

# Dissociation in Posttraumatic Stress Disorder Part I: Definitions and Review of Research

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Since Janet wrote about dissociation in the early 1900s, the relationship between traumatic stress and dissociation has been discussed and debated in the fields of psychology and psychiatry. In the last 25 years, research has been conducted that allows empirical examination of this relationship and the question of how dissociative symptoms are related to posttraumatic stress disorder (PTSD). After defining the types of dissociative experiences that are considered most relevant to PTSD, we present a comprehensive and systematic review of research addressing the relationship between dissociation and traumatic stress; the rise in dissociation after traumatic stress and its subsequent decline over time; the relationship between dissociation and symptoms of PTSD in nonclinical, clinical, and PTSD samples; the conditional probability of high PTSD symptoms when dissociation level is high; the relationships among dissociation and re-experiencing, avoidance, and hyperarousal symptoms of PTSD; and biological studies of dissociation in PTSD.

*Keywords:* dissociation, traumatic stress, trauma, posttraumatic stress disorder, PTSD

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The idea that dissociation could be a psychological response to traumatic stress has been discussed in the literature for over a century (Putnam, 1985; Spiegel & Cardeña, 1990; Spiegel, 1986; van der Kolk, Brown, & van der Hart, 1989), but the *Diagnostic and Statistical Manual for Mental Disorders—Fourth Edition (DSM-IV)* diagnostic criteria for posttraumatic stress disorder (PTSD) includes only two of many symptoms that are considered dissociative (lack of recall of an important aspect of the trauma and behavioral or emotional re-experiencing). This may have been the result of the fact that relatively little empirical work that focused on dissociative symptoms in response to traumatic stress had been published when the *DSM-IV* and International Classification of Diseases-10 (ICD-10) were developed. It was not until publication of dissociation measures in the late 1980s (Bernstein & Putnam, 1986; Briere & Runtz, 1987) that studies of the relationship of dissociative symptoms to traumatic stress began to appear. In 1999, a review of the first 12 years of research on trauma, disso-

ciation, and PTSD concluded that there are fairly strong relationships between dissociation and trauma and between dissociation and PTSD (Gershuny & Thayer, 1999). In 2012, as the revision of ICD began and revisions to the *DSM-IV* diagnostic criteria were considered, another 12 years of empirical work is now available to inform questions about how dissociation relates to traumatic stress and to PTSD symptoms. After briefly describing the domains of dissociation that are most relevant to traumatic stress, we present a comprehensive review of empirical work that addresses major questions about dissociation and traumatic stress. The review provides a basis for consideration of theoretical models for the relationship between trauma and dissociative symptoms and for recommendations about their inclusion in the diagnostic criteria for PTSD, which is presented in Part II of this article (Dalenberg & Carlson, 2012).

## The Domains of Dissociation

Before addressing central questions about the relationship of dissociation to trauma and PTSD, it is important to define the domains of dissociation considered relevant to PTSD. A recent global definition of dissociation is “an experienced loss of information or control over mental processes that, under normal circumstances, are available to conscious awareness, self-attribution, or control, in relation to the individual’s age and cognitive development” (Cardeña & Carlson, 2011, p. 251). Dissociative experiences generally fall into one of three domains: (1) loss of continuity in subjective experience accompanied by involuntary and unwanted intrusions into awareness or behavior; (2) an inability to access information or control mental functions that are normally

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amenable to such access or control; or (3) a sense of experiential disconnectedness that may include distortions in perceptions about the self or the environment (Cardeña & Carlson, 2011). Experiences that are described as dissociative span a wide range, from mild and relatively benign lapses in awareness that occur in everyday life to severe identity dissociation that occurs almost exclusively in those with dissociative disorders. In those with PTSD or complex PTSD, dissociation is typically manifested in mild or moderately severe forms that are disruptive, but not as extreme or pervasive as in those with dissociative disorders (Ginzburg, Butler, Saltzman, & Koopman, 2009; Steele, van der Hart, & Nijenhuis, 2009; Waelde, Silvern, Carlson, Fairbank, & Kletter, 2009). For example, in PTSD, there may be distortions in perceptions about the self, but not complete identity dissociation as in Dissociative Identity Disorder (DID).

Common symptoms in those with PTSD in the domain of loss of continuity with intrusions include intrusions of trauma-related affect, cognition, images, sensory perceptions, or behavior into daily life (also referred to as dissociative re-experiencing). Dissociative re-experiencing includes a range of sensory and perceptual experiences in which elements of past threatening situations are experienced in the present. Dissociative re-experiencing symptoms can be very brief and intense, such as a momentary, trauma-related misperception of some environmental sensory stimulus. For example, a person with past exposure to combat trauma may hear a car backfire and momentarily misperceive the sound as gunfire. Symptoms that fall into the domain of inability to access or control mental functions include disruptive gaps in awareness or memory. Gaps in awareness are experienced as blanking out or losing track of what is going on around one. Common symptoms for trauma survivors of experiential disconnectedness or distortions in perceptions of the self or environment include derealization and depersonalization. Derealization refers to distortions in perceptions of objects, events, or one's surroundings. People experiencing derealization may feel that the environment around them seems "unreal" or perceive themselves as disconnected from activities going on around them as if they were watching a movie. Depersonalization refers to distortions in perceptions of the self, parts of the body, or one's sense of agency. A person experiencing depersonalization may feel strange or disconnected from his or her body or may report that a normal sense of agency in behavior is missing or distorted.

Some relatively mild dissociative experiences, such as brief gaps in awareness, experiences of imaginative involvement, and experiences of intense absorption occur in those with various diagnoses and in those with no psychiatric disorders. Because of high-base rates for occasional occurrence of these dissociative experiences, they are often considered "normal" or "nonpathological." However, as Dalenberg and Paulson (2009) discuss, a high frequency of normal dissociation predict the presence of pathological diagnoses. Benign behaviors or experiences are commonly included in diagnostic criteria when they occur at extremely high rates and are disruptive to functioning, such as hand washing behaviors in obsessive-compulsive disorder. For this reason, we did not limit the review to research on "pathological" dissociation.

