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Posttraumatic cognitions predict distorted body perceptions in women with dissociative identity disorder

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ABSTRACT

Background: Dissociative identity disorder (DID) is a psychobiological syndrome associated with a history of exposure to childhood abuse and neglect. The consequences of these traumatic events often include a profound impact on the way individuals inhabit and experience their bodies. Despite this, there is a paucity of empirical research on the subject. The aim of this study was to systematically document the occurrence of distorted body perceptions in DID and examine childhood maltreatment, posttraumatic stress disorder (PTSD) symptom severity, and posttraumatic cognitions as predictors of distorted body perceptions in DID.
Methods: Participants were adult women with histories of childhood abuse and neglect and a current DID diagnosis receiving treatment at a psychiatric care facility. Data were obtained through a battery of self-report measures, including the Body Uneasiness Test, Childhood Trauma Questionnaire, PTSD Checklist for DMS-5, and Posttraumatic Cognitions Inventory.
Results: A series of unpaired t-tests documented elevated levels of weight phobia, body image concerns, body avoidance, compulsive self-monitoring, and depersonalization in DID compared to published non-clinical data on the Body Uneasiness Test. A series of multiple regression models including measures of childhood trauma, PTSD symptoms, and posttraumatic cognitions demonstrated that over and above childhood trauma and PTSD symptom severity, posttraumatic cognitions significantly predicted distorted body perceptions.
Conclusions: In a treatment-seeking sample of women with DID, distorted body perceptions were elevated. Furthermore, posttraumatic cognitive distortions significantly predicted distorted body perceptions when controlling for childhood maltreatment and PTSD symptom severity. This suggests that distorted cognitions are a key target for therapeutic intervention.

Introduction

Dissociative identity disorder (DID) is a psychobiological syndrome associated with a history of exposure to abuse and neglect during childhood most often at the hands of a caregiver (Dorahy et al., 2014; Putnam et al., 1986). Studies consistently show that childhood trauma has innumerable effects on the development and health outcomes of those who experience it (Teicher et al., 2016; de Bellis, 2001; Afifi et al., 2016). One such effect can be observed in the way individuals inhabit and experience their bodies as adults (van der Kolk, 2014). Despite extensive clinical accounts of body-related distortions in individuals with histories of childhood trauma (Goodwin and Attias, 1999) and DID (Steinberg and Schnall, 2001; Dell, 2006a), there is a paucity of empirical research exploring possible predictors of distorted body perceptions in this population.

Trauma-related body distortions

Childhood trauma-related body distortions manifest in a number of different ways (Scheffers et al., 2017). However, most fall within two

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overarching categories: (1) depersonalization; and, (2) negative body image and perceptions.

Depersonalization. Depersonalization is generally described as a feeling of detachment from one's body or sense of self (APA, 2013). Experiences of depersonalization are widely endorsed in individuals with histories of childhood trauma (Putnam, 1989; Simeon et al., 2001) and are a core feature of DID (Spiegel et al., 2011; Dorahy et al., 2014). Individuals who experience depersonalization may endorse statements such as "I feel detached from my body" or "I feel the sensation that my body does not belong to me" (Cuzzolaro et al., 2006). Specifically in DID, individuals experience even more extreme forms of depersonalization in which their own thoughts, emotions, memories, and behaviors can feel as if they do not belong to them (Dell, 2006a). For these individuals, it is not simply a sensation of detachment or unfamiliarity, but often rather the experience of their thoughts, emotions, etc. as belonging to *someone else* (Frewen and Lanius, 2015).

Lack of a felt sense of ownership over one's body and its experiences, which often includes a lack of interoceptive awareness, may serve as an adaptive coping response to childhood trauma (van der Hart et al., 2006). At the time of the trauma, and even years later, perceiving the body and its internal sensations as "not mine" may allow the child to survive overwhelming experiences of threat and preserve attachment bonds necessary for survival (Freyd, 1996).

Negative body image and perceptions. *Body shape and weight dissatisfaction.* Individuals with histories of childhood trauma frequently endorse experiences of body shape and weight dissatisfaction, as well as a lack of body esteem. These body-related beliefs may originate in a negative self-concept formed early in life (Harter, 2001). Self-concept is defined as the view one has of oneself and one's attributes (Baumeister, 1999). Caregivers play a critical role in the development of a child's positive self-concept, and this development starts with the formation of a positive emotional bond in infancy (Harter, 2001). When caregivers fail to provide an environment that facilitates this development, as is often the case in the type of significant childhood trauma reported by individuals with DID, a negative self-concept may form (Harter, 2001). This negative self-concept persists into adulthood and may be manifested, at least in part, in one's physical self-image, resulting in lack of body esteem in adulthood.

Body hatred/disgust, avoidance, and shame. The consequences of childhood trauma can also be reflected in the hatred and/or disgust of one's body. Particularly in cases of childhood physical and sexual abuse, which are unique in their violation of physical boundaries, the whole body itself, parts of it, or bodily sensations may serve as a constant reminder of the trauma. This is often the case for individuals with DID (Steele et al., 2016; Van der Hart et al., 2006). It follows that one might experience hatred and/or disgust of, and thus avoidance of and shame in, that which reminds them of such experiences – in this case, the physical body. Furthermore, one's hatred of their physical body may stem from a misattribution of blame for the traumatic experience. To feel some control over their traumatic experiences, individuals with DID may place blame on themselves and their physical body (e.g., "If I didn't have a body, I would never have been hurt") rather than placing blame for the abuse on the perpetrator (Steele et al., 2016).

