently, however, there was little convergence in the literature regarding theoretical explanations of how or why dissociation and PTSD co-occur. For example, a 2012 review found six theoretical models in the literature explaining the co-occurrence of dissociation and PTSD (Dalenberg and Carlson, 2012). The review found strongest

\* Corresponding author at: McLean Hospital, 115 Mill Street, Belmont, MA, 02478, USA.

E-mail address: [llebois@mclean.harvard.edu](mailto:llebois@mclean.harvard.edu) (L.A.M. Lebois).

<sup>1</sup> indicates authors contributed equally to the work

support for a component model (i.e., dissociative symptoms are generated from the same underlying process of PTSD symptom development, and are part of the normal variation in PTSD symptoms), and the subtype model (i.e., dissociative symptoms are distinct and associated with a different configuration of PTSD symptoms). Hansen et al. (2017) identify eleven studies that have used latent profile analysis (LPA) and latent class analysis (LCA) to empirically test the subtype model. These studies consistently identify a distinct class of individuals with PTSD who have high levels of depersonalization and derealization and comprising anywhere from 6% to 45% of individuals with PTSD, supporting a subtype model (Hansen et al., 2017). Although there are still proponents of the component model and others, findings from LPA and LCA have led to the recognition of a new dissociative subtype of PTSD (D-PTSD) in the DSM 5 (American Psychiatric Association, 2013). Given the prevalence of D-PTSD and the possible treatment implications of dissociation, the DSM 5 recognition of D-PTSD advances a clinically useful distinction with potentially significant implications for treatment of PTSD.

Many specific questions regarding the etiology of D-PTSD remain, but the literature generally identifies a role for both environmental influence and genetic predisposition. Two general population twin studies have found a large role for genetics, accounting for about 50%–60% of variation in dissociative symptoms (Becker-Blease et al., 2004; Jang et al., 1998). Using a candidate gene approach, other studies have identified several possible gene targets for a predisposition to the capacity to dissociate in trauma-exposed children and adults with significant psychiatric comorbidity, but without PTSD (Dackis et al., 2012; Koenen et al., 2005; Lochner et al., 2007; Pieper et al., 2011; Savitz et al., 2008). In addition, Wolf and colleagues (2014) conducted the first genome-wide association study to delineate genetic variants associated with D-PTSD in traumatized adults. While their findings did not reach genome-wide statistical significance, ten single nucleotide polymorphisms were associated at suggestive levels with dissociation symptom severity scores even after controlling for other PTSD symptom severity scores, adding to the data that heritability may explain some of the risk for D-PTSD.

Among possible environmental contributors, trauma exposure is consistently found to contribute to dissociative symptoms (Dalenberg et al., 2012), and by definition trauma exposure is a necessary precursor to PTSD. For instance, one study found that 90% of individuals with clinically significant dissociation had experienced trauma, whereas only 2% of those without trauma exposure experienced clinically significant dissociation (Briere, 2006). Although LCA and LPA studies rarely measure a consistent set of D-PTSD covariates, childhood maltreatment, particularly sexual abuse and physical abuse, are often significant risk factors for D-PTSD (Frewen et al., 2015; Steuwe et al., 2012; Wolf et al., 2012). In addition to the few LCA and LPA studies examining factors that differentiate PTSD and D-PTSD, many studies have examined predictors of dissociative symptom manifestation regardless of PTSD status (Briere and Runtz, 1988; Dalenberg and Palesh, 2004; Gušić et al., 2016; Haferkamp et al., 2015; Mueller-Pfeiffer et al., 2013; Mulder et al., 1998). These studies generally also find that childhood trauma, in particular, significantly contributes to dissociation.