Peritraumatic dissociative (periTD) experiences do not appear to be appropriate for inclusion in the criteria for PTSD because, unlike the other symptoms included, they occur at a specific time in the past. They are also distinct phenomenologically from current

dissociation symptoms. PeriTD is assessed in the vast majority of studies by the Peritraumatic Dissociative Experiences Questionnaire and operationalized as dissociation at the time of trauma and immediately afterward (Marmar, Metzler, & Otte, 2004). The difference in phenomenology of periTD and persisting dissociation symptoms is apparent in the relatively small observed empirical relationship between the two (e.g.,  $r = .25$ ; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996). Furthermore, retrospective reports of periTD that are not collected very soon after trauma have been found to be unstable and strongly influenced by psychological symptoms at the time of measurement. In a prospective study of traumatically injured patients, retrospective reports of periTD among those who developed PTSD showed low, nonsignificant correlations with reports of periTD made soon after the event (David, Akerib, Gaston, & Brunet, 2010). In other words, reports about periTD were changing over time for those with PTSD. A loss of confidence in the clinical importance of peritraumatic responses is also reflected in the fact that the proposed diagnostic criteria for PTSD for *DSM-IV* no longer include Criterion A2, which specifies peritraumatic responses (Friedman, Resick, Bryant, & Brewin, 2010; Phillips, 2009).

### Empirical Questions and Findings Related to Dissociation and Trauma

This review presents the results of the most rigorous research from the past 24 years that addresses questions about the relationship between traumatic stress and dissociation. Studies were located by searching the Medline, PsycInfo, and PILOTS databases for the years 1986 (the year of publication of the first published measure of dissociation) to 2011. For Medline and PsycInfo, we searched for keywords using the combination "*dissociative or dissociation*" and "*trauma or traumatic or child abuse or sexual abuse or disaster or catastrophe*." For PILOTS, only *dissociative or dissociation* was used because all records in the PILOTS database relate to traumatic stress. We included only those studies that used a validated measure of dissociation. Studies included also either sampled a population exposed to a known traumatic stressor or used a validated measure of PTSD, a validated measure of trauma exposure, or a detailed, behaviorally specific set of items to assess exposure to particular potentially traumatic experiences. To observe the relationship among trauma exposure, PTSD, and dissociation, it was important that study samples not be selected based on any variable highly likely to be associated with trauma severity, PTSD, or dissociation. For this reason, we did not include studies that only sampled people seeking treatment for a trauma-related disorder (e.g., Acute Stress Disorder, PTSD, and any dissociative disorder) or studies that sampled only people exposed to a stressor that is so extreme that there is little variance in response (e.g., torture victims, prisoners of war). Studies were included of "unselected" samples of various populations that are heterogeneous in their exposure to trauma and their levels of PTSD and dissociation (e.g., general population, community, students, psychiatric inpatients, psychiatric outpatients, veterans, and substance abuse patients). We also included samples of people with known exposure to particular traumatic stressors (e.g., hospitalized for accidental injuries, refugees, and disaster victims) so long as the sample was not selected by some variable that would effectively limit the

heterogeneity of the sample in respect to trauma exposure, PTSD, or dissociation. Studies were excluded if they included fewer than 30 subjects. Most of the findings presented were published in peer-reviewed journals, but when no published studies address particular questions, we also report new analyses of data from published studies and analyses of recently collected, not yet published data.

### Questions 1 and 2: Does Dissociation Relate to Trauma Exposure and Trauma Severity?

Research relevant to this question falls into three categories: (1) research on dissociation symptoms in various diagnostic groups, (2) research on the relationship between trauma exposure and dissociation, and (3) research on the relationship between dissociation and trauma severity.

### Dissociation in Trauma-Related Diagnoses

If dissociation relates to trauma exposure and severity, then dissociative symptoms should be more frequent in those with trauma-related psychiatric diagnoses. Figure 1 shows means and 95% confidence intervals for nine diagnostic categories or disorders and two general population samples from a collaborative study including over 1,500 participants (Carlson & Putnam, 1993). Marked elevations in dissociation were observed in PTSD, DID, and other dissociative disorders, which are all described as having trauma etiologies in *DSM-IV* and are all categorized as stress-related disorders in ICD-10. Similarly, the work group responsible for PTSD and dissociative disorders for *DSM-IV* is considering the possibility of creating a new category of disorders that includes adjustment disorder, PTSD, and dissociative disorders (Phillips, 2009).

Dissociation occurring in the context of dissociative disorders has been related to trauma exposure in virtually all major theoretical writings on dissociative disorders (e.g., Dell, 2009; Putnam, 1985; Spiegel & Cardena, 1991; Spiegel, 1984). Research addressing this question directly is rare because of the low base rate for dissociative disorders and the absence of dissociation measures in

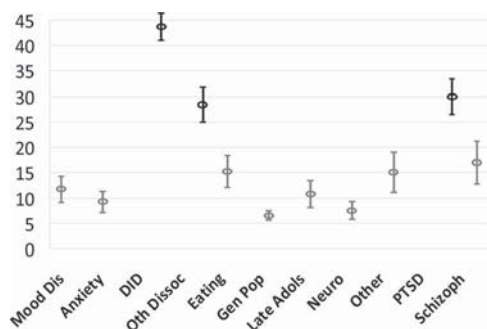


Figure 1. Mean levels of dissociation across diagnostic groups. Bars represent *SDs*. Mood Dis = Mood Disorders (Affective Disorders); Anxiety = Anxiety Disorders; DID = Dissociative Identity Disorder; Oth Dissoc = Dissociative Disorders other than DID; Eating = Eating Disorders; Gen Pop = General Population; Late Adols = Late Adolescents; Neuro = Neurological Disorders; Other = Other Disorders; PTSD = Posttraumatic Stress Disorder; Schizophr = Schizophrenia.