Clinical reports also suggest that these negatively valenced emotions (e.g., disgust, shame) may be rooted in a sense of bodily betrayal experienced during trauma. For example, in cases of sexual abuse, one's body may (against one's will) respond to the abuse with arousal, despite lack of desire (Steele et al., 2016). This discrepancy between subjective and physiological arousal, or arousal non-concordance, may be quite common, even outside an abuse context (Chivers et al., 2010). This finding supports the fact that physiological arousal equates to neither enjoyment nor consent. Nevertheless, individuals may mistakenly think that physiological arousal does equate to enjoyment/consent, or their abuser may lead them to believe that it does. Thus, an individual's bodily shame, disgust, etc. may at least in part be rooted in that individual's sense of being betrayed by their own body, and this sense of betrayal is frequently observed in DID (Steele et al., 2016).

Potential predictors of trauma-related body distortions

Although prior studies have explored the link between experiences of trauma and distorted body perceptions, few have parsed out the distinct contributions of specific types of abuse to the development of these perceptions. A review of the literature reveals that most studies do not incorporate multiple forms of abuse and neglect into their analysis. Instead, they look at sexual abuse alone (Wonderlich et al., 2000; Wenninger and Heiman, 1998), or combine physical and sexual abuse into a single representation of the general experience of childhood abuse (Eubanks et al., 2006). Studies of sexual abuse as a potential predictor of distorted body perceptions present mixed results – while some found that sexual abuse, but not physical abuse, contributed to the development of these body distortions (e.g., Kremer et al., 2013), others find the reverse to be true (e.g., Treuer et al., 2005). Given how little we know about the development of trauma-related body distortions, it is critical we explore all forms of abuse and neglect (e.g., emotional, physical, and sexual) as potential unique contributors to the development of these distortions.

Another lens through which we can begin to understand the development of trauma-related body distortions originates in the perceived stress literature, which suggests that the consequences of stress present themselves only when: 1) the event is *perceived* as stressful; and, 2) the individual lacks the resources necessary to cope with this stressor (Lazarus and Folkman, 1984; Lebois et al., 2016). Within the context of childhood trauma exposure, it is plausible that the severity of its consequence – in this case, distorted body perceptions – is determined not completely by the trauma itself, but rather the degree to which the trauma is perceived as stressful.

One way in which we can quantify perceived stress is through the assessment of posttraumatic symptoms and negative cognitions. Posttraumatic symptoms reflect the wide array of symptoms (e.g., avoidance, hypervigilance, etc.) that can form following a traumatic experience. Posttraumatic cognitions represent the negative thoughts and beliefs that may emerge following a traumatic event, and are subsequently believed to contribute to the development and maintenance of the aforementioned posttraumatic symptoms (Dunmore et al., 1999). More specifically, these cognitions encompass negative thoughts about oneself ("I am inadequate"), the world ("the world is a dangerous place"), and attribution of blame for the traumatic experience ("the event happened because of the way I acted"; Foa et al., 1999). It is posited that individuals who maintain these rigid negative beliefs about themselves or the world have difficulty recovering from the traumatic event due to the resulting persistent experience of internal or external threat (Ehlers and Clark, 2000). Posttraumatic symptoms and cognitions are thus representative of perceived stress in that they are the manifestation of the trauma's impact on the individual's body and mind.

Experiment overview

Despite the ubiquity of body distortions among individuals with histories of childhood trauma and subsequent DID, empirical studies are needed to document the occurrence of these distortions in DID and investigate their predictors. Indeed, a deeper understanding of this phenomenon is critical to identifying potential targets for therapeutic intervention.

Given this, we systematically documented the occurrence of distorted body perceptions with a standardized measure and investigated potential predictors of distorted body perceptions in twenty-one treatment-seeking women with DID. Participants completed a battery of self-report measures, including measures of distorted body perceptions, childhood trauma severity, posttraumatic stress disorder (PTSD) symptom severity, and posttraumatic negative cognitions. We hypothesized that 1) distorted body perceptions would be prevalent in this sample,

particularly in comparison to an age- and gender-matched non-clinical sample, 2) childhood trauma severity would predict the severity of body distortions, and 3) over and above childhood trauma severity, PTSD symptom severity and posttraumatic negative cognitions would predict body distortions. Given the mixed literature on which type of trauma (e.g., sexual abuse vs. physical abuse) is the most predictive of distorted body perceptions (e.g., Kremer et al., 2013; Treuer et al., 2005), we chose to include a range of maltreatment types, with intent to explore the individual contributions of each type. Additionally, given individual differences in perceived stress, we anticipated that body distortions would be better predicted by posttraumatic symptoms and cognitions (which serve as a proxy for perceived stress) than by the traumatic experience itself.

Materials and methods

Participants

Participants were twenty-one treatment-seeking women receiving inpatient, residential, or partial hospitalization level of care at a free-standing psychiatric facility. All participants reported histories of early childhood trauma and carried both current PTSD and DID diagnoses. A diagnosis of PTSD was made using the gold standard Clinician Administered PTSD Scale for DSM 5 (Weathers et al., 2018), and a diagnosis of DID was made using the gold standard Structured Clinical Interview for DSM-IV-R Dissociative disorders (Steinberg et al., 1994). Diagnostic interviews were conducted by trained bachelor (JDW) and MD/PhD (LAML, MLK, SRW) level research staff. A final diagnosis was made for each participant by a psychiatrist with an expertise in dissociative disorders (MLK). See Tables 1 and 2 for participant demographics and clinical characteristics. The control comparison sample was drawn from a previously published non-clinical sample of 367 women aged 40–65 (Cuzzolaro et al., 2006).

