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Abstract

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The independent predictive value of peritraumatic dissociation for PTSD symptomatology after type I trauma: A systematic review of prospective studies

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Running head: Peritraumatic dissociation and PTSD

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Abstract

We conducted a systematic review of prospective studies examining the independent predictive value of peritraumatic dissociation (PD) for posttraumatic stress disorder (PTSD) symptomatology following single traumatic events. Insight into the independent predictive value may help to identify victims at risk for PTSD symptomatology. For this purpose a literature search was carried out using the online databases PsycINFO, Medline/Pubmed, and PILOTS. Studies were included if they were published in peer-reviewed journals (before 2007), focused on more or less single traumatic events (Type I trauma), assessed PD within 1 month, had follow-ups 3 months or later, and which controlled for mental health problems at the time PD was assessed. The majority of the 17 identified studies showed no or only weak indications of an independent predictive value of PD for PTSD symptomatology following type I traumas. Only 3 of the 6 studies with positive results reported a strong independent predictive value of PD.

Although bivariately associated with PTSD symptomatology, there is no general consensus across prospective Type I trauma studies that PD qualifies as an important independent predictor of PTSD symptomatology. Results indicate that initial mental health problems, among other factors, are better predictors of PTSD symptomatology than PD.
1. Introduction

In the aftermath of single traumatic events (type I trauma, Terr, 1991), such as disasters, acts of violence, terrorism, and serious traffic accidents, victims may be confronted with (mental) health problems in the short or long term. They may suffer from, for example, anxiety, agoraphobic and depressive symptoms, re-experiencing of the event, fatigue, pain, unexplained medical symptoms or sleeping difficulties. A proportion of the victims will develop a mental health disorder (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) such as posttraumatic stress disorder (PTSD, DSM-IV).

Effective treatment programs are available for those victims who develop or continue to experience PTSD symptomatology (Foa, 2006). However, a proportion of the victims with these mental health disturbances does not seek or delays seeking treatment (Boscarino, Adams, & Figley, 2004). Early identification of victims who are at elevated risk for these disturbances may help to make adequate treatment available and thereby reduce PTSD symptoms and prevent the development of chronic mental health disturbances in the long term.

Nowadays, the classic concept of hypnoid states applied in the studies of trauma-related hysteria developed by Charcot (1887) and others has found renewed attention: peritraumatic dissociation (PD) during or immediately following a traumatic event is considered to be an important risk factor for the development of mental health disturbances such as PTSD. Examples of dissociative reactions in this phase include a sense of emotional numbing or detachment, reduced awareness of one's surroundings, and/or distortions in the perception of reality, body and time (Bryant, 2007; Van der Kolk & Van der Hart, 1989). Symptoms of PD are frequently reported by survivors of traumatic events (Bryant, 2007). Ozer and his colleagues (2003) conducted a comprehensive meta-analysis of predictors of PTSD and symptoms, assessed in studies published between 1980 (the year PTSD was first included in the DSM) and 2000. They focused on person characteristics salient for psychological processing and functioning, and aspects of the traumatic
event or its sequela, although cognitive abilities such as intelligence were not included (Cf. Buckley, Blanchard, & Neill, 2000). PD emerged as the strongest predictor for PTSD symptomatology compared to 6 other risk factors such as prior trauma, previous psychological adjustment, family history of psychopathology, perceived life threat during the trauma, post-trauma social support and peritraumatic emotional responses. A more recent meta-analysis of studies published between 1995 and 2004 (Breh & Seidler, 2007) has confirmed Ozer et al. (2003) results.

However, results of other studies (see below) have questioned the extent to which peritraumatic dissociation can be considered an independent risk factor for PTSD symptomatology. Their results point to the possibility that the relationship between PD and PTSD might be confounded by further variables. If those variables are not adequately controlled for, PD would artificially appear as an independent predictor of PTSD symptomatology. Mental health problems occurring in the first days or weeks post-event are one example of a possible mediating factor. Typically, such immediate responses are diagnosed as Acute Stress Disorder (ASD) which was introduced in DSM-IV. The aim of introducing ASD was to distinguish between normal and pathological acute stress responses by linking ASD with a relatively poor prognosis (McNally, 2003). It is of relevance that several studies have shown that the recollection of peritraumatic dissociation during or immediately after the particular event may be biased by the current psychological state of the affected individual (Bryant, 2007; Candel & Merckelbach, 2004; Harvey & Bryant, 1999; Marshall & Schell, 2002). Thus, current symptoms indicative of mental health disturbances such as ASD / PTSD may be a cause rather than a consequence of reported peritraumatic dissociation (Sterlini & Bryant, 2002). Interestingly, in their recent meta-analysis Breh and Seidler (2007) compared effect sizes between selected prospective and retrospective studies. Although they found moderate and almost equal effect sizes in both groups of studies (.36 and .37,
respectively), it is unclear whether equal effect sizes provide sufficient evidence that retrospectively reported PD is not biased.