typical psychiatric admissions batteries. Furthermore, studies of patients in trauma-specific dissociative disorder programs are problematic to interpret because they may have a positive bias in reports of trauma exposure. One study, however, sampled consecutive admissions to an inner-city hospital-based psychiatric clinic and found that 71% of patients with a dissociative disorder reported a childhood physical abuse history, and 75% reported a childhood sexual abuse history, compared with 29 and 28%, respectively, in patients without a dissociative disorder diagnosis (Odds ratios [OR] 5.86 and 7.87,  $p$  values  $> .001$ ) (Foote, Smolin, Kaplan, Legatt, & Lipschitz, 2006). We also conducted analyses of reports of any type of childhood abuse in a carefully assessed, large, unselected sample of psychiatric inpatients (Carlson et al., 2001). Of those with no dissociative disorder, 73% reported some type of childhood abuse, compared with 98% of those with a dissociative disorder (OR 20.6,  $p < .0001$ ). These findings support the conclusion that dissociation in those with dissociative disorders is indeed associated with trauma exposure.

### Dissociation and Trauma Exposure

Many studies have investigated whether level of dissociation is associated with exposure to trauma. Table 1 shows means and standard deviations for trauma exposure and control groups and Cohen's  $d$  values for effect size (when data were available to calculate  $d$ ). The studies shown used a variety of measures of dissociation and studied a wide variety of trauma types in non-clinical and clinical samples. Mean differences and effect sizes were significant for all and ranged from moderate to very large ( $M = 0.67$ ). Differences in effect sizes are likely because of variations in severity of trauma across trauma types or in the range of trauma severity and dissociation across samples, to time elapsed since trauma exposure, to differences in the rigor of study methods, and to differences across measures in the representation of different types of dissociation. Elevated dissociation has also been found in samples of refugees (Carlson & Rosser-Hogan, 1991), people seeking support after violent homicides of loved ones (Rynearson & McCreery, 1993), and in battered women (Weaver & Clum, 1996).

### Dissociation and Trauma Severity

Research findings in a wide variety of clinical and nonclinical populations on the relationship between level of dissociation and level of trauma severity or frequency is shown in Table 2. Variation in effect sizes across studies is likely because of the type of traumatic stressor studied, the range of frequency and/or severity of trauma exposure in the sample studied, and the capacity of the measures used to accurately quantify trauma exposure. Correlations are also provided in Table 2 for the relationship between trauma and PTSD symptoms when available. Notably, in the studies that included both dissociation and PTSD, the average sizes of the relationships between dissociation and trauma severity or frequency weighted by sample size (.36) are comparable with those between trauma severity or frequency and PTSD symptoms (.39).

To examine the specificity of the relationship between trauma and dissociation, we calculated the partial correlation between

Table 1  
Levels of Dissociation Across Trauma Exposure Groups

Study	Control		Trauma		Cohen's <i>d</i>	Sample types of trauma dissociation		Exposure measure
	<i>N</i>	Mean ( <i>SD</i> )	<i>N</i>	Mean ( <i>SD</i> )		Type		
<b>Nonclinical samples</b>								
Briere and Elliott (2000)	879	49.8 (9.9)	48	53.9 (11.8)	.38	General population	Fire	TSI-DIS
	886	49.7 (9.9)	41	55.6 (12.4)	.53	General population	Flood	TSI-DIS
Briere and Runtz (1988)	881	49.8 (10.0)	46	53.8 (10.1)	.40	General population	Tornado	TSI-DIS
Britton and Bootzin (2004)	191	6.46 (Nr)	33	7.39 (Nr)	.44	Female undergrads	Childhood sexual abuse	HSL-D
Davis et al. (2001)	20	7.2 (4.8)	23	11.4 (9.0)	.58	Community	Near death experiences	DES
	200	6.18 (4.9)	58	7.86 (6.01)	.31	Female undergrads	Sexual abuse only	TSI-DIS
	200	6.18 (4.9)	35	8.21 (5.68)	.38	Female undergrads	Physical abuse only	TSI-DIS
	200	6.18 (4.9)	22	9.63 (5.29)	.68	Female undergrads	Physical + sexual abuse	TSI-DIS
Elliot, Mok, and Briere (2004)	358	4.4 (4.5)	104	7.7 (5.4)	.66	General population females	Adult sexual assault	TSI-DIS
	447	3.7 (4.1)	18	10.3 (6.1)	1.27	General population males	Adult sexual assault	TSI-DIS
Green et al. (2001)	58	7.1 (5.2)	32	11.0 (8.4)	.57	General population	Traumatic loss	DES
	58	7.1 (5.2)	34	10.1 (10.2)	.38	General population	Single physical assault	DES
Zelikovsky and Lynn (2002)	35	7.8 (6.4)	35	17.2 (13.0)	.92	Undergraduates	Psychol + physical abuse	DES
<b>Clinical samples</b>								
Briere (1988)	61	0.29 (Nr)	133	0.53 (Nr)	.74	Crisis clinic females	Childhood sexual abuse	CSC-D
Briere, Evans, and Runtz (1988)	40	2.8 (Nr)	40	6.8 (Nr)	1.12	Crisis clinic clients	Childhood sexual abuse	TSC-33
Carlson et al. (2001)	43	19.6 (14.9)	64	21.1 (16.9)	.09	Inpatient	Physical abuse	DES
	43	19.6 (14.9)	9	31.1 (22.6)	.60	Inpatient	Sexual abuse	DES
	43	19.6 (14.9)	86	43.6 (23.4)	1.22	Inpatient	Physical + sexual abuse	DES
Chu and Dill (1990)	48	10.3 <sup>A</sup> (Nr)	50	19.3 <sup>A</sup> (Nr)	.75	Inpatient	Physical abuse	DES
	63	11.6 <sup>A</sup> (Nr)	35	20.4 <sup>A</sup> (Nr)	.53	Inpatient	Sexual abuse	DES
Everill et al. (1995)	31	14.2 (10.5)	29	23.2 (14.6)	.71	Eating Disorder	Sexual abuse	DES
Goff et al. (1991)	34	12.5 (12.4)	27	20.0 (16.1)	.52	Chronic psychotic	Childhood abuse	DES
Heckman and Westfeld (2006)	32	7.6 (5.3)	106	10.3 (6.0)	.47	Outpatients and pain	Various	TSI-DIS
Miller et al. (1993)	(Nr)	10.5 (8.6)	(Nr)	19.2 (9.8)	.94	Bulimic women	Sexual abuse	DES
Pribor et al. (1993)	22	10.2 (7.0)	77	23.6 (19.0)	.94	Inpatient	Any type of abuse	DES
Ross, Anderson, and Clark (1994)	46	8.5 (Nr)	37	21.6 (Nr)	1.08	Schizophrenia	Childhood abuse	DES

