Relations Among Peritraumatic Dissociation and Posttraumatic Stress: A Critical Review

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ABSTRACT. This paper critically reviews the empirical literature addressing the relationship of peritraumatic dissociation to posttraumatic stress. PSYCHLIT and MEDLINE literature searches were conducted to identify relevant studies. The list of articles generated was supplemented by a review of their bibliographies, which resulted in a total of 53 empirical studies. These studies were classified according to the type of potentially traumatizing event investigated and discussed. In the majority of studies, evidence was found for a positive association between peritraumatic dissociation and posttraumatic stress. However, research in this area is limited

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by several methodological differences and shortcomings with respect to study design, sample characteristics, measurement instruments, and control for moderating or mediating variables. In addition, research is also limited by conceptual problems and the lack of specific time parameters for the occurrence of peritraumatic dissociation. The literature is evaluated according to these methodological differences or shortcomings, and directions for future research are provided.

KEYWORDS. Peritraumatic dissociation, dissociation, PTSD, posttraumatic stress, predictors

Some trauma victims report dissociative reactions during or immediately after a potentially traumatizing event, referred to as *peritraumatic dissociation* (PD; Marmar, Weiss, & Metzler, 1998; Marmar et al., 1994). Many authors have argued that the immediate effects of PD are adaptive (i.e., to protect the individual from intense emotional states such as helplessness, horror, and fear). However, PD increases the risk of general psychopathology and, in particular, posttraumatic stress disorder (PTSD) over time (Bremner & Brett, 1997; Briere, Scott, & Weathers, 2005; Marmar et al., 1998; Van der Kolk, Van der Hart, & Marmar, 1996). In their meta-analysis of predictors of PTSD and PTSD symptoms following different forms of trauma, Ozer, Best, Lipsey, and Weiss (2003) found that PD was the strongest predictor of PTSD and related symptoms compared to other common predictor variables. More than a century ago, Pierre Janet (1889/1973, 1909) had already expressed the idea that peritraumatic dissociative reactions may increase the risk of developing posttraumatic stress (PTS) symptoms. He suggested that these dissociative reactions are a manifestation of acute integrative failure (rather than a survival coping strategy), which sets the stage for a more chronic failure to realize that the traumatizing event is finished and to relegate attendant affects, sensations, beliefs, and so on, to the past. This integrative failure may lead to PTS (Van der Hart, Nijenhuis, & Steele, 2006).

Even though a large number of studies have consistently demonstrated a positive relationship of PD to PTS, a small group of studies have failed to replicate this relationship, or have found that the relationship between PD and PTS disappeared or significantly diminished after other variables were taken into account (e.g., Holeva & Tarrier, 2001; G. N. Marshall & Schell, 2002; Marx & Sloan, 2005). A previous review (Candel & Merkelbach, 2004) posited that conflicting results of PD as a predictor of PTS were due to significant limitations of the retrospective methodologies on which studies

of PD rely, because people do not always give accurate descriptions of past emotional states as a general rule. These conflicting findings indicate that the predictive role of PD for PTS needs further and more refined study.

Although self-report difficulties may be one factor that could explain the diverse outcomes of these studies, this review adds to the literature in that it not only considers a much larger series of studies but also discusses methodological and conceptual differences in studies of PD. The Ozer (2003) study showed that studies on the relation between PD and PTSD were quite heterogeneous. This heterogeneity manifested in a large diversity of potentially traumatizing events and in many methodological issues, such as incomplete specification of the temporal boundaries of PD, certain sample characteristics, and lack of control for moderating/mediating variables. Even the outcome measures for PD and PTSD differed among studies. For example, there were significant differences in the inclusion of types of psychoform dissociation (e.g., amnesia) and somatoform dissociation (e.g., sensory loss). This diversity in study features became most apparent when we looked at the definition of PTS across studies. In the present study we had to incorporate three different outcome measures under the label of *PTS* in order to clarify how various publications defined PTS variables: general PTS reactions, PTSD symptoms, and formal PTSD diagnosis. Under the term *general posttraumatic stress reactions*, we refer to intrusions and avoidance reactions that are quite common after experiencing emotional intense experiences. The term *PTSD symptoms* refers to the specific symptoms of PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM–IV*).

Such methodological and conceptual heterogeneity should be taken into account when evaluating the literature on the relationship between PD and PTS. Therefore, this narrative review of the research evidence on the relationship between PD and PTS focuses on the methodological diversity of the eligible studies and discusses underlying conceptual problems in an effort to more clearly understand the findings of these numerous studies.

METHOD

Literature Search

A comprehensive search of the PSYCHLIT and MEDLINE databases of English-language abstracts was conducted in January 2006 for empirical studies on PD and PTS. There were no time restrictions added to the search. Keywords, used both individually and in combination, included

peritraumatic dissociation, *peritraumatic emotional responses*, *peritraumatic distress*, *posttraumatic stress*, and *posttraumatic stress disorder*. Once an initial pool of articles was obtained, a lateral search was conducted from the reference section of every article. Studies were included for review based on the following criteria: (a) Peritraumatic dissociation was assessed, (b) PTS (i.e., PTS reactions, PTSD symptoms, or PTSD) was assessed as a dependent variable, and (c) quantitative methods were used to examine the association between PD and PTS. Additionally, only articles written in English and available full text or in the library of Utrecht University (Utrecht, The Netherlands) were included for review.