In other words: predictive value of peritraumatic dissociation may be reduced if one controls for, among other factors, existing psychological problems during the first days or weeks post-event (Keane, Kaufman, & Kimble, 2000). For example, in 3 recent prospective studies (Simeon, Greenberg, Nelson, Schmeidler, & Hollander, 2005; Van der Velden, Kleber, Christiaanse, Gersons, Marcelissen, Drogendijk, Grievink, Olff, & Meewisse, 2006; Wittmann, Moergeli, & Schnyder, 2006) peritraumatic dissociation had no significant independent predictive value over and above existing mental health problems during the first days or weeks post-event.

The aim of the present review is to assess the independent predictive value of peritraumatic dissociation in type I trauma studies, i.e. prospective studies aimed at more or less distinct single traumatic events such as disasters, violent assaults, and traffic accidents.

2. Method

For the present study we conducted a literature search using the online databases PsycINFO, PubMed/Medline and PILOTS using the keywords “peri(-)traumatic dissociation,” “peri(-)traumatic dissociative experiences” and/or “PDEQ” (as abbreviation of peritraumatic dissociative experiences questionnaire). In addition, we examined the reference lists of relevant empirical studies and reviews. The following selection criteria were used:

1. We focused on studies after single traumatic events (type I trauma, Terr, 1991) such as traffic accidents and disasters. Victims or veterans of war were excluded (Cf. Kaufman, Kimble, Kaloupek, McTeague, Bachrach, Forti, & Keane, 2002). In lasting or repeated (type II) traumas, it is difficult to distinguish between peritraumatic and persistent dissociation. From a theoretical perspective, as well as due to their different associations with posttraumatic stress (Briere, Scott,
& Weathers, 2005; Panasetis & Bryant, 2003), both types of dissociation need to be carefully distinguished.

2. To reduce the problem of possible bias in the recall of peritraumatic dissociation, studies that examined peritraumatic dissociation more than 1 month after the traumatic event were excluded (Kaufman et al., 2002; Marmar, Weiss, Metzler, Delucchi, Best, & Wentworth, 1999; Simeon et al., 2005).

3. Only prospective studies with a follow-up interval of at least 3 months were included. Prospective designs are most suited to establish causal relations. The minimal duration of the follow-up interval was required as a rapid decline of event-related symptoms has been found during this period (Bryant, 2005).

4. We excluded studies that did not control for, among other possible risk factors, existing mental health problems at the time PD was assessed (Cf. Birmes, Carreras, Ducasse, Charlet, Warner, Lauque, & Schmitt, 2001b; Ursano, Fullerton, Epstein, Crowley, Vance, Kao, & Baum, 1999).

5. We did not include studies that assessed the dissociation cluster (cluster B) of Acute Stress Disorder (ASD, Cf. DSM-IV) instead of peritraumatic dissociation (Cf. Schäfer, Barkmann, Riedesser, & Schulte-Markwort, 2004) since ASD criteria do not distinguish between peritraumatic and persistent dissociation.

6. We excluded general studies on childbirth (Olde, Van der Hart, Kleber, van Son, Wijnen, & Pop, 2005) but included studies with respect to pregnancy loss because of the stressor criterion of the PTSD diagnosis (criterion A, DSM-IV).

7. Finally, studies had to be published in peer-reviewed journals. Publications in languages other than English, German, Dutch, or French were excluded (Cf. Ozaltin, Kaptanoglu, & Aksaray, 2004).
To attain additional information about certain details of some selected studies, authors were contacted by e-mail (reported as personal communications). The study by Freedman et al. (1999) was included although a small proportion of this sample is identical with the sample in Shalev et al. (1998; personal communication with A. Shalev, 2007) and although possibly up to 4 of the 62 subjects suffered from combat exposure.