Note. References included in Online Supplemental Material. CSC-D = Crisis Symptom Checklist Dissociation Subscale (Briere & Runtz, 1987); DES = Dissociative Experiences Scale (Bernstein & Putnam, 1986); DES-T = Dissociative Experiences Scale-Taxon (Waller et al., 1996); TSC-33 = Trauma Symptom Checklist-33 Dissociation Subscale (Briere & Runtz, 1989); TSI-DIS = Dissociation Subscale of The Trauma Symptom Inventory (Briere, Elliott, Harris, & Cotman, 1995); Cohen's *d* is calculated as (trauma mean-control mean)/pooled *SD*.

<sup>A</sup> Descriptive data reported were median values.

Table 2

*Relationship of Trauma Exposure Severity/Frequency to Dissociation and PTSD Levels*

Study	Trauma (sample)	N	r (dissoc)	r (PTSD)	Dissociation measure
Nonclinical samples					
Becker-Lausen et al. (1995)	Childhood maltreatment (undergraduates)	301	.24***		DES
Briere, Hodges, and Godbout (2010)	Various (general population, all trauma-exposed)	418	.33**	.35**	MDI
Carlson and Rosser-Hogan (1991)	Refugee traumas (Cambodian refugees)	50	.38**	.39**	DES
DiTomasso and Routh (1993)	Child physical abuse (undergraduates)	312	.18**		DES
	Child sexual abuse (undergraduates)	312	.21***		DES
Gerke et al. (2006)	Child sexual abuse (female undergraduates)	417	.06		DES
	Child physical abuse (undergraduates)	417	.05		DES
Geisbrecht et al. (2007)	Various child trauma (undergraduates)	185	.38**		DES
Kent et al. (1999)	Various child trauma (undergraduates)	236	.35***		DES
Merckelbach et al. (2002)	Various child trauma (undergraduates)	109	.34**		DES
Merckelbach et al. (2004)	Various child trauma (female undergraduates)	43	.33**		DES-T
	Various child trauma (undergraduates)	127	.54***		DES-T
Poythress et al. (2006)	Various child trauma (offenders)	615	.15**		DES
Ruiz et al. (2008)	Various (prisoners)	1551	.19***		DES
Sanders and Becker-Lausen (1995)	Various child trauma (undergraduates)	228	.33***		DES
	Various child trauma (undergraduates)	301	.24***		DES
Schapiro et al. (2002)	Combat (Vietnam veterans)	42	.44**		DES
Carlson & Dalenberg (2009)	Various (general population adults)	113	.39***	.33***	TDS
Temple et al. (2007)	Adult sexual assault (African American women)	302	.39***	.40***	HSCL-D
	Adult sexual assault (European American women)	273	.41***	.42***	HSCL-D
	Adult sexual assault (Mexican American women)	260	.25**	.27***	HSCL-D
Vanwesenbeeck et al. (1995)	Violence on the job (Dutch prostitutes)	127	.33***		PAS
Clinical samples					
Angelini, Kumar, and Pekala (2001)	Various (substance abuse patients)	77	.25*		DES
Carlson et al. (2001)	Violent child physical abuse (psychiatric inpatients)	210	.34**	.39***	DES
	Violent child sexual abuse (psychiatric inpatients)	184	.52***	.58***	DES
Dell (2006)	Various (outpatients)	204	.47***		DES
Gast et al. (2001)	Various child trauma (psychiatric inpatients)	115	.47***		FDS
Heckman and Westfeld (2006)	Various child trauma (med and psychiatric outpatients)	138	.36**		TSI-DIS
Hartt and Waller (2002)	Various (eating disorder patients)	23	.40*		DES
Mercado et al. (2008)	Child sexual abuse (psychiatric inpatients)	28	.77***		DES
Nijenhuis et al. (2002)	Various (general psychiatric patients)	153	.43***		DES
Nijman et al. (1999)	Various child trauma (psychiatric inpatients)	54	.72***		DES
Pekala et al. (2002)	Child sex abuse (sub. abuse vet inpatients)	1229	.32***		DES
	Child phys/verbal abuse (substance abuse veteran inpatients)	1229	.14***		DES
Somer (2003)	Various (substance abuse patients)	93	.29**		H-DES
Van Der Boom et al. (2010)	Various (psychiatric outpatients with somatoform disord)	86	.27*		DES

Note. References included in Online Supplemental Material. DES = Dissociative Experiences Scale (Bernstein & Putnam, 1986); TDS = Traumatic Dissociation Scale (Carlson, Waelde, Smith, Palmieri, & McDade-Montez, 2011); H-DES = Hebrew Version of The DES; HSCL-D = Dissociation Subscale Added To Hopkins Symptom Checklist (Briere & Runtz, 1990); FDS = German Version of The DES (Freyberger et al., 1998); MDI = Multidimensional Dissociation Inventory (Briere, 2002); PAS = Perceptual Alteration Scale (S. Sanders, 1986); TSI-DIS = Dissociation Subscale of The Trauma Symptom Inventory (Briere et al., 1995).