This search resulted in 88 articles, of which 39 met the inclusion criteria and were selected for review. Additionally, 11 empirical articles were found by cross-referencing articles. Therefore, the search resulted in 50 empirical articles, 1 of which was in press and subsequently published (Van der Velden et al., 2006) and 3 of which reported on two different studies each (Briere et al., 2005; Halligan, Michael, Clark, & Ehlers, 2003; Murray, Ehlers, & Mayou, 2002). The total number of studies under review was 53. Only one of these pertained to children.

Coding of the Papers

All eligible papers were submitted to close reading and were coded by two readers (Jacobien M. van Ochten, Linda Breeman) on the following characteristics: (a) study design (retrospective, prospective, longitudinal); (b) number of participants in the study; (c) clinical status of participants (clinical sample vs. general population/community sample); (d) instruments used to measure PD and PTS reactions, PTSD symptoms, and PTSD; (e) time interval between potentially traumatizing event and first PD assessment; (f) time interval between potentially traumatizing event and first assessment of PTS reactions, PTSD symptoms, or PTSD; and (g) type of potentially traumatizing event assessed. The results from each study were coded as + (positive relation between PD and PTS reactions, PTSD symptoms, or PTSD), 0 (no significant relation could be found), or – (relation was not in the expected direction).

RESULTS

The results of the review process are summarized in Table 1. As stated before, the methodological features of each of the 53 studies were

TABLE 1. Characteristics of the studies reviewed.

Study	Design[a]	*N*[b]	Clinical Status	PD		PTS		Results[c]
				Instrument	Measurement Point	Instrument	Measurement Point	
Combat Exposure								
Bremner & Brett (1997)	R	62	Psychiatric (*N* = 34) and medical (*N* = 28)	DEQ-M	20+ years	SCID PTSD module, MISS	20+ years	++
Kaufman et al. (2002)	R	374	Medical	4-item abbreviated version of PDEQ	20+ years	SCID PTSD module, MISS, MMPI-PK	20+ years	++
Marmar et al. (1994)	R	251	Community	PDEQ-8-RV	20+ years	SCID PTSD module, MISS, MMPI-PK	20+ years	+++
O'Toole et al. (1999)	R	641	Community	PDEQ-8-RV	20+ years	Adapted version of SCID	20+ years	++
Tampke & Irwin (1999)	R	74	Community	PDEQ-10-SRV	20+ years	PCL-M	20+ years	0
Tichenor et al. (1996)	R	77	Community	PDEQ-8-RV	20+ years	IES, SRRS, MISS, MMPI-PK	20+ years	0
Road Traffic Accidents								
Bryant & Harvey (2003)	L(1)	134	Medical	ASDI	1 month	CIDI PTSD module	6 months	++
Ehlers et al. (1998)	L(2)	781	Medical	Two items measuring numbness and dazedness	8 days	PSS-SR	3 months, 1 year	+
Fullerton et al. (2001)	R	122	Medical	PDEQ-8-RV	1 month	SCID PTSD module	1 month	++
Holeva & Tarrier (2001)	L(1)	265	Medical	PDEQ-8-SRV	2–4 weeks	PI	4–6 months	–
Murray et al. (2002)	L(5)[d]; L(2)[e]	21[d]; 140[e]	Medical	SDQ	24 hr[d]; 48 hr[e]	PDS	1, 2, and 4 weeks, and 3 and 6 months[d]; 4 weeks and 6 months[e]	–[d]; 0[e]
Schäfer et al. (2004)	L(2)	45	Medical	5-item rater scale of dissociative symptoms	1 week	IES-R	1 week, 1 month	++
Ursano et al. (1999)	L(1)	99	Medical	PDEQ-8-RV	1 month	SCID PTSD module	1 month, 3 months	++
Natural Disasters								
Birmes, Brunet, Coppin-Calmes, et al. (2005)	R	200	Community	PDEQ-10-SRV	6 months	PCL	6 months	+++
Koopman et al. (1994)	L(1)	154	Community	SASRQ	1 month	MISS-CV, IES	7–9 months	+++
Van der Velden et al. (2006)	L(3)	662	Community	PDEQ-10-SRV	2–3 weeks	IES, SRS-PTSD	2–3 weeks, 18 months, and almost 4 years	–

TABLE 1 (continued)