3. Results
Seventeen prospective studies met the inclusion criteria: 6 with positive results and 11 with negative findings (see Table 1, right column).

Methodological characteristics and main findings of the 16 publications with respect to PD are presented in Table 1. For each selected study publication year, country of origin, type of event, recruitment procedure, possible traumatic brain injury (TBI), gender and age of participants, number of respondents included in the analyses, times of survey and follow-up(s), assessment of PD (instruments), main dependent mental health problems (and instruments), control variables included in the model such as demographic, event, and injury characteristics, and psychological variables and main result are presented.

3.1 General characteristics of the studies
Table 1 shows that all included studies were conducted in western industrialized countries. Study samples represented victims of a variety of man-made and non man-made type I traumatic events such as burns, pregnancy loss, life threatening illnesses, traffic accidents, and natural and industrial
disasters. In all but 2 studies (Koopman, Classen, & Spiegel, 1994; Van der Velden et al., 2006) subjects were recruited in the context of physical treatment related to their traumatic injuries. Only 2 studies focused exclusively on males (Marshall & Schell, 2002) or females (Engelhard, van den Hout, Kindt, Arntz, & Schouten, 2003). Only 1 of the selected studies focused on children (Schäfer, Barkmann, Riedesser, & Schulte-Markwort, 2006). Eight studies had a relatively small sample size of 86 or less.

The instrument most frequently used for the assessment of PD was – in different versions – the Peritraumatic Dissociative Experiences Questionnaire (PDEQ, (Marmar, Weiss, & Metzler, 1997), 11 studies). Two studies utilized an observer-rated version (Wittmann et al., 2006; Zatzick, Kang, Muller, Russo, Rivara, Katon, Jurkovich, & Roy-Byrne, 2002). Assessments of PD occurred within a week of the trauma in 10 studies. All studies focused on a general construct of PD and did not examine possible specific factors of PD.

Table 1 shows that in 15 studies PTSD severity and in 5 studies PTSD caseness were used as dependent variables, based on self-rating scales (14 studies) or observer-rated instruments (5 studies). Both were measured with a variety of instruments such as the IES(-R), PCL, SRS-PTSD, or CAPS. Studies with positive and negative outcomes were reported among studies examining PTSD caseness and studies examining PTSD symptomatology as well as among studies examining PD within 1 week and within 1 month.

Some studies included multiple follow-ups. Van Loey et al. (2003) continuously repeated assessments over the course of 1 year (i.e. 1, 2, and 3 weeks following their injury and subsequently every 8 weeks). In the other 16 studies, 1 to 3 follow-up assessments were performed; however, the majority of studies employed 1 follow-up. In 11 studies the longest follow-up interval ranged between 3 and 6 months.
To test the independent predictive value of PD for PTSD, 13 studies applied multiple or logistic regression analyses. All but 6 studies controlled for sociodemographic or biographical attributes of the subjects, as did all except 6 for event or injury characteristics. Eleven studies controlled for initial ASD/PTSD and a further 12 controlled for initial psychopathological symptoms such as depressive reactions. Interestingly, only 2 of the 6 studies reporting positive findings controlled for initial traumatic stress (symptoms of ASD or PTSD). Six studies controlled for other psychological variables such as memory fragmentation, sensory impressions, or surprise. One study controlled for pre-existing dissociative tendencies (Murray, Ehlers, & Mayou, 2002) and 1 for personality traits (Holeva & Tarrier, 2001).

3.2 Studies with positive outcomes
Kangas et al. (2005) found a strong correlation between cancer related PTSD and dissociative reactions upon receiving the diagnosis in a rather small sample of cancer patients (N=63). Among many other variables assessed, PD was the strongest predictor of PTSD severity and caseness. PD and initial emotional distress together allowed for the correct identification of 92% of PTSD cases. In a study of a small group (N=51) of emergency room (ER) patients, Shalev et al. (1996) detected a strong predictive power of PD for PTSD severity (29.4% explained variance). Despite the fact that the sensitivity of PD for PTSD caseness was high (94.7%), the specificity ratio was low (30.8%). On the other hand, in a sample of 75 patients who had experienced myocardial infarction, Bennett et al. (2002) found that PD contributed only little (4.9%) to the explained variance.