Many cross-sectional studies have examined whether retrospectively assessed childhood maltreatment predicts current dissociative symptoms regardless of PTSD status. Consistent with LCA and LPA studies of D-PTSD, these studies generally find that childhood maltreatment predicts current dissociative symptoms. Childhood physical, sexual and emotional abuse are most consistently measured across studies, and are most consistently identified as predictors of current dissociation (Briere and Runtz, 1988; Dalenberg and Palesh, 2004; Dietrich, 2003; Gušić et al., 2016; Haferkamp et al., 2015; Mueller-Pfeiffer et al., 2013; Simeon et al., 2001; Van Ijzendoorn and Schuengel, 1996; Zelikovsky and Lynn, 2002). Notably, when controlling for other abuse types in multiple regression models, emotional

abuse, sometimes referred to as psychological abuse, is typically most predictive of current dissociation (Gušić et al., 2016; Haferkamp et al., 2015).

Longitudinal studies of dissociation are uncommon in the literature, but they generally align with cross-sectional studies implicating childhood environmental factors with dissociation. Two longitudinal studies have implicated features of early childhood caregiving with the manifestation of dissociation later in life. As with cross-sectional studies, Ogawa and colleagues (1997) found that chronicity and severity of childhood trauma predicted later levels of dissociation. They also found that earlier age at first trauma had a greater impact on the development of dissociation than later trauma. Notably, when using multiple regression modelling, maternal psychological unavailability, disorganized attachment style, and infant attention span accounted for 30% of the variation in dissociative symptoms at age 20 (Ogawa et al., 1997). In another longitudinal study, Carlson (1998) found that features of the early caregiving environment influenced later dissociation directly, and indirectly through disorganized attachment style.

The literature to date implicates childhood maltreatment broadly as a significant contributor to later life dissociation and D-PTSD susceptibility. Given these findings, the opportunity now exists to investigate more distinctly questions about the nature of childhood maltreatment. Most LPA and LCA cross-sectional studies have only examined childhood physical and sexual abuse. Given that all types of childhood maltreatment are highly correlated, and few studies implement multiple regression models that control for the severity of other childhood maltreatment types, it remains unclear which maltreatment types explain unique variance of dissociation or D-PTSD. Gabrielli and Jackson (2019) have noted the importance of comprehensively measuring as many aspects of childhood maltreatment history as possible. One potentially overlooked aspect of childhood maltreatment history as it relates to dissociation is the interactions between childhood maltreatment types. To our knowledge, no studies of dissociation have statistically tested interaction effects among childhood maltreatment types. Doing so may reveal more holistic characteristics of trauma that contribute to the development of D-PTSD, and may uncover targets for intervention. For example, some combinations of maltreatment (i.e. high levels of emotional abuse in the presence of high levels of sexual abuse) may be especially harmful or predictive of dissociation or D-PTSD.

Consequently, this study aimed to determine how variation in childhood maltreatment type and severity, predict D-PTSD in a population of women seeking treatment for trauma spectrum disorders. Specifically, to identify etiological factors that may differentiate the development of PTSD vs. D-PTSD, we sought to determine how childhood maltreatment type and severity associate with the dissociative symptoms that contribute to D-PTSD in a sample of participants with PTSD. We hypothesized that, consistent with prior multiple regression modelling in similar populations, higher emotional abuse severity would be significantly associated with D-PTSD in our sample. As an exploratory analysis, we hypothesized that we would identify statistical interactions between childhood maltreatment predictors. Lastly, given recent calls to assess a wider range of dissociative symptoms (Wolf et al., 2017) we also present results of associations between childhood maltreatment and dissociative amnesia.

## 2. Methods

### 2.1. Participants

All participants ( $N = 128$ ) in this cross-sectional study were women receiving treatment at a program specializing in treatment for women with histories of trauma and trauma-related disorders in a standalone psychiatric hospital in a large northeastern metropolitan area. This group-based program provides both residential and partial hospital-based treatment, and at time of the study 59.8% of participants were

receiving residential level of care, and 40.2% were receiving partial level of care. Participants had a mean age of 35.80 years (min = 18, max = 63), 89.3% identified as white, 4.1% identified as multiracial, 2.5% identified as American Indian, 1.7% identified as Black/African American, and 0.9% identified as Asian. All participants had experienced a traumatic event as measured by the Traumatic Life Events Questionnaire.