Study	Design[a]	*N*[b]	Clinical Status	PD		PTS		Results[c]
				Instrument	Measurement Point	Instrument	Measurement Point	
Violence Against Individual								
Birmes et al. (2001)	L(1)	48	Medical	PDEQ-10-SRV	24 hr	CAPS, IES	5 weeks	++
Birmes et al. (2003)	L(1)	35	Medical	PDEQ-10-SRV	24 hr	CAPS, IES	3 months	+++
Halligan et al. (2003)	R[d]; L(3)[e]	81[d]; 70[e]	Community	SDQ	4+ months[d]; within 3 months[e]	PDS	4+ months[d]; within 3 months, and 3 and 6 months later[e]	+++[d]; 0[e]
G. N. Marshall & Schell (2002)	L(3)	250	Medical	7-item modified version of PDEQ	Within days, and at 3 and 12 months	PCL	Within days, and at 3 and 12 months	–
Injury-Inducing Events								
Mellman et al. (2001)	L(1)	50	Medical	PDEQ-8-RV	1–35 days	CAPS	6 weeks after initial assessment	–
Michaels et al. (1998)	L(1)	35	Medical	MCEPS dissociation scale	48 hr	MISS-CV	5 months	+
Michaels, Michaels, Zimmerman, et al. (1999)	L(1)	176	Medical	MCEPS dissociation scale	Within days	MISS-CV	6 months	+
Shalev et al. (1996)	L(1)	51	Medical	8-item modified version of PDEQ	1 week	IES, MISS-CV, SCID PTSD module	6 months	++
Van Loey et al. (2003)	L(8)	242	Medical	ADS	Within 1 week	IES	2 and 3 weeks, and subsequently every 8 weeks until 12 months	+
Emergency Services Work								
Laposa & Alden (2003)	R	51	Community	PDEQ-10-SRV	Variable	PDS	Variable	0
Marmar et al. (1996)	R	439	Community	PDEQ-8-SRV	1.9 years	IES-R, MISS-M	1.9 years	++
Marmar et al. (1999)	L(2)	275	Community	PDEQ-8-SRV	1.9 and 3.5 years	IES-R, MISS-M	1.9 and 3.5 years	++
Pole et al. (2005)	R	655	Community	PDEQ-10-SRV	Variable	MISS-CV	Variable	++
Childbirth								
Engelhard et al. (2002)	R	113	Medical	PDEQ-10-SRV	Variable (within 2 years)	PSS-SR	Variable (within 2 years)	+
Engelhard et al. (2003)	L(2)	104	Community	PDEQ-10-SRV	1 month	PSS-SR	1 month, 4 months	0
Olde et al. (2005)	L(1)	140	Community	PDEQ-10-SRV, SDQ-P	1 week	PSS-SR	3 months	++
Olde et al. (2006a)	L(1)	348	Community	PDEQ-10-SRV, SDQ-P	1 week	PSS-SR, IES	3 months	+++
Olde et al. (2006b)	L(2)	285	Community	PDEQ-10-SRV, SDQ-P	1 week	PSS-SR, IES	3 and 10 months	0

Van Son et al. (2005)	L(3)	248	Community	PDEQ-10-SRV	3 months	IES	1, 6, and 12 months	++
Terrorist Attacks								
Grieger et al. (2003)	R	77	Community	PDEQ-SRV	7 months	IES-R	7 months	+
Shalev & Freedman (2005)	L(2)	426	Medical	PDEQ-SRV	1 week	CAPS	1 week and 4 months	+
Simeon et al. (2003)	R	75	Community	PDEQ-8-SRV	Within 3 months	IES-R	Within 3 months	0
Simeon et al. (2005)	L(2)	58	Community	PDEQ-8-SRV	Within 3 months	IES-R	Within 3 months, 1 year	–
Childhood Abuse								
Hetzel & McCanne (2005)	R	467	Community	PDEQ-10-SRV	Variable	PTSD-Q	Variable	++
Johnson et al. (2001)	R	89	Psychiatric	TISAV	Variable	CAPS	Variable	+++
Cancer Diagnosis								
Kangas et al. (2005)	R	63	Medical	PDEQ-10-SRV	1 month	CAPS	6 months	+++
Miscellaneous Events								
Bernat et al. (1998)	R	349	Community	PDEQ-10-RV	Variable	IES-R	Variable	++
Briere et al. (2005)	R	52[d]; 366[e]	Community	PDEQ-10-SRV[d]; DAPS[e]	Variable	CAPS[d]; DAPS[e]	Variable	–[d]; –[e]
Freedman et al. (1999)	L(3)	236/62	Medical	PDEQ-8-SRV	1 week	IES, MISS-CV, CAPS	1 and 4 months (N = 236), 1 year (N = 62)	0
Gershuny et al. (2003)	R	146	Community	PDEQ-8-SRV	Variable	PDS	Variable	–
Martin & Marchand (2003)	R	75	Community	PDEQ-10-SRV	Variable	MPSS-SR	Variable	+
Marx & Sloan (2005)	L(3)	185/70	Community	PDEQ-10-SRV	Variable	PTSD	Baseline, 4 (N = 185) and 8 weeks (N = 70)	+
Punamäki et al. (2005)	R	585	Community	8-item modified version of PDEQ	Variable	CIDI PTSD module	Variable	+
Shalev et al. (1997)	L(2)	207	Medical	PDEQ-8-SRV	1 week	IES, MISS-CV, CAPS	1 month, 4 months	+

Notes: PD=peritraumatic dissociation; PTSD=posttraumatic stress disorder; DEQ-M=Modified Dissociative Experiences Questionnaire; SCID=Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.); MISS=Mississippi Scale for Combat-Related PTSD; PDEQ=Peritraumatic Dissociative Experiences Questionnaire; MMPI-PK=Minnesota Multiphasic Personality Inventory-2 PTSD (pk) subscale; PDEQ-8-RV= Peritraumatic Dissociative Experiences Questionnaire–8-item Rate; PDEQ-10-SRV=Peritraumatic Dissociative Experiences Questionnaire–10-item Self-Report Version; PCL-M=PTSD Checklist for military experiences; IES=Impact of Event Scale; SRRS=Stress Response Rating Scale; ASDI=Acute Stress Disorder Interview; CIDI=Composite International Diagnostic Interview; PSS-SR=PTSD Symptom Scale–Self-Report Version; PDEQ-8-SRV=Peritraumatic Dissociative Experiences Questionnaire–8-item Self-Report Version; PI=Penn Inventory; SDQ=State Dissociation Questionnaire; PDS=Posttraumatic Diagnostic Scale; IES-R=Impact of Event Scale–Revised; PCL=PTSD Checklist; SASRQ=Stanford Acute Stress Reaction Questionnaire; MISS-CV=Mississippi Scale for Combat-Related PTSD–Civilian Version; SRS-PTSD=Posttraumatic Stress Disorder self-rating scale; CAPS=Clinician-Administered PTSD Scale; MCEPS=Michigan Critical Events Perception Scale; ADS=Anxiety Dissociation Scale; MISS-M=Mississippi Scale for Combat-Related PTSD–modified for civilian emergency medical services workers; SDQ-P=Somatoform Dissociation Questionnaire–Peritraumatic; PDEQ-SRV=Peritraumatic Dissociative Experiences Questionnaire–Self-Report Version; PTSD-Q=PTSD Questionnaire; TISAV=Trauma Interview for Sexual Abuse Victims; PDEQ-10-RV=Peritraumatic Dissociative Experiences Questionnaire–10-item Rater Version; DAPS=Detailed Assessment of Posttraumatic Stress; MPSS-SR=Modified PTSD Symptom Scale–Self-Report Version.