In the Michaels et al. study (Michaels, Michaels, Moon, Smith, Zimmerman, Taheri, & Peterson, 1999, N=100) the independent association between PD and PTSD was again low; after controlling for a few control variables PD explained 8.2% of PTSD in violence and burn victims. Van Loey et al. (2003) examined a large sample (N=254) of burn victims and found that PD and
other predictors together explained 42% of the variance in IES-scores. However, PD significantly explained 3.5% or less of the variance of intrusions and avoidance at 3 and 12 months over other variables included in the model (personal communication N. Loey, 2007). The results of the only study examining survivors of a natural disaster (Koopman et al., 1994) were mixed. These authors found an independent association between PD and PTSD. However, in the regression analysis for IES subscales, PD emerged as a significant predictor of posttraumatic avoidance (31% explained variance), but not of intrusions. None of the studies with positive outcomes had follow-ups after 1 year.

3.3 Studies with negative outcomes
In the Birmes et al. (2001a) study of a small sample of assault victims (N=35) the following pattern emerged. Entered in the first step of the hierarchical regression analysis, PD explained a significant proportion of PTSD symptom variance. At step 2 initial PTSD symptoms added a significant proportion of explained variance. However, when the order of entry was reversed PD did not add significant explanation of variance. In addition, in a relatively small sample of survivors of various traumas (85% accidents, N=86) recruited by Shalev et al. (1998), PD did not significantly predict PTSD caseness over and above a large range of control variables. Without controlling for other factors, the effect size (Cohen, 1988) for the difference in PDEQ-scores between PTSD and non-PTSD cases was d=.3. The study by Freedman et al. (1999) was part of the same large-scale study as the previous study (Shalev et al., 1998). Here, in this small sample of 62 ER patients following different traumatic events PD significantly predicted PTSD, but only if state anxiety and initial PTSD symptoms were not controlled for. Due to the small sample sizes it cannot be ruled out that statistical significance for PD was not reached due to insufficient test power. However, considering
the weak associations (4.6% explained variance in Birmes et al. (2001a) and an uncontrolled effect size of \(d=.3\) in Shalev et al. (1998)), such an explanation appears to be less meaningful.

In a study on subjects after motor vehicle accidents or violent assault by Zatzick et al. (Zatzick et al., 2002) PD did not significantly explain the development of PTSD severity over 1 year over and above other variables in a random coefficient regression model.

In the Van der Velden et al. (2006) study using a large sample of disaster victims (\(N=662\)), PD was not a significant independent predictor for PTSD severity at 18 months or 4 years post-disaster. For IES-scores at 18 months (but not at 4 years), PD significantly added 0.8% explained variance, but not when only intrusions and avoidance or only psychological distress at the first survey was entered in the analyses (in the first hierarchical analyses both intrusions and avoidance and psychological distress were entered). However, bivariate correlations showed that PD was associated with mental health problems at follow-ups.

Wittmann et al. (2006) assessed both PD and PTSD by means of observer-rated instruments in a large sample of accident survivors (\(N=214\)) exhibiting a relatively low degree of post-traumatic psychopathology. When entered before initial PTSD symptoms PD added a significant but small (3%) proportion of explained variance over and above a set of other control variables. When entered after initial PTSD symptoms PD was not significant. With respect to depression and anxiety symptoms, PD did not significantly add to the explained variance independent of the order of entry into the regression model. In another large sample of RTA patients (Holeva & Tarrier, 2001, \(N=265\)) Holeva and Tarrier found that PD did predict PTSD caseness, but once again not over and above other variables – especially personality factors – included in the regression model.

As shown in Table 1, 2 studies with negative outcomes used path-analyses to assess the associations between PD and posttraumatic stress symptoms. Engelhard et al. (2003) performed a path analysis in order to model the relationship between PD, additional initial reactions and PTSD
after pregnancy loss (N=104). Whereas the coefficient of a direct path between initial PTSD and PTSD at 4 months was significant, the direct path between PD and PTSD at 4 months was not. Furthermore, the relation between PD and PTSD at 1 month was entirely mediated by memory fragmentation and thought suppression. Bivariate correlations showed that PD was related to expected emotional control, general dissociative tendencies and education, but not to negative life events, neuroticism, or absorption. A cross-lagged panel analysis based on structural equation modeling with latent variables by Marshall and Schell (2002) showed that self-rated PTSD severity and PD were strongly correlated cross-sectionally at 3 different time points among male victims of community violence (N=250). Interestingly, PD assessed 10 days after violent assault again did not significantly predict PTSD severity at follow-ups.