\* significant correlation;  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

violent child sexual abuse and dissociation while controlling for general distress (assessed by the SCL-90R Global Severity Index) in an unselected sample of psychiatric inpatients, and the relationship remained moderately strong ( $r = .42$ ) (Carlson et al., 2001). Similarly, the partial correlation between violent child physical abuse and dissociation remained moderately strong ( $r = .36$ ) after controlling for general distress. In this study, it does not appear that the relationship between trauma and dissociation can be accounted for by overall distress alone. This finding is consistent with a conceptualization of dissociation as a response that is specific to trauma exposure, rather than a general response to distress.

### Question 3: What Is the Pattern of Dissociation Levels Over Time After Trauma Exposure?

A few studies have assessed dissociation levels prospectively in recent trauma survivors. Times of assessment, mean or median dissociation levels, statistical tests, and significance for three studies are shown in Table 3. After sexual and physical assault (Dancu, Riggs, Hearst-Ikeda, Foa, & Shoyer, 1996), earthquake (Cardena & Spiegel, 1993), and traumatic injury of self of a close family member (Carlson & Dalenberg, 2009), the frequency of dissociative experiences was observed to gradually decline in the weeks and months after exposure. In addition, Halligan, Michael, Clark,

Table 3  
Changes in Dissociation Levels Over Time After Trauma Exposure

Study	Trauma type	Mean or median	Time of assessments				Statistic			Dissociation measure
			1 week	4 weeks	8 weeks	12 weeks	$\chi^2$	<i>p</i>	<i>N</i>	
Dancu et al. (1996)	Sexual assault	Median	18.46	13.02	9.79	9.43	56	.001	52	DES
	Nonsexual assault	Median	12.04	7.11	5.72	4.00	60	.001	72	DES
Cardeña and Spiegel (1993)	Earthquake	Mean derealization	6.61	2.07	<i>t</i>		4.55	.001	101	SASRQ
	Earthquake	Mean depersonalization	4.89	1.81			3.3	.001	98	SASRQ
Carlson and Dalenberg (2009)	Injury trauma	Mean	12.4	12.1	8.9	<i>F</i>		.01	71	TDS
			2–14 days	9–21 days	2 months					

Note. References included in Online Supplemental Material. DES = Dissociative Experiences Scale; SASRQ = Stanford Acute Stress Reaction Questionnaire (Cardeña, Koopman, Classen, Waelde, & Spiegel, 2000); TDS = Traumatic Dissociation Scale.

and Ehlers (2003) studied persistent dissociation at 3 months in a group of 81 victims of sexual or physical assault and found significantly higher dissociation ( $M = 72.1, SD = 27.1$ ) for those who had current PTSD compared with those who had PTSD 1 month after the event ( $M = 47.3, SD = 29.0$ ) and those who did not have PTSD at either time ( $M = 24.1, SD = 13.0$ ) [ $F(2, 73) = 28.84, p < .0005$ ]. Although we know of no studies that have assessed dissociation levels before and after trauma exposure, it is possible to examine whether levels of dissociation soon after exposure to a traumatic stressor are elevated compared with norms. Applying a definition of elevation of 1.5 SDs above the mean for adults from a community sample who report no prior exposure to potentially traumatic events (Carlson et al., 2011), 40% of participants in the sample exposed to traumatic injury of self or a close family member within the past 2 weeks reported elevated levels of dissociation (Carlson & Dalenberg, 2009). From these studies, it appears that a prototypical pattern of dissociative symptoms over time is a sharp rise in symptoms immediately after trauma expo-

sure followed by a gradual decline. For a minority, dissociation levels remain high for months or years.

**Questions 4 and 5: Does Dissociation Level Relate to Presence of PTSD and Severity of PTSD?**

Level of dissociative symptoms has also been studied in samples of participants who were all exposed to traumatic stress. Given that trauma is strongly related to dissociation (as described above), we would expect the presence and severity of PTSD to relate to dissociation in such samples, although the restricted range of PTSD symptoms may cause lower correlations.

To investigate the association of PTSD diagnosis with level of dissociation, many studies have included comparisons of dissociation level in trauma-exposed participants with PTSD to trauma-exposed participants without PTSD. In 11 of 13 studies (shown in Table 4), dissociation levels were significantly higher in those with PTSD. Statistical significance and larger effect sizes were observed in the

Table 4  
Mean Dissociative Scores for No-PTSD and PTSD Groups in Trauma-Exposed Samples

Study	No PTSD		PTSD		Cohen's <i>d</i>	Dissociation	
	<i>N</i>	Mean ( <i>SD</i> )	<i>N</i>	Mean ( <i>SD</i> )		Sample	Measure
Bremner et al. (1992)	32	13.7 (16.0)	53	27.0 (18.0)	.78*	Vietnam combat vets	DES
Bremner et al. (1993)	15	5.33 (0.93)	40	17.0 (4.13)	1.62*	Vietnam combat vets	SCID-D
Brewin and Patel (2001)	13	13.1 (7.3)	30	34.8 (19.7)	.51*	PTSD and community	DES
	44	9.4 (11.2)	93	40.3 (23.5)	1.53*	Veterans	DES-T
Briere et al. (2005)	38	22.9 (17.9)	14	56.2 (40.1)	1.07*	Community adults	DES
Carlier et al. (1996)	50	7.5 (5.8)	42	19.4 (9.6)	1.51*	Police	SCID-D
Carlson et al. (2007)	95	5.2 (7.4)	33	20.9 (15.7)	1.59*	Traumatic injury	TDS
Favaro et al. (2006)	20	16.0 (6.8)	20	21.2 (12.1)	.53	Refugees	DES
Jelinek et al. (2009)	28	2.1 (0.7)	20	2.3 (1.0)	.22	Medical trauma pts	DES
Lytte et al. (2010)	25	13.7 (9.5)	25	35.6 (24.8)	1.17*	Outpatients	DES
Spitzer et al. (2007)	55	13.1 (9.1)	28	25.0 (18.4)	.82*	Inpatients	DES
Warshaw et al. (1993)	76	10.1 (9.3)	40	15.7 (10.7)	.56*	Anxiety disorder pts	DES
Yehuda et al. (1996)	25	2.7 (1.6)	35	3.9 (1.7)	.78*	Conc. camp survivors	DES

Note. References included in Online Supplemental Material. DES = Dissociative Experiences Scale; DES-T = DES-Taxon Items; TDS = Traumatic Dissociation Scale (Carlson & Dalenberg, 2009); SCID-D = Adaptation of the Structured Clinical Interview for Dissociative Disorders (Steinberg, Rounsaville, & Cicchetti, 1990).