[a]R=retrospective, cross-sectional study design; L(n)=longitudinal study design with (n) measurement points for PTS. [b]Where possible, N is based on the number of participants who had complete data on all of the measures. [c]+=positive, significant relationship between PD and PTS; –=nonsignificant relationship between PD and PTS; 0=relationship between PD and PTS remained unclear or differed over time. For effect size, the rule of thumb given by Cohen was used: Standardized effect measures between .10 and .29 are small (+), between .3 and .49 are medium (++), and between .5 and 1 are large (+++). [d]Study 1. [e]Study 2.

inspected. In the majority of studies (34 of 53), evidence was found for a positive association between PD and PTS. These studies found a positive, significant relationship between PD and PTS (see Table 2). We were able to distinguish 10 definitive categories of traumatizing events (combat exposure, road traffic accidents, natural disasters, violence against the individual, injury-inducing events, emergency services work, childbirth-related trauma, terrorist attacks, childhood abuse, and receiving a cancer diagnosis) and 1 miscellaneous category of events (9 studies).

In all, 23 studies used a retrospective design to assess PD and PTS reactions, PTSD symptoms, or PTSD. The other studies used a longitudinal design with a minimum of two and a maximum of five waves. The number of participants ranged from 21 (in a study on road traffic accidents) to 655 (in a study of emergency workers).

The clinical status of the participants varied across studies: 28 studies reported on a sample of the general population, 23 studies reported on medical samples, and only 2 studies reported on clinical samples with PTSD. The instruments used to measure PD and PTS reactions, PTSD symptoms, and PTSD were very diverse. For PD, the majority of the studies used a version of the Peritraumatic Dissociative Experiences Questionnaire.

Finally, the time between the measurement point of PD and PTS reactions, PTSD symptoms, or PTSD was coded. This time interval varied largely. For PD, the interval ranged from the first 24 hr after to 20 years following the potentially traumatizing event. Only 12 studies reported PD assessment within 1 week of the event, and 8 studies reported a first assessment within a month. PTS reactions, PTSD symptoms, and PTSD were assessed between 1 week and 20 years after the potentially traumatizing events.

TABLE 2. Overall summary of results.

Relationship	Cross-Sectional Studies	Longitudinal Studies	Total
Positive, Significant	17 (70.8)[a]	17 (58.6)[a]	34 (64.1)
Nonsignificant	3 (12.5)[a]	6 (20.7)[a]	9 (17.0)
Remained Unclear/ Differed Over Time	4 (16.7)[a]	6 (20.7)[a]	10 (18.9)
Total	24 (100.0)	29 (100.0)	53 (100.0)

Notes: Data are *n* (%).
[a]$\alpha = .01$; $\chi^2 = .937$, $p = .246$, *ns*.

DISCUSSION

In the majority of studies, evidence was found for a positive association between PD and PTS (see Table 2). That is, 34 of 53 studies found a positive, significant relationship. Nevertheless, 9 studies found a nonsignificant relationship, and 10 studies found that the relationship remained unclear or differed over time. Therefore, although there are strong indications that there is a positive relation between PD and PTS, the results across studies are diverse and not fully conclusive. Below, several possible contributing factors to this diversity are described.

Methodological Differences

All studies varied greatly in methodological features, such as study design, sample characteristics, measurement instruments, and control for moderating or mediating variables. In spite of inherent difficulties with design differences, the fact that so many studies of various designs all showed a positive relationship between PD and PTS strengthens the conclusion that there is a strong correlation between these variables, regardless of how this relationship is studied. However, methodological differences in design and sample population are known to affect study results. Differences between studies make it difficult to compare outcomes precisely and to generalize outcomes across general populations and topics. For reasons discussed below, future studies should be designed more consistently in order to further clarify the relation between PD and PTS.