In the sample of patients ( $n = 123$ ) that completed all measures of the study, 106 (86.2%) met criteria for a preliminary diagnosis of PTSD as measured by the PTSD Checklist for DSM 5 (PCL-5). Below we report all results for only this subsample of participants meeting criteria for a preliminary diagnosis of PTSD. Of these 106 patients, 85 (80.2%) met criteria for a D-PTSD diagnosis, according to their lifetime depersonalization and derealization scores on the Dissociative Subtype of PTSD Scale (DSPS). Participants reported a mean of 9.17 (min = 1, median = 9, max = 22, SD = 4.02) traumatic events on the Traumatic Life Events Questionnaire, and a mean overall PTSD symptom severity score of 52.50 on the PCL-5 (min = 20, max = 77, SD = 10.63). Patients reported a mean score of 4.05 (min = 0, max = 7, SD = 2.37) on the DSPS lifetime derealization and depersonalization subscale, well above the threshold score of two, demarcating clinically significant dissociation.

## 2.2. Procedure

This study was approved by the study site Institutional Review Board. Patients seeking treatment at the study site were recruited to participate in a study about psychiatric symptoms between October 2016 and December 2018. After patients provided their treating clinician with either verbal or written consent to learn about a research study, a study research assistant approached the patient and described the study. Patients who agreed to participate completed the written informed consent process with a research assistant, and then completed a series of self-report questionnaires on a computer or mobile tablet device.

## 2.2. Measures

- 1) The Childhood Trauma Questionnaire (CTQ) - The CTQ is an extensively used 28-item self-report retrospective questionnaire assessing the severity of multiple maltreatment types in childhood and adolescence (Bernstein et al., 2003). The CTQ asks respondents to rate maltreatment experiences as a child and teenager (i.e. "people in my family hit me so hard that it left me with bruises or marks") on a five-point Likert scale ranging from 1 (*Never true*) to 5 (*Very often true*). The CTQ yields a sum severity score ranging from 25 to 125 and subscale severity scores for sexual abuse, physical abuse, physical neglect, emotional abuse, and emotional neglect each ranging from five to 25. Higher scores indicate greater severity of childhood maltreatment. In both clinical and non-clinical samples, the CTQ has been shown to have good reliability and validity (Bernstein et al., 2003). In our sample all CTQ subscales displayed good to excellent internal consistency: emotional abuse ( $\alpha = .86$ ), physical abuse ( $\alpha = .89$ ), sexual abuse ( $\alpha = .95$ ), emotional neglect ( $\alpha = .90$ ), and physical neglect ( $\alpha = .82$ ).
- 2) The Traumatic Life Events Questionnaire (TLEQ) - The TLEQ is an extensively refined and validated inventory of 23 traumatic events with demonstrated content validity and reliability (Kubany et al., 2000). This questionnaire asks whether and how many times respondents have experienced 22 types of traumatic events (i.e. "have you ever experienced the sudden and unexpected death of a close friend or loved one?") and an open-ended question asking respondents to describe "other" traumatic events. For each event selected, participants are asked follow up questions specific to the traumatic event, (i.e. "Due to accident?") and including whether they "experienced intense, fear, helplessness or horror when it

happened". This survey was used to establish the criterion A event for a preliminary diagnosis of PTSD.