\* effect was statistically significant.

analyses of samples with higher variances in trauma exposure and dissociation. The two studies that found no significant difference both had a relatively small number of subjects (40 and 48) and insufficient power to detect a medium or low effect size. It seems, then, that PTSD diagnosis is generally associated with higher levels of dissociation, even in samples of persons who were all trauma-exposed.

Dissociative experiences have been correlated with PTSD symptoms in a variety of clinical and nonclinical samples. As can be seen in Table 5, correlation strengths range from moderate to very strong, with the highest correlations in nonclinical samples with high variance in PTSD symptom frequency. To confirm that correlations between dissociation and PTSD were not inflated by overlap in symptoms, we calculated the correlations without PTSD symptoms that are considered dissociative (behavioral re-experiencing and gaps in memory) in two of the datasets. In the data from three time points after traumatic injury, correlations were essentially unchanged (from 0.70 to 0.71 at 2 to 14 days postinjury, from 0.73 to 0.72 at 9 to 21 days postinjury, and from 0.84 to 0.80 at 2 months postinjury) (Carlson & Dalenber, 2009). In a community sample of adults with a wide range of past trauma exposure levels, the correlation were also unchanged (Carlson & Dalenber, 2009). Figure 2 provides evidence that the size of the correlation between dissociation and PTSD is not being distorted by a small subset of participants with extremely high scores. In six samples, including one sample making real-time ratings, the relationship between dissociation and PTSD can be seen across a wide range for both variables.

One study has investigated the relationship between dissociation and PTSD symptoms in real time after trauma exposure. In a study of recently injured, hospitalized patients and family

members of injured, hospitalized patients (Carlson & Dalenber, 2009), dissociation and PTSD symptoms were assessed every 4 hr during waking hours over 7 days. For 1,018 assessments in 62 injured patients and family members, dissociation and PTSD symptoms (not including behavioral re-experiencing and gaps in memory) were strongly correlated  $r = .84$  ( $p < .0001$ ). Correlations between the 17 *DSM-IV* symptoms for PTSD and 10 dissociation symptoms all correlated positively, ranging from 0.2 to 0.724 with an average correlation of 0.44 ( $SD = .084$ ). In addition, analyses of the internal consistency of experiences of dissociative and PTSD symptoms showed very high consistency for all PTSD and dissociation items together. The Cronbach's  $\alpha$  value was 0.93 for the PTSD items alone, and 0.92 for dissociation items alone, and 0.96 for PTSD and dissociation items together (Carlson et al., 2011). In "real time," then, symptoms of dissociation and PTSD seem to be highly associated, just as they are in retrospective reports that summarize longer periods of time.

It is also worth noting that symptoms of dissociation and PTSD appear to move together during treatment. In a sample of 174 patients treated in an outpatient clinic specializing in treatment of traumatic stress, change in dissociation was significantly related to change in PTSD over the course of treatment (Lynch, Forman, Mendelsohn, & Herman, 2008). This is particularly notable because constriction of the range of both variables in this fairly homogenous sample makes detecting this relationship fairly difficult. This evidence that dissociation and PTSD symptoms changed together during treatment is strong support for the case that the two sets of symptoms are psychologically and phenomenologically related.

Table 5  
*Correlations Between Dissociation and PTSD Symptoms*

Study	Sample	<i>N</i>	<i>r</i>	Dissociation measure
Treatment-seeking samples				
Carlson et al. (2001)	Psychiatric inpatients	184	.60***	DES
El-Hage et al. (2002)	Psychiatric outpatients; various traumas	140	.62***	DES
Gleaves et al. (1998)	Eating disorder patients	294	.80***	DES
Lyttle et al. (2010)	Psychiatric outpatients	50	.63***	DES
General population and trauma-exposed samples				
Briere et al. (2010)	General population, all trauma-exposed	418	.66***	MDI
Carlson & Dalenber (2009)	Injury trauma, 2–14 days postinjury	149	.70***	TDS
	Injury trauma, 9–21 days postinjury	77	.73***	TDS
	Injury trauma, 60 days postinjury	128	.84***	TDS
	Injury trauma, real time postinjury	62	.84***	TDS
	Homeless veterans, various trauma types	115	.72***	TDS
Carlson et al. (2011)	Adult physical or sexual assault	81	.55***	TDQ
Halligan et al. (2003)	Firestorm survivors	154	.59***	SASRQ
Koopman et al. (1994)	Vehicle accident/injury	140	.55***	SDQ
Murray et al. (2002)	General population adults	118	.81***	TDS
Carlson & Dalenber, 2009	Community sample, African American women	302	.91***	HSCL-D
	Community sample, European American women	273	.90***	HSCL-D
	Community sample, Mexican American women	260	.86***	HSCL-D
Temple et al. (2007)	First responders	367	.45***	M-PTSD

*Note.* References included in Online Supplemental Material. TDS = Traumatic Dissociation Scale (Carlson & Dalenber, 2009); DES = Dissociative Experiences Scale; MDI = Multidimensional Dissociation Inventory (Briere, 2002); M-PTSD = Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988); SASRQ = Stanford Acute Stress Reaction Questionnaire (Cardeña & Spiegel, 1989); SDQ = State Dissociation Questionnaire (Murray et al., 2002); HSCL-D = Dissociation Subscale added to Hopkins Symptom Checklist (Briere & Runtz, 1990); TDQ = Trait Dissociation Questionnaire (Murray et al., 2002).