Measures

The Body Uneasiness Test (BUT; Cuzzolaro et al., 2006) is a 71-item self-report measure developed and validated as a psychometric tool for the screening and assessment of distorted body perceptions. Part 1 of the BUT assesses weight phobia, body image concerns, avoidance, compulsive self-monitoring, and depersonalization. Part 2 assesses specific worries about particular body parts. Parts 1 and 2 both utilize a 6-point Likert scale ranging from 0, "Never," to 5, "Always." A total distorted body perception severity score is represented by the BUT Global Severity Index, which is calculated as the average rating of all 34 items constituting Part 1 of the BUT. Global Severity Index scores range from 0 to 5, with higher scores indicating more severe negative body perceptions. We used the global severity scores as our measure of distorted body perceptions.

Table 1
Participant demographics.

Age, mean ± SD	43.47 ± 13.79
Sex assigned at birth, N (%)	
Female	21 (100%)
Gender, N (%)	
Female	19 (90.5%)
Missing	2 (9.5%)
Race, N (%)	
Black/African American	1 (4.8%)
White	18 (85.7%)
Missing	2 (9.5%)
Ethnicity, N (%)	
Non-Hispanic/Non-Latinx	17 (81%)
Other	2 (9.5%)
Education, N (%)	
Grade 7 to 12 (without graduating high school)	1 (4.8%)
Part of College	5 (23.8%)
Graduated 2 Year College	1 (4.8%)
Graduated 4 Year College	3 (14.3%)
Part of Graduate/Professional School	2 (9.5%)
Completed Graduate/Professional School	7 (33.3%)
Missing	2 (9.5%)

Note: $N = 21$.

Table 2
Clinical characteristics.

Diagnoses, N (%)	
PTSD	21 (100%)
DID	21 (100%)
Body Uneasiness Test (BUT), mean ± SD	
Global Severity Index (Range: 0–5)	2.61 ± 1.07
Weight Phobia (Range: 0–5)	2.83 ± 1.31
Body Image Concerns (Range: 0–5)	2.76 ± 1.27
Avoidance (Range: 0–5)	2.29 ± 1.12
Compulsive Self-Monitoring (Range: 0–5)	1.79 ± 1.11
Depersonalization (Range: 0–5)	2.61 ± 1.12
Childhood Trauma Questionnaire (CTQ), mean ± SD	
Total Childhood Trauma (Range: 25–125)	82.85 ± 15.57
Emotional Abuse (Range: 5–25)	19.65 ± 4.63
Physical Abuse (Range: 5–25)	12.25 ± 4.94
Sexual Abuse (Range: 5–25)	20.95 ± 4.03
Emotional Neglect (Range: 5–25)	18.55 ± 3.20
Physical Neglect (Range: 5–25)	11.45 ± 3.58
PTSD Checklist for DSM-5 (PCL-5), mean ± SD	
Total Symptom Severity Score (Range: 0–80)	50.52 ± 14.29
Posttraumatic Cognitions Inventory (PTCI), mean ± SD	
Total Score (Range: 33–231)	164.76 ± 35.15
Negative Cognitions About the Self (Range: 1–7)	4.29 ± 1.07
Negative Cognitions About the World (Range: 1–7)	5.66 ± 0.91
Self-Blame (Range: 1–7)	5.11 ± 1.16

Note: $N = 21$ for BUT, PCL-5, and PCTI; $N = 20$ for CTQ.

The Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994) is a 28-item self-report measure designed to systematically assess childhood maltreatment severity. The CTQ asks participants about the frequency of certain events in childhood on a 5-point Likert scale ranging from "Never true" to "Very often true". This measure has five subscales measuring physical, sexual, and emotional abuse, and physical and emotional neglect. Research supports the reliability and validity of the CTQ, particularly with regard to internal consistency and test-retest reliability (Bernstein et al., 1994, 1997). Subscale scores range from 5 to 25, and total scores range from 25 to 125. Higher scores indicate greater childhood trauma severity.

The PTSD Checklist for DMS-5 (PCL-5; Weathers et al., 2013) is a 20-item self-report measure used to assess PTSD symptoms on a 5-point Likert scale ranging from "Not at all" to "Extremely." Psychometric analysis of the PCL-5 has identified it as a valid, reliable, and sensitive measure of PTSD symptoms (Wortmann et al., 2016). The PCL-5 Global Severity score was used as our measure of PTSD symptom severity. Scores range from 0 to 80, with higher scores indicating greater symptom severity.

The Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999) is a 33-item self-report measure developed for the assessment of cognitions about the self, world, and attribution of blame surrounding a traumatic event on a 7-point Likert scale ranging from "Totally disagree" to "Totally agree". Psychometric evaluations of the PTCI found for two of the three subscales good concurrent and discriminant validity, as well as adequate internal consistency (Foa et al., 1999; Adreu et al., 2017). Given this, the PTCI total score was used as our measure of posttraumatic negative cognitions. Scores range from 33 to 231, with higher scores indicating greater negative posttraumatic cognitions.