Finally, Murray and colleagues (2002) were the only researchers who assessed the association between PD and PTSD while controlling for pre-existing dissociative tendencies. Once again, PD added no significant explanation of variance of PTSD severity in multiple regression analyses. In the only study which included a (small) sample of children (Schäfer et al., 2006), stepwise regression analyses revealed that only PTSD symptomatology 1 week post-event significantly predicted PTSD severity 3 months after the traffic accident (38% explained variance). Only when PTSD symptomatology 1 week post-event was excluded from the analyses did PD become a significant predictor.

4. Discussion

In this review we rigorously selected prospective type I trauma studies. Studies not assessing PD within 1 month, studies that failed to control for psychological problems at the time PD was assessed and studies without follow-up intervals of at least 3 months were excluded.
This systematic review demonstrates that the majority of prospective studies found no indications that PD is an independent predictor for PTSD symptomatology 3 months or later after type I traumatic events, although several studies reported a significant cross-sectional or bivariate association between PD and PTSD symptomatology.

Three of the 6 studies with positive outcomes (50%) were based on relatively small samples, as were 5 of 11 studies with negative outcomes (41.7%). No studies with positive outcomes (and only 1 study with negative outcomes, Schäfer et al., 2006) included children affected by a traumatic event. Only 1 positive (16.7%) and 3 negative (27.3%) studies included teenagers. Thus, the association between PD and PTSD symptomatology among children has scarcely been examined.

As regards physical injury, the issue of traumatic brain injury (TBI) is of special interest as TBI can resemble the symptoms of PD as well as of ASD or PTSD (Bryant & Harvey, 1997; Jones, Harvey, & Brewin, 2005). However, 2 of the 4 studies that explicitly included subjects suffering from (mild) TBI repeated the reported analyses excluding the TBI-subjects without affecting the results (Marshall & Schell, 2002; Wittmann et al., 2006). Four studies excluded subjects with TBI, the remaining 9 studies did not assess or report on TBI; for 4 of them it can be assumed that no TBI-cases were included (Bennett et al., 2002; Kangas et al., 2005; Koopman et al., 1994; Van Loey et al., 2003).

Although respondents were confronted with a variety of traumatic events, no studies were found among homogeneous samples of victims of other type I traumatic events such as (bank) robberies, violence at work, and rape. Only 1 study with positive (16.7%, Koopman et al., 1994) and two studies with negative (Engelhard et al., 2003; Van der Velden et al., 2006) outcomes included respondents who were not recruited in the context of physical treatment related to their traumatic injuries. Therefore it remains relatively unclear whether PD is an important independent predictor for PTSD symptomatology among the aforementioned groups of victims.
As shown in several of the selected studies, there was a significant association between PD and initial psychological problems. It is unclear if this correlation indicates that PD plays an important role in the etiology of initial psychological problems (Bryant, 2007) or rather if it represents the influence of current mental states on the assessment of PD (e.g., Marshall & Schell, 2002). It is also possible that PD and other peritraumatic experiences are different manifestations of the same process that results in PTSD symptomatology, rather than an independent cause of the later PTSD symptomatology: that peritraumatic dissociation is sometimes associated with subsequent PTSD and symptoms because it is associated with other risk factors (Bryant, 2007). Assessing the empirical evidence of the influence of PD on initial psychological problems was not the aim of our review. On the other hand, as noted by Bryant (Bryant, 2007), PD can assist adaptation because it may limit awareness of threatening experiences (Handford, Mayes, Mattison, Humphrey, Bagnato, Bixler, & Kales, 1986; Horowitz, 1986; Moleman, van der Hart, & van der Kolk, 1992). In addition, PD is also frequently reported after pleasant experiences (Candel & Merckelbach, 2004) as well as sensation seeking activities such as skydiving (Sterlini & Bryant, 2002), neither of which frequently causes enduring posttraumatic stress, suggesting at least that the association between PD and PTSD symptomatology is complex. In addition, most studies used versions of the PDEQ to assess PD and included total PD scores in their analyses. In other words: they focused on a general construct of PD. As suggested by Bryant (Bryant, 2007) and McNally (McNally, 2003), perhaps the general construct of PD needs to be deconstructed into more specific factors such as time distortion, reduced awareness, emotional numbing, amnesia, and derealization in order to improve the prediction of PTSD symptomatology. Thus, instead of lumping diverse phenomena of PD under the same label (McNally, 2003), the predictive value of specific factors of PD should be examined and compared. To the best of our knowledge, there are no such studies available. Therefore, future research in which the independent predictive value of a general construct of PD is compared with the
independent predictive value of specific factors of PD, is warranted. Interestingly, 4 out of the 6 studies with positive outcomes used measures other than the PDEQ to examine PD. This finding raise the question if the PDEQ is an optimal instrument to measure PD. However, since different questionnaires were used to measure PD in these studies and 2 other studies also using other instruments had negative outcomes, it is difficult to draw conclusions.