\* significant correlation,  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

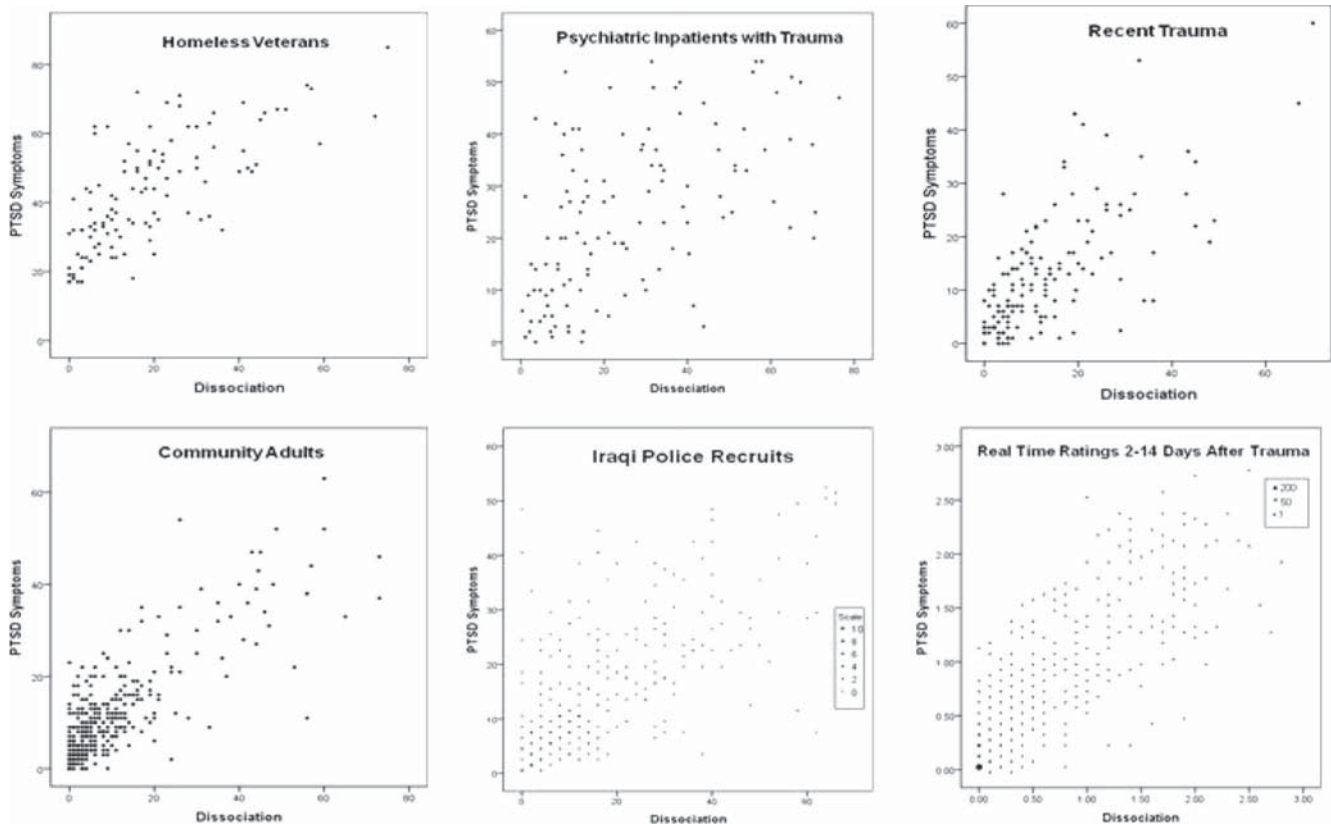


Figure 2. Relationship between PTSD symptoms and dissociation in homeless veterans ( $N = 115$ ) (Note: Lowest possible score for PTSD symptoms is 17) (Carlson & Dalenberg, 2009), psychiatric inpatients reporting trauma exposure ( $N = 121$ ) (Carlson et al., 2001), recent trauma survivors ( $N = 149$ ) (Carlson & Dalenberg, 2009), community adults ( $N = 342$ ) (Carlson & Dalenberg, 2009), Iraqi police recruits ( $n = 298$ ), and recent trauma survivors (1,018 ratings by 62 persons) (Carlson & Dalenberg, 2009). References included in Online Supplemental Material.

### Question 6: Does the Presence of High Dissociation Raise the Probability of the Presence of PTSD Symptoms at High Levels of Severity?

Another important question about dissociation and PTSD symptoms is whether the presence of high dissociation is associated with a higher probability of high PTSD symptoms. In an adult community sample, 71% of those with high dissociation had high levels of re-experiencing symptoms, while 33% of those with low dissociation had high levels of re-experiencing symptoms (Dalenberg & Carlson, 2009). Brewin, Andrews, Rose, and Kirk (1999) studied 157 crime victims and found that those with dissociative symptoms (meeting criteria for Acute Stress Disorder within 1 month of the event) scored more than twice as high on two measures of PTSD as those who did not meet criteria for Acute Stress Disorder. Similarly, in a nonclinical general population sample, 89% of those with elevated dissociation [ $>1.5$  SDs above the mean] had elevated levels of PTSD symptoms ( $>1.5$  SDs above the mean), while 22% of those with low dissociation had elevated levels of PTSD symptoms (Carlson & Dalenberg, 2009).

Studies using taxometric procedures to identify a dissociative taxon in PTSD are also relevant to the question of whether high

dissociation raises the probability that PTSD symptoms will also be at high levels. Taxometric studies use statistical methods to examine whether the phenomenology of particular symptoms or experiences (e.g., particular dissociative experiences) tends to be continuous or dimensional (endorsed across individuals at many points along a dimension of frequency or severity) or discontinuous (endorsed across individuals as either present or absent). Several studies have examined or applied a pathological dissociation taxon represented by eight Dissociative Experiences Scale (DES) items that distinguished patients with DID patients from adults in a nonclinical sample (Waller, Putnam, & Carlson, 1996). However, this pathological dissociation taxon represents experiences of severe identity dissociation and major gaps in awareness and memory, which are not the most common type of dissociative experiences observed in those with PTSD. This pathological dissociation taxon is found largely in those with severe dissociative disorders and less frequently in those with less severe dissociative disorders or PTSD (Simeon, Knutelska, Nelson, Guralnik, & Schmeidler, 2003; Waller et al., 1996).