- 3) The PTSD Checklist for DSM-5 (PCL-5) - The PCL-5 is a validated 20-item self-report questionnaire assessing PTSD symptoms by asking respondents "in the past month, how much were you bothered by" a range of PTSD symptoms related to a traumatic event (i.e. "repeated, disturbing, and unwanted memories of the stressful experience" (Blevins et al., 2015). Participants respond on a five-point Likert scale, ranging from 0 (*Not at all*) to 4 (*Extremely*). The PCL-5 has good test-retest reliability ( $r = .83$ ), convergent ( $r_s = .74$  to  $.85$ ) and discriminant ( $r_s = .31$  to  $.60$ ) validity (Blevins et al., 2015) and excellent internal consistency in our sample ( $\alpha = .93$ ). The PCL-5 reports a total score ranging from 0-80 and a cutoff score of 31-33 and above is sufficient for a preliminary diagnosis of PTSD (Bovin et al., 2016). As the PCL-5 assesses symptoms comprising each criterion of the DSM-V PTSD diagnosis, a preliminary diagnosis can be made following DSM-5 diagnostic rules and considering each item rated "moderate" or higher as an endorsed symptom (Blevins et al., 2015). This later method was used to establish a preliminary DSM-5 diagnosis of PTSD after using the TLEQ to assess for a criterion A trauma.
- 4) The Dissociative Subtype of PTSD Scale (DSPS). The DSPS is a 15 item self-report questionnaire assessing lifetime and past month dissociative symptoms (Wolf et al., 2017). Participants are first asked if they have experienced a dissociative symptom (i.e. "Have there been times when you were in a familiar place, yet it seemed strange and unfamiliar to you?"). Participants are then asked if and how frequently they have experienced the symptom in the past month and how strong the feeling was on a five-point Likert scale from 1 (*Not very strong*) to 5 (*Extremely strong*). The DSPS reports subscale scores for current, past month and lifetime presence of three dissociative symptoms: depersonalization/derealization (range: 0-7), loss of awareness (range: 0-6) and dissociative amnesia (range: 0-2). Higher scores indicate greater severity of symptoms. A cutoff score of two or above on the lifetime depersonalization and derealization scale is an optimal cutoff score with 100% sensitivity and 86% specificity for a preliminary diagnosis of D-PTSD if the patient meets criteria for PTSD (Wolf et al., 2017).

## 2.3. Statistical analysis

All survey scales were calculated according to published scoring guides. Prior to analysis observations with missing data ( $n = 5$ ) were removed. To assess the association of childhood maltreatment with the dissociative symptoms that contribute to D-PTSD, we constructed a series of multiple linear regression models. As our primary aim was to investigate how childhood maltreatment might contribute to the dissociative symptoms of D-PTSD in those with PTSD, only those participants with a preliminary diagnosis of PTSD ( $n = 106$ ) were included in this analysis. All models in the first model series featured the DSPS lifetime depersonalization and derealization scale as a continuous, linear dependent variable. Given our secondary aim to present findings on additional dissociative symptoms, the second model series featured the DSPS lifetime dissociative amnesia scale as a continuous, linear dependent variable.

As our first aim was to determine whether individual maltreatment types (i.e., emotional abuse, physical abuse, sexual abuse, physical neglect, emotional neglect) associated with dissociative symptoms above and beyond the associations of the others, we built a multiple regression model featuring all five trauma types measured in the CTQ. This allowed us to simultaneously control for contributions of other maltreatment types in the model. To ensure acceptable collinearity, we computed variance inflated factor (VIF) statistics for each variable in the model. Next, to address our exploratory aim, we tested all possible unique interactions between maltreatment types ( $n = 10$ ). This procedure was also repeated for the secondary outcome of dissociative

amnesia. Given our sample size ( $n = 106$ ), and our selected alpha level of  $p < .05$  prior to adjustment for multiple comparisons, we determined we would be able to detect a standardized interaction effect size of  $\beta = 0.27$  at 80% power for any given interaction between CTQ predictors.