Procedure

Participants were recruited as part of a larger study on the biological mechanisms of trauma-related dissociation. In addition to biological assessments not reported here, participants completed a battery of self-

report measures on body perceptions (BUT), childhood trauma (CTQ), PTSD symptoms (PCL-5), and posttraumatic cognitions (PTCI). Participants were compensated $200 for completion of the full study. All procedures were in accordance with the ethical standards of the Partners Hospital Institutional Review Board, and the United States Federal Policy for the Protection of Human Subjects. Written informed consent was obtained from all participants following an explanation of the study's procedures.

Data analysis

All self-report scores were calculated as recommended by published scoring guidelines. A series of unpaired t-tests with publicly available published age- and gender-matched control data and our DID data tested for distorted body perceptions in DID. A series of multiple regression analyses were conducted to determine whether childhood trauma, PTSD symptom severity, and/or posttraumatic cognitions were predictors of distorted body perceptions in individuals with DID. Reported p-values are two-tailed. All calculations were computed using SPSS version 24.

Results

Range of distorted body perceptions in DID

We first sought to document the occurrence and range of distorted body perceptions in this treatment-seeking sample of twenty-one women with DID. As illustrated in Table 2, the average Body Uneasiness Test (BUT) Global Severity Index score for our sample was 2.61 out of a possible range of 0–5. In comparison, publicly available published data showed an average BUT Global Severity Index score of 0.90 for an age-matched, non-clinical sample of women (Cuzzolaro et al., 2006). Body Uneasiness Test subscale scores for our DID sample (Table 2) indicated an elevated occurrence on average of all measured body distortions, including weight phobia, body image concern, body avoidance, compulsive self-monitoring, and depersonalization. A series of unpaired t-tests between our sample and the previously published non-clinical sample (Cuzzolaro et al., 2006) demonstrate all BUT scales were highly elevated in our DID sample compared to reported averages in age-matched female controls (p's < 0.01; Table 3).

Predictors of distorted body perceptions

The following results are illustrated in Table 4. We hypothesized that the severity of childhood trauma would predict distorted body perceptions in our sample, such that higher total Childhood Trauma Questionnaire scores would confer higher total Body Uneasiness Test scores. A multiple regression of all five forms of abuse and neglect (i.e., physical, sexual, and emotional abuse, and physical and emotional neglect) confirmed our hypothesis (Model 1). Of note, there was no specific form of abuse or neglect driving the prediction of distorted body perceptions. Given this, we subsequently modeled the total childhood trauma severity score (calculated as the sum of all five forms of abuse and neglect) as the singular predictor of distorted body perceptions in Model 2. This model confirmed that higher total childhood trauma severity scores predicted higher distorted body perceptions.

In addition, we hypothesized that over and above childhood trauma, PTSD symptom severity and posttraumatic cognitions would predict distorted body perceptions. Therefore, we next modeled total childhood trauma severity and PTSD symptom severity as predictors of distorted body perceptions (Model 3). While the overall model was significant, the total childhood trauma severity beta value was not, and the PTSD symptom severity beta value was marginally significant.

Our next model tested the relationship between posttraumatic cognitions and distorted body perceptions. Given that PTSD symptom severity was marginally significant in Model 3, in Model 4, we included PTSD symptom severity and posttraumatic cognition severity as predictors of distorted body perceptions. In this model, posttraumatic cognitions were the only significant predictor of distorted body perceptions. In a final confirmatory analysis (Model 5), we modeled posttraumatic cognitions alone as a predictor of distorted body perceptions.

Table 3
Summary of unpaired T-Tests.

BUT Scores	Our DID Sample (N = 21)		Control Sample (N = 367)			
	M	SD	M	SD	t	p
Global Severity Index	2.61	1.07	0.9	0.81	7.21	<.0001
Weight Phobia	2.83	1.31	1.35	0.91	5.11	<.0001
Body Image Concerns	2.76	1.27	1.05	0.93	6.08	<.0001
Avoidance	2.29	1.12	0.45	0.69	7.45	<.0001
Compulsive Self-Monitoring	1.79	1.11	0.96	0.64	3.39	.001
Depersonalization	2.61	1.12	0.4	0.67	8.95	<.0001

*Note: Participants in the previously published control sample were age- and gender-matched to our DID sample (aged 40–65). See Cuzzolaro et al., 2006 for published control data.

Table 4
Predicting distorted body perceptions[a] in a DID sample using a series of multiple regression analyses.

Model		R^2	F	df	β	t	p
1	*Overall Model*	0.55	3.35	5, 14			0.034*
	CTQ[b] Sexual Abuse				0.39	1.67	0.117
	CTQ Physical Abuse				−0.05	−0.16	0.874
	CTQ Physical Neglect				−0.45	−1.48	0.161
	CTQ Emotional Abuse				0.51	1.63	0.126
	CTQ Emotional Neglect				0.37	1.31	0.211
2	CTQ Total Severity	0.23	5.25	1, 18			0.034*
3	*Overall Model*	0.38	5.25	2, 17			0.017*
	CTQ Total Severity				0.19	0.81	0.428
	PCL-5 Symptom Severity				0.49	2.07	0.054
4	*Overall Model*	0.62	17.21	2, 18			0.000*
	PCL-5 Symptom Severity				0.14	0.79	0.441
	PTCI Total Score				0.72	4.03	0.001*
5	PTCI Total Score	0.65	34.49	1, 19			0.000*

Note: N = 21. Items with an asterisk (*) are statistically significant ($p < .05$).
[a] Distorted body perceptions are represented by Global Severity Index scores on the Body Uneasiness Test.
[b] CTQ is the Childhood Trauma Questionnaire; PCL-5 is the Posttraumatic Stress Disorder Checklist; PTCI is the Posttraumatic Cognitions Inventory.