One study that is more relevant to the question of whether high dissociation raises the probability of high PTSD symptoms inves-



tigated the possibility of a dissociation taxon using a wider range of dissociative experiences as indices. In this study, taxometric procedures were used to analyze dissociation subscales and items to determine if they were indicators of a dissociation taxon. In an epidemiological sample of Vietnam veterans, Waelde, Silvern, and Fairbank (2005) found that 30 of 316 (32% of those diagnosed with PTSD) were taxon positive. Those who were taxon-positive were not only more likely to have PTSD (80%, compared with 18.2% of those who were taxon-negative), but also were more likely to be diagnosed with Dysthymia or Major Depression. Taxon-positive veterans also experienced a more severe form of PTSD, as suggested by much higher means on two PTSD measures. While no other studies have used taxometric procedures to identify a dissociative taxon, two studies that conducted taxometric analyses on indices of PTSD to investigate whether responses to traumatic stress are taxonic concluded that PTSD symptoms appear to be dimensional, rather than taxonic. (Forbes, Haslam, Williams, & Creamer, 2005; Ruscio, Ruscio, & Keane, 2002). Since it is possible for a taxon to be defined by dissociative symptoms and not appear in taxonic analyses of PTSD symptoms, the two studies of a PTSD taxon based on PTSD symptoms are not evidence for or against a dissociative taxon. Therefore, the single study focused on dissociation does support the premise that the presence of high dissociation raises the probability of the presence of PTSD.

### **Question 7: How Do Dissociation, Re-Experiencing, Avoidance, and Hyperarousal Symptoms Relate to One Another and to Diagnosis?**

If dissociation symptoms are an important aspect of the response to trauma, then dissociative symptoms should relate as strongly to the *DSM-IV* symptom clusters of PTSD as the clusters relate to one another. To investigate this question, we examined data from three different studies of traumatic stress experiences and responses. In a general population sample (Carlson & Dalenberg, 2009), a sample of homeless veterans (Carlson & Garvert, 2010), and a sample of traumatically injured hospital patients (Carlson & Dalenberg, 2009). In these samples, intercorrelations among the re-experiencing, avoidance, and hyperarousal clusters ranged from 0.64 to 0.79. Dissociation and the PTSD symptom clusters (re-experiencing, avoidance, and hyperarousal) were also very strongly related with correlations of comparable magnitude, ranging from 0.64 to 0.77. It seems, then, that dissociative symptoms do have the same strength of relationship to the three PTSD symptom clusters as they have to one another.

Findings from a study that assessed new diagnoses in traumatically injured hospital patients 1 year after the injury shed light on the question of how dissociation symptoms relate to posttrauma diagnosis (Bryant, O'Donnell, Creamer, & McFarlane, 2011). Of those who developed disorders other than PTSD, 33% met criteria for re-experiencing, 63% met criteria for avoidance, and 73% met criteria for hyperarousal. When individual symptoms were examined, *only* the dissociative symptoms (behavioral re-experiencing and gaps in memory) were distinctively characteristic of PTSD. All other PTSD symptoms were elevated in those with other disorders compared with those with no disorder.

### **Question 8: Are There Findings That Show Biological Differences Associated With Dissociation Symptoms in Those With PTSD?**

A large number of studies have examined biological aspects of PTSD, including psychophysiological studies, neuroendocrine studies, and studies of brain structure and function, but relatively few studies have investigated how biological variables relate to dissociative symptoms or states. Psychophysiological studies of dissociation measuring heart rate or startle responses to loud sounds have not been conclusive, but there is some indication that dissociation may be associated with a distinctive physiological response (Ebner-Priemer et al., 2005; Halligan, Michael, Wilhelm, Clark, & Ehlers, 2006; Koopman et al., 2004). Increases in salivary cortisol in response to a stressor was positively related to dissociative symptoms in two studies (Giesbrecht, Smeets, Merckelbach, & Jelicic, 2007; Powers et al., 2006), but were negatively related in a third study (Simeon, Yehuda, Knutelska, & Schmeidler, 2008). A small number of neuroimaging studies in samples of persons with PTSD have found dissociation in response to trauma reminders is associated with increased activity in the brain region associated with inhibition and emotion regulation (Lanius et al., 2010).

### **Conclusion**

This systematic, comprehensive review of the empirical literature from the past 25 years provided clear and consistent evidence that: (1) Dissociation is moderately related to trauma exposure and severity; (2) dissociation symptoms rise sharply immediately after trauma exposure, then gradually decline for most, but stay high for some; (3) dissociation is clearly, consistently, and very strongly related to the presence and severity of *DSM-IV* PTSD symptoms; (4) the presence of high dissociation raises the probability of the presence and high levels of PTSD symptoms; and (5) dissociative symptoms relate as strongly to the three PTSD symptom clusters as they do to one another. These conclusions can provide the basis for consideration of various models of the causal relationships among traumatic stress, dissociation, and PTSD and recommendations about diagnostic criteria for PTSD.

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### Correction to Carlson, Dalenberg, and McDade-Montez (2012)

In the article, “Dissociation in Posttraumatic Stress Disorder Part I: Definitions and Review of Research,” (*Psychological Trauma: Theory, Research, Practice, and Policy*. Advanced online publication. April 30, 2012. doi: 10.1037/a0027748) there was an error in the section, “Question 6: Does the Presence of High Dissociation Raise the Probability of the Presence of PTSD Symptoms at High Levels of Severity?” The paragraph that began, “Three studies that have investigated the possibility. . .” has been replaced with a paragraph that begins, “One study that is more relevant to the question. . .” All versions of this article have been corrected.

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