Retrospective reporting. Even though the field of traumatic stress draws heavily upon retrospective self-reporting, there is some debate over whether retrospective self-reports of traumatic symptoms and experiences are sufficiently reliable (Candel & Merckelbach, 2004; Gershuny, Cloitre, & Otto, 2003; G. N. Marshall & Schell, 2002). Retrospective reports of PD may be partially biased by levels of current pathology (Bowman, 1999; Southwick, Morgan, Nicolaou, & Charney, 1997). Some have questioned whether retrospective self-reports of PD that were measured long after traumatizing events (weeks, months, years; e.g., Kaufman et al., 2002; Marmar et al., 1994; O'Toole, Marshall, Schureck, & Dobson, 1999; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996) are stable over time. One study indicated that retrospective reports of PD can change over time as a function of current PTSD symptoms (G. N. Marshall & Schell, 2002). However, these findings were contradicted by a study that

found self-reports to be stable across 2 years (Marmar et al., 1999). In support of retrospective self-reporting, results from longitudinal studies of PD (e.g., Koopman, Classen, & Spiegel, 1994; Shalev, Peri, Canetti, & Schreiber, 1996) converged with results from retrospective studies (e.g., Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996; Marmar et al., 1994; Tichenor et al., 1996). It is possible that retrospective measurement of PD may measure a phenomenon other than PD soon after the traumatizing event, but there was not a statistically significant difference between studies that simultaneously measured PD and PTS and those that used longitudinal measurement (see Table 2).

In sum, there are conflicting data regarding the stability and accuracy of retrospective reports of PD. Thus, a degree of caution should be observed when interpreting the results of PD studies that utilize retrospective self-reports.

Type of potentially traumatizing event. An inspection of Table 1 shows that the nature of the potentially traumatizing event (e.g., natural disaster, profession-related incident, motor accident, peripartum trauma) did not differ in magnitude of association between PD and PTS reactions, PTSD symptoms, or PTSD.

Sample characteristics. Participants in the studies differed in number and characteristics, possibly hindering the validity of the results. First, four out of the nine studies that found a nonsignificant relationship between PD and PTS used small sample sizes of 21 to 58 participants (Briere et al., 2005, Study 1; Mellman, David, Bustamente, Fins, & Esposito, 2001; Murray et al., 2002, Study 1; Simeon, Greenberg, Nelson, Schmeidler, & Hollander, 2005). These small sample sizes resulted in very low power. For example, for the Murray et al. and Mellman et al. studies, we computed a post hoc power lower than 50%, which is below the formal chance level. These sample sizes were thus too small to detect associations that may in fact have been present in the population studied. But power problems due to small sample sizes could not be attributed to the other five studies that found no significant effects. We conclude that there must be other, yet-to-be-determined reasons for this lack of consistent results.

Second, the vast majority of studies focused on community and medical samples rather than on psychiatric, treatment-seeking samples. Only 2 of the 53 studies focused on clinical samples: one with participants seeking treatment for PTSD (Bremner & Brett, 1997) and the other with women seeking treatment for symptoms related to childhood abuse (Johnson, Pike, & Chard, 2001). When compared with one another, medical sample

studies were more likely than community sample studies to find either a positive association between PD and PTS or a nonsignificant association rather than a negative one (see Table 3).

Third, results may have been affected by nonresponders. Although some authors who reported on differences between responders and nonresponders did not find significant differences between these two groups (e.g., Bryant & Harvey, 2003; Koopman et al., 1994; G. N. Marshall & Schell, 2002; Shalev et al., 1996), others reported that responders differed statistically from nonresponders, for example in demographic characteristics (e.g., Birmes et al., 2003; Marmar et al., 1999; Michaels, Michaels, Zimmerman, et al., 1999; Olde et al., 2005, 2006a, 2006b) and length of hospital stay (Van Loey, Maas, Faber, & Taal, 2003), and also in PTSD symptomatology and PD symptoms (Engelhard, Van den Hout, Kindt, Arntz, & Schouten, 2003; Marx & Sloan, 2005) and initial psychological distress (Shalev, Freedman, Peri, Brandes, & Sahar, 1997; Van der Velden et al., 2006).

Again, we conclude that PD studies are very diverse and inconsistent in design and outcomes: Caution should be observed when interpreting results.

Outcome measures of PTS. Studies generally focused on three outcome measures: PTS reactions, PTSD symptoms (as measured by *DSM–IV* criteria), and PTSD diagnosis. Thus, it should be kept in mind that the studies were not focused exclusively on the pathological symptom characteristics of PTSD but also on other, more wide-ranging trauma-related responses.

We chose to compare the studies according to the outcome measure they each utilized (see Table 4). Because of the range of symptoms

TABLE 3. Results by clinical status of the sample.

Relationship	Community Studies	Medical Studies	Psychiatric Studies	Total
Positive, Significant	16 (55.2)[a]	16 (72.7)[a]	2 (100.0)	34 (64.1)
Nonsignificant	5 (17.2)[a]	4 (18.2)[a]	0 (0.0)	9 (17.0)
Remained Unclear/Differed Over Time	8 (27.6)[a]	2 (9.1)[a]	0 (0.0)	10 (18.9)
Total	29 (100.0)	22 (100.0)	2 (100.0)	53 (100.0)

Notes: Data are *n* (%). Because only two studies were conducted on psychiatric samples, this group was excluded from the statistical analysis.
[a]$\alpha = .01$; $\chi^2 = 2.803$, $p = .246$, *ns*.

TABLE 4. Results by outcome measure.