Discussion

DID is a posttraumatic syndrome associated with significant experiences of distorted body perceptions, including depersonalization (Putnam, 1989; Dorahy et al., 2014) and altered body image/perceptions (Dell, 2006b). However, to date, the range of these distorted body perceptions has not been documented systematically, and the predictors of these experiences have remained unexplored in DID. Empirical evidence of these predictors will facilitate identification of targets for therapeutic intervention, as well as the identification of individuals at elevated risk for developing these distorted body perceptions. Given these important

clinical goals, we assessed the occurrence of distorted body perceptions in DID and tested the relationship between childhood trauma severity, PTSD symptom severity, posttraumatic negative cognitions, and distorted body perceptions in a well-characterized sample of treatment-seeking women with DID. We confirmed our hypotheses that childhood trauma would predict distorted body perceptions, and that over and above childhood trauma severity, PTSD symptom severity and posttraumatic cognitions would predict distorted body perceptions.

Range of distorted body perceptions in DID

This study marks the first use of the Body Uneasiness Test (BUT) as a measure of body image perceptions in individuals with DID. We found that the global severity of these experiences was nearly 3x higher than published averages in age-matched, female, non-clinical controls (Cuzzolaro et al., 2006). Furthermore, all measured subscales were elevated in our sample compared to these controls. That is, individuals with DID on average reported elevated fear of being or becoming fat (weight phobia), worries related to physical appearance (body image concerns), body avoidance behaviors, compulsive checking of physical appearance (compulsive self-monitoring), and depersonalization experiences of detachment from their body.

Of note, the BUT was designed specifically for use in eating disorder populations, and it is the only existing eating disorder assessment tool that includes a discrete measure of depersonalization symptoms. Given the prevalence of depersonalization in DID, the BUT is uniquely suited to assess body perceptions in this population.

Furthermore, among the BUT's subscales, its depersonalization subscale has the highest predictive validity for eating disorders (Cuzzolaro et al., 2006). The more commonly used Eating Disorder Examination (Cooper et al., 1989), the gold standard eating disorder assessment tool (Berg et al., 2012), does not account for the dissociative component of distorted body experiences. At the same time, while the BUT incorporates dissociative symptomatology, it does not capture disordered eating behaviors, the assessment of which may be critical to identifying more immediate safety concerns. An ideal measure would incorporate a wide array of body perceptions (including a range of dissociative symptoms) as well as a thorough assessment of disordered eating behaviors. Such a tool may be especially useful for the assessment of distorted body perceptions, trauma-related disordered eating, and co-occurring eating disorders in DID samples.

Childhood trauma type predicted distorted body perceptions

We found that childhood trauma severity was significantly predictive of distorted body perceptions in our sample of women with DID. This finding is consistent with the understanding that experiences of childhood trauma confer, broadly speaking, worse mental and physical health outcomes (see Hughes et al., 2017 for a systematic review and meta-analysis). As the severity of the trauma increases, it follows that the severity of the mental health outcome (in this case, distorted body perceptions) would increase as well. Contrary to previous work in individuals with childhood maltreatment histories and/or eating disorder diagnoses (e.g., Kremer et al., 2013; Treuer et al., 2005), we did not find that any specific form of abuse uniquely predicted distorted body perceptions in DID. Instead, we found that overall interpersonal childhood maltreatment severity predicted distorted body perceptions – a finding which may be specific to DID. In our DID sample, and typically for those with DID, individuals experience high severity and frequency of all forms of abuse/neglect, and these experiences are intertwined (e.g., sexual abuse is also a form of emotional abuse). Alternatively, higher-powered DID samples may find unique contributions of certain maltreatment types. Given this, although no single form of abuse or neglect stood out as contributing most to the development of distorted body perceptions in this sample, it is critical that future investigations continue to examine the unique contributions of each maltreatment type.

Posttraumatic symptoms predicted distorted body perceptions

When we included PTSD symptoms and posttraumatic negative cognitions in the model with childhood maltreatment, posttraumatic negative cognitions were the only significant predictor of distorted body perceptions. Our measure of posttraumatic negative cognitions (PTCI; Foa et al., 1999) focused on distorted negative cognitions surrounding oneself, the world, and attribution of blame for the traumatic experience. Among distorted negative cognitions, shame, in particular, has been identified as relevant to the development of dissociative processes and DID (Kluft, 2007; Chefetz, 2015). Herman posits that the link between shame and trauma disorders (such as DID) originates in the shame experienced in the social subordination inherent to interpersonal trauma (Herman, 2011). Furthermore, individuals with DID may blame themselves and their physical body for their abuse instead of the perpetrator (Steele et al., 2016). Internalized shame and misattributed blame, among other self-directed negative cognitions, may manifest in one's physical self-perceptions. This may be a central cause of the predictive relationship we found between posttraumatic negative cognitions and distorted body perceptions in DID.