This analysis implemented permutation re-sampling to recalculate p-values of all model variables. Permutation resampling estimates more robust p-values by generating a predetermined number of randomly generated samples against which to compare test statistics of the model built from the observed sample. This allows one to more precisely calculate how likely a finding is given a large random sample of all possible data sets, and consequently generate a more reliable p-value. For our analysis we used the permutation resampling algorithm for linear models implemented in the ‘permuco’ package in R (Frossard and Renaud, 2019). This algorithm also accounts for lack of the assumption of exchangeability, which may arise due to nuisance variables or when testing, as in this analysis, interactions (Winkler et al., 2014). Finally, to adjust for multiple comparisons all interaction term p-values were recalculated according to the Benjamini-Hochberg method. All analyses were performed using R version 3.6.0.

### 3. Results

The analyses that follow were completed only on the sample of participants ( $N = 106$ ) who met criteria for a preliminary diagnosis of PTSD. As presented in Table 1, the correlation matrix of all childhood maltreatment types demonstrated that all childhood maltreatment types were moderately to strongly correlated with each other and weakly to moderately associated with PCL-5 and DSPS depersonalization and derealization scores.

Table 2 presents the linear regression modelling of associations between childhood maltreatment variables and depersonalization / derealization among those with a preliminary PTSD diagnosis. The multiple regression model results presented are adjusted for covariates in the model. We found that without accounting for interactions between independent variables, emotional and physical abuse predicted depersonalization / derealization among those with PTSD. Specifically, emotional abuse predicted more depersonalization / derealization symptoms, while physical abuse predicted less depersonalization / derealization. The VIF statistics for all variables were less than 2.4, within a generally acceptable range. As presented in Supplementary Table 1, testing all 10 possible unique interactions between childhood maltreatment types resulted in no significant interactions at  $p < 0.05$  after accounting for multiple comparison corrections.

Table 3 presents the linear regression modelling of associations between childhood maltreatment variables and dissociative amnesia among those with a preliminary PTSD diagnosis. In this case only childhood physical abuse predicted dissociative amnesia. Specifically, greater severity physical abuse was associated with lower levels of dissociative amnesia. As presented in Supplementary Table 2, testing all 10 possible unique interactions between childhood maltreatment

Table 1

Correlation table of childhood maltreatment variables

	Mean	(SD)	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Emotional Abuse	16.64	(5.61)	-	.58***	.20*	.58***	.49***	.17*	.20*	.02	.39***
2. Physical Abuse	9.70	(5.45)		-	.52***	.43***	.61***	-.04	-.07	-.19*	.50***
3. Sexual Abuse	12.96	(7.46)			-	.22*	.38***	-.06	.08	-.01	.38***
4. Emotional Neglect	15.12	(5.23)				-	.61***	-.15	.05	-.05	.28**
5. Physical Neglect	9.86	(4.64)					-	.05	.07	-.09	.46***
6. PCL-5 Total Score	58.99	(10.63)						-	.23*	.14	.12
7. Depersonalization / Derealization	4.05	(2.37)							-	.24*	.16
8. Amnesia	1.18	(0.91)								-	-.14
9. Traumatic Events	9.17	(4.06)									-

Note. \*\*\* indicates  $p < .001$ , \*\* indicates  $p < .01$ , \* indicates  $p < .05$ . PCL-5 is the PTSD Checklist for DSM-5. DSPS is the Dissociative Subtype of PTSD Scale. Traumatic Events is the Traumatic Life Events Questionnaire.

Table 2

Childhood abuse type predicting depersonalization / derealization in a PTSD sample ( $n = 106$ )

Predictors	Estimates	CI	p
Emotional Abuse	0.18	0.08 – 0.29	.001
Physical Abuse	-0.20	-0.32 – -0.08	.002
Sexual Abuse	0.07	-0.00 – 0.13	.066
Physical Neglect	0.07	-0.06 – 0.21	.306
Emotional Neglect	-0.06	-0.18 – 0.05	.289
df	100		
F	3.19		
p	.010		
R <sup>2</sup>	0.14		

Table 3

Childhood abuse type predicting dissociative amnesia in a PTSD sample ( $n = 106$ )

Predictors	Estimates	CI	p
Emotional Abuse	0.04	-0.00 – 0.08	.064
Physical Abuse	-0.07	-0.11 – -0.02	.009
Sexual Abuse	0.02	-0.01 – 0.05	.160
Physical Neglect	0.00	-0.05 – 0.05	.987
Emotional Neglect	-0.01	-0.06 – 0.03	.623
df	100		
F	1.73		
p	.034		
R <sup>2</sup>	0.08		

types resulted in no significant interactions at  $p < 0.05$  after accounting for multiple comparison corrections.