Relationship	Posttraumatic Stress Studies	PTSD Symptom Studies	PTSD Diagnosis Studies	Total
Positive, Significant	4 (66.6)	15 (53.5)[a]	15 (78.9)[a]	34 (64.1)
Nonsignificant	1 (16.7)	5 (17.9)[a]	3 (15.8)[a]	9 (17.0)
Remained Unclear/ Differed Over Time	1 (16.7)	8 (28.6)[a]	1 (5.3)[a]	10 (18.9)
Total	6 (100.0)	28 (100.0)	19 (100.0)	53 (100.0)

Notes: Data are *n* (%). Because only six studies used posttraumatic stress as an outcome measure, this group was excluded from the statistical analysis. PTSD = posttraumatic stress disorder.
[a]$\alpha = .01$; $\chi^2 = 4.382$, $p = .122$, *ns*.

included in various studies, we distinguished those studies in which a structured diagnostic interview was used to assess the *disorder* of PTSD from those that measured specific PTS *symptoms* (e.g., numbing or intrusion) and from those that measured more general post-event symptoms. The use of a structured diagnostic interview, such as the Composite International Diagnostic Interview, the Clinician-Administered PTSD Scale, or the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.) PTSD module, is generally considered to be the only valid method to assess PTSD (Olde, 2006); a self-report questionnaire alone is not appropriate for this purpose. Thus, although some of the studies used a self-report instrument to asses PTSD (i.e., Ehlers, Mayou, & Bryant, 1998; Engelhard et al., 2002; Grieger, Fullerton, & Ursano, 2003; Holeva & Tarrier, 2001; Michaels et al., 1998; Michaels, Michaels, Zimmerman, et al., 1999), we chose not to categorize them with studies that measured the PTSD diagnosis.

Only a very small group of five studies focused solely on PTS reactions assessed with the Impact of Event Scale or the Impact of Event Scale–Revised. Thus, a comparison of this group with the larger groups of studies that focused on PTSD symptoms and PTSD yielded few significant results.

When the group of studies focused on PTSD diagnosis was compared with those focused on PTSD symptomatology (see Table 4), PD appeared to be more consistently associated with PTSD diagnosis than with PTSD symptomatology. However, this difference was not statistically significant.

Measurement of PD. A methodological flaw across all studies was the failure to provide a clear and consistent definition and operationalization

of PD across measurement instruments. In itself, this serious underlying conceptual flaw brings in to question exactly what peritraumatic instruments were measuring. Such a major definitional problem stems from a broader lack of clarity and consensus in the field about the construct of dissociation and its relationship to disorders of traumatic stress. This issue is discussed below in "Conceptual Problems."

Incomplete specification of the temporal boundaries of PD. In the majority of studies, the extent to which PD persisted over time was not examined. As a result, it is difficult to determine whether it is the time of onset or the persistence of dissociation that is a more important risk factor in determining who develops PTS (Briere et al., 2005). The few studies that examined both peritraumatic and persistent dissociation suggest that the primary risk for PTS is greater with *persistent* dissociation (Briere et al., 2005; Halligan et al., 2003; Murray et al., 2002). Similar results were found in a study on acute stress disorder (Panasetis & Bryant, 2003), indicating that persistent dissociation in civilian trauma survivors was more strongly associated with severity of acute stress disorder and intrusive symptoms than was PD. This pattern of results suggests that although initial dissociation may be a risk factor for PTS, many individuals are able to subsequently integrate their overwhelming experiences. Because ongoing dissociation impedes access to and resolution of traumatic memories and associated emotions, those who continue to dissociate may be at increased risk for persistent PTS (Harvey & Bryant, 2002; Murray et al., 2002; Panasetis & Bryant, 2003).

Measurement point of PTS. The time of measurement of PTS varied widely among the studies. In cross-sectional studies, PD and PTS were measured simultaneously, and a one-time measurement of PTS was used. In longitudinal studies, PTS was measured at one or more points after exposure to a potentially traumatizing event and after the assessment of PD (see Table 2).

In longitudinal studies, some authors found that the association between PD and PTS remained relatively stable over periods of 3 months (Ursano et al., 1999) and 1 year (Ehlers et al., 1998; Van Loey et al., 2003), whereas others found that this association significantly decreased over periods of 4 months (Engelhard et al., 2003), 6 months (Halligan et al., 2003; Murray et al., 2002), and 1 year (Freedman, Brandes, Peri, & Shalev, 1999; G. N. Marshall & Schell, 2002).

One possible explanation for these conflicting findings can be found in the other predictor variables that were examined in tandem with PD (see below) and is derived from the results from the studies in which the predictive value of PD for PTS decreased over time. This hypothesis posits that

PD is important in predicting short-term psychological adjustment, whereas persistent dissociation (Halligan et al., 2003; Murray et al., 2002) and/or acute PTSD symptom severity (Engelhard et al., 2003; G. N. Marshall & Schell, 2002) is more important in predicting long-term adjustment.

The effect of statistical analyses: Control for moderating/mediating variables. Another possible reason for conflicting findings on the relationship of PD to PTS is the variability in the extent to which studies controlled for moderating or mediating variables (cf. Briere et al., 2005; DePrince, Chu, & Visvanathan, 2006). PD independently predicted severity of PTS over and above the contributions of variables such as level of stress exposure (Kaufman et al., 2002; Marmar et al., 1994; Shalev et al., 1996; Tichenor et al., 1996), pretrauma tendency to dissociate (Marmar et al., 1994; Murray et al., 2002; Tichenor et al., 1996), and severity of physical injury (Kaufman et al., 2002). Other studies demonstrated that the effect of PD on PTS disappeared or significantly diminished over time after the authors took into account other variables, such as trauma-related persistent dissociation (Briere et al., 2005; Halligan et al., 2003; Murray et al., 2002), personality traits (Holeva & Tarrier, 2001), peritraumatic distress (Gershuny et al., 2003; Olde et al., 2006b; Simeon, Greenberg, Knutelska, Schmeidler, & Hollander, 2003), negative interpretations of trauma memories (Halligan et al., 2003), and initial PTSD symptom severity (Engelhard et al., 2003; G. N. Marshall & Schell, 2002; Marx & Sloan, 2005). Taken together, these findings suggest that alternative interpretations of the PD–PTS relationship are likely and that the specific role of PD in relation to other predictors of PTS remains to be determined.