The impact posttraumatic negative cognitions have on body perception is likely because our in-the-moment interoceptive and exteroceptive experience of the body is constructed based on a combination of past experiences stored in memory and incoming sensory input (Barrett and Simmons, 2015; Lebois et al., 2019; Panichello et al., 2012). In this way, distorted negative cognitions about one's self can influence how someone perceives their physical body. In DID specifically, shame about their body or blame they place on themselves or their body for the abuse may contribute to perceived lack of ownership or agency over their body (Lebois et al., 2019). It is through this lens that we can begin to understand why distorted negative cognitions may serve as a strong predictor of body distortions in women with histories of childhood trauma and subsequent DID.

Developmental sensitivity

The developmental timing of abuse may also inform our understanding of the role of negative cognitions in the formation of distorted body perceptions. Young children have a developmentally appropriate egocentrism, that is, the inability to differentiate between one's own perspective and that of another – or, in other words, the inability to see a situation from another's perspective (Piaget, 1972). Given this self-centered conceptual framework, a maltreated child is developmentally prone to assume that they are the cause of and/or deserving of such treatment. Young children are also prone to dichotomous, or "all-or-nothing," thinking (Harter, 2001). Children with nurturing and supportive caregivers tend to view themselves as inherently "all good," such that a single scolding or punishment is not sufficient to disrupt their positive self-concept. For children who are abused and whose basic needs are neglected, a negative self-concept is chronically reinforced, such that the child's perception of the self is "all bad" (Harter, 2001). This all-or-nothing thinking, in conjunction with egocentrism, may lead to the self-blame and self-hatred that often follows childhood maltreatment to be generalized to the whole self, including the physical body.

Limitations

When considering the implications of this study, it is important to bear in mind the limitations presented by our study sample and design. Our principle limitation is small sample size; however, the well-characterized nature of our cohort, the limited number of studies on treatment-seeking clinical populations with DID, and the statistical significance of our findings despite a small *N* speak to the importance of

this work. Notably, our study examined treatment-seeking women with DID, and therefore our findings may not be generalizable beyond this clinical population. Future work should seek to replicate these findings in larger and broader samples. Additionally, while we diagnosed individuals with the gold-standard clinical interviews, symptom assessments were collected via self-report surveys, and thus may be subject to self-report bias. Future work should seek to identify objective behavioral and biomarkers of distorted body perceptions to bolster subjective self-report findings.

Clinical implications and conclusions

This study was the first to employ an empirical approach to exploring predictors of distorted body perceptions in women with DID, and we identified posttraumatic negative cognitions as a significant predictor of these body perceptions. This may have clinical implications for how we think about and treat distorted body perceptions and related disordered eating behaviors in individuals with histories of childhood trauma and subsequent DID. Given that posttraumatic cognitions predict the severity of body distortions in this sample, these cognitions should be a targeted focus of therapeutic interventions. Furthermore, the elevated occurrence of various distorted body perceptions in DID highlights the need to address distorted body perceptions as part of the clinical care of all women with histories of childhood trauma (and subsequent DID) – not just for those with co-occurring eating disorders.

Location of study

McLean Hospital, Belmont, MA.

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Role of funding source

Funding sources had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the article for publication.

Data sharing

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CRediT authorship contribution statement

Julia B. Merker: Conceptualization, Data curation, Formal analysis, Writing - original draft. **Sarah B. Hill:** Investigation, Data curation, Writing - review & editing. **Jonathan D. Wolff:** Investigation, Data curation, Writing - review & editing. **Sherry R. Winternitz:** Data curation, Writing - review & editing. **Kerry J. Ressler:** Writing - review & editing. **Milissa L. Kaufman:** Conceptualization, Supervision, Funding acquisition, Writing - review & editing. **Lauren A.M. Lebois:** Conceptualization, Methodology, Software, Investigation, Resources, Formal analysis, Supervision, Funding acquisition, Project administration, Writing - review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Dr. Kerry J. Ressler has received consulting income or sponsored research from Alkermes, Brainsway and Genomind, and is on scientific advisory boards for Janssen, Takeda, and Verily.

All other authors declare no conflicts of interest with respect to the authorship or publication of this article. Dr. Lauren Lebois reports grants from the National Institute of Mental Health during the conduct of the study. Dr. Kaufman reports support from the Trauma Initiative Fund and the Trauma Scholars Fund at McLean Hospital during the conduct of the study.

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References

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders, fifth ed. American Psychiatric Publishing, Virginia.

Afifi, T.O., MacMillan, H.L., Boyle, M., Cheung, K., Taillieu, T., Turner, S., Sareen, J., 2016. Child abuse and physical health in adulthood. Health Rep. 27, 10–18.

Andreu, J.M., Peña, M.E., de La Cruz, M.Á., 2017. Psychometric evaluation of the Posttraumatic Cognitions Inventory (PTCI) in female survivors of sexual assault. Women Health 57, 463–477. https://doi.org/10.1080/03630242.2016.1153019.

Barrett, L.F., Simmons, W.K., 2015. Interoceptive predictions in the brain. Nat. Rev. Neurosci. 16, 419–429.

Baumeister, R.F., 1999. The nature and structure of the self: an overview. In: Baumeister, R. (Ed.), The Self in Social Psychology. Psychology Press (Taylor & Francis), Pennsylvania, pp. 1–20.