### 4. Discussion

The current study identifies distinct features of childhood maltreatment that may contribute to the development of D-PTSD. We found that the childhood maltreatment type (i.e. emotional abuse, physical abuse) and maltreatment type severity associated with the severity of dissociation in this population of trauma-exposed treatment-seeking women. This suggests that retrospectively reported childhood maltreatment is significantly associated with the dissociative symptoms of D-PTSD in this population. Specifically, we found that higher levels of emotional abuse, and lower levels of physical abuse were associated with greater depersonalization and derealization. Contrary to our hypothesis, we did not identify an interaction relationship between childhood maltreatment types. Lastly, we found that physical abuse was negatively associated with dissociative amnesia.

As Spiegel and colleagues (2011) note, dissociation can be non-pathological and is often functionally adaptive. In contexts of severe and lasting trauma or unavoidable threat and maltreatment, dissociative responses may especially enhance resilience and the chance of survival. Unfortunately, dissociation may also be functionally pathological when maintained as a response to nonthreatening contexts. Consequently,



much of the etiology literature conceptualizes pathological dissociation as the development of an early adaptive capacity in response to overwhelming contexts. Following prior work, it is through this lens that we address the clinical and research implications for each of our findings below.

Our finding that childhood emotional abuse is associated with dissociation in women with PTSD aligns with previous work. Schore (2001) notes that emotional abuse may underlie all forms of abuse. Furthermore, it is unlikely that physical and sexual abuse could exist in a context in which emotional abuse was not also present, and in a way those types of abuse are also a type of emotional abuse. Indeed, we find that emotional abuse explains one of the largest portions of unique variance in dissociation, and is correlated with all other types of maltreatment in this population. This may account for the lack of a significant association between childhood sexual abuse and dissociation which has been reported in prior studies examining only bivariate relationships. A prior study of women receiving hospital-level of care for PTSD, which controlled for other trauma types in a multiple regression model, also found that emotional abuse was the strongest predictor of dissociation (Haferkamp et al., 2015). As Haferkamp and colleagues (2015) have speculated, emotional abuse may be as threatening to a child as other forms of abuse. Given the reliance on caregivers for survival, emotional abuse may signal impending existential danger and acutely activate the stress response. In the absence of an emotionally supportive caregiver, dissociation may be activated as a coping strategy to self-regulate the stress response. Dissociation in response to emotional abuse may also be especially effective for maintaining caregiver/child bond in the presence of caregiver abuse (Haferkamp et al., 2015). If emotional abuse is chronic and dissociation is consistently activated, it may be reinforced and maintained into adulthood as a pathological process.

The current study did not find evidence that abuse and neglect types interact to associate with dissociation in this sample. However, this may be an issue of statistical power – especially given that an interaction between, for example, emotional abuse and neglect may find support in the literature. As operationalized in the CTQ, which generally references maltreatment in the context of family/caregiver relationships, the severity of dissociation may increase in childhood environments with incongruity and contradiction: the presence of both sufficient emotional support and emotional abuse. In such caregiving environments, dissociation may arise from the child's struggle to integrate contradictory messages about the self (i.e. that one is both good and bad, or that one is both worthy and unworthy of love). Such an interpretation aligns with Main & Hesse's (1990) conceptualization of dissociation, whereby contradictory affective communication presents the child with incompatible models of self, prompting dissociation. Relatedly, a substantial line of research in the attachment field has observed a strong link between disorganized attachment style and dissociation. Infants with disorganized attachment styles view their caregiver as a source of both fear and comfort. This contradiction is thought to arise from contradictory, or unresponsive caregiver affective communication and is expressed by the infant as contradictory or disorganized attachment behaviors toward the caregiver (Main and Solomon, 1990). Notably, infants who display the hallmarks of disorganized attachment and who later experience trauma are more likely to experience dissociation later in life (Lyons-Ruth, 2003). Together this evidence suggests the utility of testing for an interaction between emotional abuse and neglect in higher-powered samples.