Only a minority of the studies involved multilevel analyses. Regrettably, that number is too small to be able to discuss possible differences between the studies involving multilevel analysis and those that did not examine the hierarchical relationship between variables.

Integration and Directions for Future Research

The methodological problems described above highlight several issues central to evaluating the literature on the relationship of PD to PTS. In general, it can be concluded that the methodological quality of the studies is variable, making it difficult to compare results across studies.

First, almost half of the studies used a cross-sectional design involving retrospective self-reports of PD. Retrospective reporting of PD may have low reliability and may be biased by levels of current pathology. The results of this literature review, however, reveal no statistical difference

between the results of the cross-sectional studies, which are generally characterized by a long interval between the experience of a potentially traumatizing event and the assessment of PD, and those of the longitudinal studies. Nonetheless, future studies would benefit from the assessment of PD as soon as possible after, or possibly even during, the potentially traumatizing event. Of course, there are obvious difficulties with measurement of any symptoms during potentially traumatizing events: The subjective experience of PD may not be accessible in the moment and may only be understood or recognized after the immediate danger has passed (Ozer et al., 2003). Nonetheless, dissociative phenomena could be rated by medical staff in women during childbirth and in patients being informed of a cancer diagnosis or other potentially terminal condition, for example.

Second, future studies should use a longitudinal study design with several measurement points for PTS to assess the association between PD and PTS over time. The ideal way to study the development of posttraumatic reactions is to examine individuals before and after exposure to the traumatic stressor. However, because of the unpredictable occurrence of most stressors, almost all research on PTS begins after the potentially traumatizing event has happened and is thus, by definition, retrospective. Of the studies, only four studies that focused on childbirth or related events were truly prospective (Engelhard et al., 2003; Olde et al., 2005, 2006a, 2006b) in the sense that they assessed risk factors *before* the traumatic stressor occurred. The quality of future research will be enhanced by the use of pre-event measures to assess pretrauma characteristics, especially measures of dissociative tendencies. These pre-event measures could be given to vulnerable populations, such as those at risk for traumatization due to war, terrorist attacks, community violence, or natural disasters. In addition, as was done in some studies, it would be useful to determine whether an individual had prior exposure to potentially traumatizing events, as this is an important variable to consider in at-risk populations (Green et al., 2000).

Third, the literature is characterized by significant variability in the extent to which moderating or mediating variables are controlled in the presumed relationship of PD to PTS (cf. Briere et al., 2005; DePrince et al., 2006). This problem confounds whatever conclusions can be drawn from the literature as a whole. Future progress depends upon careful examination of relevant mediators and moderators of this relationship, such as pretrauma tendency to dissociate, trauma-related persistent dissociation, peritraumatic distress, and preexisting psychological problems.

Fourth, a remarkable finding of this review is that little research has been conducted on traumatized individuals seeking mental health services, as compared with medical and community samples. Children also represent a remarkably understudied population: Only a single study on child victims was found for this review (Schäfer, Barkmann, Riedesser, & Schulte-Markwort, 2004). The strength of the relationship between PD and PTS might be influenced by the type of sample investigated. Thus, to further clarify the PD–PTS relationship, the field is in need of more studies conducted on individuals seeking treatment for mental problems that may be related to traumatization.

Fifth, the majority of the studies did not specify the temporal boundaries of PD. As a result, it is difficult to determine whether the time of onset of dissociation is critical in determining who develops PTS or whether the persistence of dissociation is a more important factor (Briere et al., 2005; Panasetis & Bryant, 2003). Inclusion of a measure of trauma-related persistent dissociation that is current, such as the Dissociative Experiences Scale–Taxon (Waller, Putnam, & Carlson, 1996), Multidimensional Inventory of Dissociation (Dell, 2006), Somatoform Dissociation Questionnaire (Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1996), or Dissociation Questionnaire (Vanderlinden, Van Dyck, Vandereycken, Vertommen, & Verkes, 1993), in PD research would resolve this issue. If PD leads to PTS, one would expect a measure of this construct to remain a strong predictor of PTS, even if there is a multivariate evaluation of peritraumatic and persistent dissociation. If, however, PD is associated with PTS only to the extent that dissociation continues beyond the trauma, control for persistent dissociation would eliminate all or most of the relationship between PD and PTS (Briere et al., 2005).

Finally, further work should be done to determine whether the type of potentially traumatizing event investigated in each study may have influenced the results. It is virtually impossible to make comparisons because each category of potentially traumatizing events consists of a limited number of studies, ranging from one to nine studies per category, and these groups are too small to make reliable comparisons at an intergroup level.