Berg, K.C., Peterson, C.B., Frazier, P., Crow, S.J., 2012. Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: a systematic review of the literature. Int. J. Eat. Disord. 45, 428–438. https://doi.org/10.1002/eat.20931.

Bernstein, D.P., Ahluvalia, T., Pogge, D., Handelsman, L., 1997. Validity of the childhood trauma questionnaire in an adolescent psychiatric population. J. Am. Acad. Child Adolesc. Psychiatry 36, 340–348. https://doi.org/10.1097/00004583-199703000-00012.

Bernstein, D.P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., Ruggiero, J., 1994. Initial reliability and validity of a new retrospective measure of child abuse and neglect. Am. J. Psychiatr. 151, 1132–1136. https://doi.org/10.1176/ajp.151.8.1132.

Chefetz, R.A., 2015. Intensive Psychotherapy for Persistent Dissociative Processes: the Fear of Feeling Real. W.W. Norton & Company, New York.

Chivers, M.L., Seto, M.C., Lalumière, M.L., Laan, E., Grimbos, T., 2010. Agreement of self reported and genital measures of sexual arousal in men and women: a meta-analysis. Arch. Sex. Behav. 39, 5–56. https://doi.org/10.1007/s10508-009-9556-9.

Cooper, Z., Cooper, P.J., Fairburn, C.G., 1989. The validity of the eating disorder examination and its subscales. Br. J. Psychiatry 154, 807–812. https://doi.org/10.1192/bjp.154.6.807.

Cuzzolaro, M., Vetrone, G., Marano, G., Garfinkel, P.E., 2006. The Body Uneasiness Test (BUT): development and validation of a new body image assessment scale. Eat. Weight Disord. 11, 1–13.

De Bellis, M.D., 2001. Developmental traumatology: the psychobiological development of maltreated children and its implications for research, treatment, and policy. Dev. Psychopathol. 13, 539–564. https://doi.org/10.1017/s0954579401003078.

Dell, P.F., 2006a. The phenomena of pathological dissociation. In: Dell, P.F., O'Neil, J.A. (Eds.), Dissociation and the Dissociative Disorders: DSM-V and beyond. Taylor & Francis Group, New York, pp. 225–237.

Dell, P.F., 2006b. A new model of dissociative identity disorder. Psychiatr. Clin. 29, 1–26. https://doi.org/10.1016/j.psc.2005.10.013 vii.

Dorahy, M.J., Brand, B.L., Sar, V., Krüger, C., Stavropoulos, P., Martínez-Taboas, A., Lewis Fernández, R., Middleton, W., 2014. Dissociative identity disorder: an empirical overview. Aust. N. Z. J. Psychiatr. 48, 402–417. https://doi.org/10.1177/0004867414527523.

Dunmore, E., Clark, D.M., Ehlers, A., 1999. Cognitive factors involved in the onset and maintenance of posttraumatic stress disorder (PTSD) after physical or sexual assault. Behav. Res. Ther. 37, 809–829. https://doi.org/10.1016/s0005-7967(98)00181-8.

Ehlers, A., Clark, D.M., 2000. A cognitive model of posttraumatic stress disorder. Behav. Res. Ther. 38, 319–345. https://doi.org/10.1016/s0005-7967(99)00123-0.

Eubanks, J.R., Kenkel, M.Y., Gardner, R.M., 2006. Body-size perception, body-esteem, and parenting history in college women reporting a history of child abuse. Percept. Mot. Skills 102, 485–497. https://doi.org/10.2466/pms.102.2.485-497.

Foa, E.B., Ehlers, A., Clark, D.M., Tolin, D.F., Orsillo, S.M., 1999. The posttraumatic cognitions inventory (PTCI): development and validation. Psychol. Assess. 11, 303–314. https://doi.org/10.1037/1040-3590.11.3.303.

Frewen, P., Lanius, R., 2015. Healing the Traumatized Self: Consciousness, Neuroscience, Treatment. W. W. Norton & Company, New York.

Freyd, J.J., 1996. Betrayal Trauma: the Logic of Forgetting Childhood Abuse. Harvard University Press, Massachusetts.

Goodwin, J., Attias, R., 1999. Splintered Reflections: Images of the Body in Trauma. Basic Books, New York.

Harter, S., 2001. The Construction of the Self. In: Developmental and Sociocultural Foundations, second ed. The Guilford Press, New York.