Lastly, to our knowledge our study is the first to find an inverse relationship between physical abuse and dissociative symptoms, in this case both depersonalization / derealization and dissociative amnesia. In fact, most studies on childhood maltreatment and dissociation find that physical abuse is positively associated with dissociation and D-PTSD (Frewen et al., 2015; Steuwe et al., 2012). Our finding may be accounted for by unique characteristics only found in this highly traumatized sample. These findings also may be merely an artifact of

multiple regression modelling of highly colinear variables, though VIF statistics for all variables were within an acceptable range and our use of permutation resampling strengthens these results. Future research should attempt to replicate and explore this finding in this population and others.

As always, there are limitations that should be addressed in future work. Although this study makes important findings regarding this specific population, the generalizability to other populations that differ clinically, diagnostically or demographically is unclear. In particular, the high percentage of the PTSD subsample with a preliminary diagnosis of D-PTSD (80.2%) is considerably higher than previously reported rates, which ranged from 6 - 45% in a review of LCA and LPA studies examining D-PTSD prevalence (Hansen et al., 2017). The high D-PTSD rate, may be a function of several factors: 1) the study site is known to treat dissociation and thus individuals with these symptoms may seek out this facility, 2) many of the patients seeking treatment in this program have histories of chronic childhood interpersonal trauma which may be associated with dissociative coping responses as discussed above (Cloitre et al., 2012; Hansen et al., 2017; Stein et al., 2013; Steuwe et al., 2012), and 3) we recruited from a partial and residential hospital program, representing a more acute level of care. D-PTSD may be more common at higher levels of care (Hill et al., 2019). Although treating the dissociation dependent variable continuously addresses some of these issues, future studies should seek to replicate and extend these findings in other populations. Also, we determined a preliminary PTSD and D-PTSD diagnosis via a self-report survey and did not confirm these diagnoses with gold standard clinician administered diagnostic interview assessment tools. Although the PCL-5 and DSPS have been rigorously assessed and validated, future studies should seek to diagnose these disorders via gold standard interviews. Lastly, this study retrospectively assessed childhood maltreatment. Thus, the accuracy of this measure is subject to the limitations of recall bias inherent in any retrospective assessment.

In conclusion, we identified features of childhood maltreatment that are correlates of D-PTSD in a sample of women seeking hospital-level treatment for trauma and trauma related disorders. This study adds to the body of work on potential etiological contributions to D-PTSD. Understanding the etiology of D-PTSD is important for improved psychoeducation, novel intervention, and prevention.

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## Authorship

LAML, JDW, SW, KJR and MLK developed the study concept and design. SBH, CEB, and JDW performed data collection. CDK performed the data analysis, and CDK and LAML interpreted the data. CDK drafted the paper, and all authors provided critical revisions. All authors approved the final version of the paper for submission.

## Disclosures

Dr. Ressler serves on scientific advisory boards of Verily and Janssen, provides scientific consultation for Alkermes and Biogen, and has received research grants from Brainsway and Takeda. The remaining authors declare no potential conflicts of interest with respect to the authorship or the publication of this article.

## Declaration of Competing Interest

Dr. Ressler serves on scientific advisory boards of Verily and Janssen, provides scientific consultation for Alkermes and Biogen, and has received research grants from Brainsway and Takeda. The remaining authors declare no potential conflicts of interest with respect to the authorship or the publication of this article.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2020.113301](https://doi.org/10.1016/j.psychres.2020.113301).

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