Conceptual problems. Perhaps even more important than these methodological differences or shortcomings is that all of the studies are limited by the unclear conceptual base of the PD construct (cf., Holmes et al., 2005; R. D. Marshall, Spitzer, & Liebowitz, 1999; Van der Hart et al., 2006; Van der Hart, Nijenhuis, Steele, & Brown, 2004), which needs urgent attention. Measurement instruments for PD lack a consistent and

clear concept of PD. As noted by Bennet and Hacker (2003) regarding scientific inquiries, "Any unclarity regarding the relevant concepts will be reflected in corresponding unclarity in the questions, and hence in the design of experiments intended to answer them" (p. 2). Table 5 shows the high degree of variability among types of phenomena that are assumed to represent PD among different instruments. With the exception of the Michigan Critical Events Perception Scale and the Somatoform Dissociation Questionnaire–Peritraumatic, we have reproduced the respective authors' original categorizations of these phenomena. At least some items are poorly operationalized and very unclear (e.g., "reduced awareness").

In most of the studies, measures excluded symptoms of peritraumatic somatoform dissociation, focusing exclusively on psychoform dissociation (mental symptoms such as amnesia) and on alterations in consciousness that may not necessarily be dissociative in nature (Brown, 2006; Steele, Dorahy, Van der Hart, & Nijenhuis, 2008, in press; Van der Hart et al., 2004, 2006). Future studies should also incorporate measures of peritraumatic somatoform dissociation, such as the Somatoform Dissociation Questionnaire–Peritraumatic. This instrument measures physical symptoms such as anesthesia and loss of motor control that are common manifestations of dissociation (Janet, 1907/1965; Nijenhuis, 2004; Van der Hart, Van Dijke, Van Son, & Steele, 2000). In addition, perhaps not all potentially traumatizing events evoke the same set of peritraumatic dissociative experiences. For example, events characterized by perceived threat to physical integrity may be more likely to evoke peritraumatic somatoform dissociation than perceived threats to psychological integrity: Physical threat evokes animal defense-like reactions that may become dissociated and that manifest in physical symptoms (e.g., Nijenhuis, Spinhoven, Vanderlinden, Van Dyck, & Van der Hart, 1998). To date, one study found evidence of this possibility in survivors of severe childhood sexual abuse (Nijenhuis, Van Engen, Kusters, & Van der Hart, 2001), but the study was not included in this review as it did not focus on the relationship between PD and PTS.

In short, scholars must first reach consensus on the operationalization of the construct PD in order to measure PD more accurately.

CONCLUSION AND CAUDA

The majority of the empirical studies reviewed supported the notion that the experience of dissociative symptoms during a potentially traumatizing

TABLE 5. Types of phenomena assumed to measure peritraumatic dissociation among various instruments.

Phenomenon	PDEQ	DEQ-M	ASDI	SDQ	5-Item Rater Scale of Dissociative Symptoms	SASRQ	MCEPS	ADS	SDQ-P
Depersonalization	x	x	x	x	x	x	x	x	
Derealization	x	x	x	x	x	x		x	
Symptoms of Amnesia	x	x			x	x			
(Emotional) Numbing	x		x	x	x	x			
Reduced Awareness	x		x	x	x		x		
Detachment	x								
Altered Time Sense	x						x	x	
Stupor						x			
Out-of-Body Experiences	x						x		
Paralysis									x
Loss of Motor Control									x
Sensory Loss									x
Uncontrolled Movements									x

Notes: PDEQ = Peritraumatic Dissociative Experiences Questionnaire (Marmar et al., 1998); DEQ-M=Modified Dissociative Experiences Questionnaire (Bremner & Brett, 1997); ASDI=Acute Stress Disorder Interview (Bryant, Harvey, Dang, & Sackville, 1998); SDQ = State Dissociation Questionnaire (Murray et al., 2002); 5-item rater scale of dissociative symptoms (Schäfer et al., 2004); SASRQ = Stanford Acute Stress Reaction Questionnaire (Koopman et al., 1994); MCEPS = Michigan Critical Events Perception Scale (Michaels, Michaels, Moon, et al., 1999); ADS = Anxiety Dissociation Scale (Van Loey et al., 2003); SDQ-P = Somatoform Dissociation Questionnaire Peritraumatic (Nijenhuis & Van der Hart, 1998). No relevant information was available concerning the Trauma Interview for Sexual Abuse Victims or the Detailed Assessment of Posttraumatic Stress.

event increases the risk of developing PTS. In this review, several methodological and conceptual issues central to evaluating the literature were highlighted. We conclude that few methodologically sophisticated studies of PD have been conducted and that progress depends upon the refinement of the methodological quality of future studies. In addition, and perhaps even more important, the literature is limited by inadequate and widely varied operationalizations of PD, which affects assessment and data interpretation. Future empirical work needs to be guided by the reevaluation of the definition of PD and by assessments based on this definition.

During the preparation of this study, a meta-analysis was published by Breh and Seidler (2007). This recent meta-analysis found a significant positive relation between PD and PTSD that we assumed. Remarkably, the authors did not find heterogeneous results among studies. This would indicate that no significant differences between studies exist and that an overall effect size could thus be computed across all studies. Instead, the authors differentiated between quasi-prospective and retrospective studies. Retrospective studies result in a correlation between PD and PTSD, whereas quasi-prospective studies result in an outcome that can be interpreted as a risk factor. Although a formal test on the differences between outcomes was not given, the fact that preliminary results were homogenous across studies implies that no differences between the two groups could be expected. These results are the opposite of our own expectations that the methodological quality of the study and differences in substantive variables will result in differences in outcomes among studies. Therefore, a new, more extended meta-analysis that takes into account all of the characteristics of each study is needed.

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