Herman, J.L., 2011. PTSD as a shame disorder. In: Dearing, R.L., Tangney, J.P. (Eds.), Shame in the Therapy Hour. American Psychological Association, Washington, DC, pp. 261–275.
Hughes, K., Bellis, M.A., Hardcastle, K.A., Sethi, D., Butchart, A., Mikton, C., Jones, L., Dunne, M.P., 2017. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. Lancet Public Health 2, e356–e366. https://doi.org/10.1016/S2468-2667(17)30118-4.
Kluft, R.P., 2007. Applications of innate affect theory to the understanding and treatment of dissociative identity disorder. In: Vermetten, E., Dorahy, M.J., Spiegel, D. (Eds.), Traumatic Dissociation: Neurobiology and Treatment. American Psychiatric Press, Inc, Virginia, pp. 301–316.
Kremer, I., Orbach, I., Rosenbloom, T., 2013. Body image among victims of sexual and physical abuse. Violence Vict. 28, 259–273. https://doi.org/10.1891/0886-6708.VV-D-12-00015.
Lazarus, R.S., Folkman, S., 1984. Stress, Appraisal, and Coping. Springer, New York.
Lebois, L.A.M., Hertzog, C., Slavich, G.M., Barrett, L.F., Barsalou, L.W., 2016. Establishing the situated features associated with perceived stress. Acta Psychol. 169, 119–132.
Lebois, L.A.M., Wolff, J.D., Hill, S.B., Bigony, C.E., Winternitz, S., Ressler, K.J., Kaufman, M.L., 2019. Preliminary evidence of a missing self bias in face perception for individuals with dissociative identity disorder. J. Trauma & Dissociation 20, 140–164.
Panichello, M., Cheung, O., Bar, M., 2012. Predictive feedback and conscious visual experience. Front. Psychol. 3, 620.
Piaget, J., 1972. Judgment and Reasoning in the Child. In: Warden Trans, M. (Ed.). Routledge & Kegan Paul, London (Original work published 1924).
Putnam, F.W., 1989. Diagnosis and Treatment of Multiple Personality Disorder. Guilford Press, New York.
Putnam, F.W., Guroff, J.J., Silberman, E.K., Barban, L., Post, R.M., 1986. The clinical phenomenology of multiple personality disorder: review of 100 recent cases. J. Clin. Psychiatr. 47, 285–293.
Scheffers, M., Hoek, M., Bosscher, R.J., van Duijn, M.A.J., Schoevers, R.A., van Busschbach, J.T., 2017. Negative body experience in women with early childhood trauma: associations with trauma severity and dissociation. Eur. J. Psychotraumatol. 8, 1322892. https://doi.org/10.1080/20008198.2017.1322892.
Simeon, D., Guralnik, O., Schmeidler, J., Sirof, B., Knutelska, M., 2001. The role of childhood interpersonal trauma in depersonalization disorder. Am. J. Psychiatr. 158, 1027–1033. https://doi.org/10.1176/appi.ajp.158.7.1027.
Spiegel, D., Loewenstein, R.J., Lewis-Fernández, R., Sar, V., Simeon, D., Vermetten, E., Cardeña, E., Dell, P.F., 2011. Dissociative disorders in DSM-5. Depress. Anxiety 28, 824–852. https://doi.org/10.1002/da.20874.
Steele, K., Boon, S., van der Hart, O., 2016. Treating Trauma-Related Dissociation: A Practical, Integrative Approach (Norton Series on Interpersonal Neurobiology). WW Norton & Company, New York.
Steinberg, M., 1994. Structured Clinical Interview for DSM-IV Dissociative Disorders – Revised (SCID-D-R), second ed. American Psychiatric Press, Washington, DC.
Steinberg, M., Schnall, M., 2001. The Stranger in the Mirror. HarperCollins Publishers Inc., New York.
Teicher, M.H., Samson, J.A., Anderson, C.M., Ohashi, K., 2016. The effects of childhood maltreatment on brain structure, function and connectivity. Nat. Rev. Neurosci. 17, 652–666. https://doi.org/10.1038/nrn.2016.111.
Treuer, T., Koperdák, M., Rózsa, S., Füredi, J., 2005. The impact of physical and sexual abuse on body image in eating disorders: impact of Physical and Sexual Abuse on Body Image in. Eur. Eat Disord. Rev. 13, 106–111. https://doi.org/10.1002/erv.616.
Van der Hart, O., Nijenhuis, E.R., Steele, K., 2006. The Haunted Self: Structural Dissociation and the Treatment of Chronic Traumatization. WW Norton & Company, New York.
van der Kolk, B.A., 2014. The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma. Penguin Books, New York.
Weathers, F.W., Bovin, M.J., Lee, D.J., Sloan, D.M., Schnurr, P.P., Kaloupek, D.G., Keane, T.M., Marx, B.P., 2018. The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5): development and initial psychometric evaluation in military veterans. Psychol. Assess. 30, 383–395. https://doi.org/10.1037/pas0000486.
Weathers, F.W., Litz, B.T., Keane, T.M., Palmieri, P.A., Marx, B.P., Schnurr, P.P., 2013. The PTSD checklist for DSM-5 (PCL-5). Scale available from the National Center for PTSD at. www.ptsd.va.gov.
Wenninger, K., Heiman, J.R., 1998. Relating body image to psychological and sexual functioning in child sexual abuse survivors. J. Trauma Stress 11, 543–562. https://doi.org/10.1023/A:1024408830159.
Wonderlich, S.A., Crosby, R.D., Mitchell, J.E., Roberts, J.A., Haseltine, B., DeMuth, G., Thompson, K.M., 2000. Relationship of childhood sexual abuse and eating disturbance in children. J. Am. Acad. Child Adolesc. Psychiatry 39, 1277–1283. https://doi.org/10.1097/00004583-200010000-00015.
Wortmann, J.H., Jordan, A.H., Weathers, F.W., Resick, P.A., Dondanville, K.A., Hall-Clark, B., Foa, E.B., Young-McCaughan, S., Yarvis, J.S., Hembree, E.A., Mintz, J., Peterson, A.L., Litz, B.T., 2016. Psychometric analysis of the PTSD Checklist-5 (PCL-5) among treatment-seeking military service members. Psychol. Assess. 28, 1392–1403. https://doi.org/10.1037/pas0000260.