As noted in other reviews and meta-analyses, there is always a “file-drawer” problem (Rosenthal, 1979). It is possible that studies of PD with negative outcomes were accepted and published less frequently than studies with positive outcomes. According to Rosenthal (Rosenthal, 1979, p. 638), “[...] journals are filled with the 5% of the studies that show Type I errors, while the file drawers back at the lab are filled with the 95% of the studies that show nonsignificant (e.g., p > .05) results.” Therefore, the few studies reporting an independent predictive value of PD may in fact be an over-estimation of the true proportion of studies that found an association. However, several of the publications included did not focus exclusively on PD.

In the majority of cases PTSD symptomatology in adults was not independently predicted by PD assessed within 1 month following the traumatic event. Of the 6 studies with positive outcomes, only 3 found strong independent associations between PD and PTSD symptomatology (Kangas et al., 2005; Koopman et al., 1994; Shalev et al., 1996). These result are surprising given that 2 meta-analyses (Breh & Seidler, 2007; Ozer et al., 2003) reported that PD was an important predictor of posttraumatic stress. However, both meta-analyses did not examine the independent predictive value of PD or the predictive value of initial mental health problems following traumatic events. Results indicate that – among other variables – initial mental health problems are better predictors of PTSD symptomatology 3 months or later after single traumatic events than peritraumatic dissociation.
Acknowledgements

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References


Table 1 Characteristics of prospective trauma I studies on peritraumatic dissociation.

<table>
<thead>
<tr>
<th>Publication</th>
<th>Type of event</th>
<th>Age (range)</th>
<th>Recruitment</th>
<th>TBI</th>
<th>Gender</th>
<th>N</th>
<th>Surveys</th>
<th>Instruments</th>
<th>Analyses</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bennett et al., (2002)</td>
<td>Myocardial infarction</td>
<td>60.4 ± 11.0</td>
<td>Consecutive admissions to a university hospital</td>
<td>Not reported</td>
<td>M+F</td>
<td>75</td>
<td>T1 T2 T3 T4</td>
<td>6 PTSD clusters, dichotomous re-experiencing, avoidance and arousal (PDS, SR)</td>
<td>MRA (H) Social support</td>
<td>Negative emotions⁷¹, Depression⁷¹, Acute Stress Disorder severity⁷²</td>
</tr>
<tr>
<td>Birmis et al., (2003)</td>
<td>Violent assault</td>
<td>39.7 ± 15.9</td>
<td>Consecutive admissions to a university hospital</td>
<td>Head injury with prolonged unconsciousness</td>
<td>M+F</td>
<td>35</td>
<td>1d 2w 3m</td>
<td>PDEQ (10 items, SR) PTSD severity (IES, SR)</td>
<td>MRA (H)</td>
<td>Acute Stress Disorder severity⁷²</td>
</tr>
</tbody>
</table>
Engelhard et al., (2003) Pregnancy loss (adults) Recruited via family magazines during early pregnancy Not reported F 104 1m 4m - - PDEQ (10 items, SR) PTSD severity (PSS, SR)\textsuperscript{a} Path - - PTSD severity\textsuperscript{b}; No significant direct influence of PD on memory fragmentation\textsuperscript{b}; PTSD severity at T2 over mediator variables Sensory impressions\textsuperscript{b}; Emotional intensity\textsuperscript{b}; Thought suppression\textsuperscript{b}

Freedman et al., (1999) Accidents, 28.2 ± 9.9 (16-65) Consecutive ER-admissions Excluded M+F 62 1w 1m 4m 1y PDEQ (8 items, SR) PTSD severity\textsuperscript{a,b,c} and caseness (CAPS, OR)\textsuperscript{d} MRA (H); LRA (H) - - Intrusions and avoidance\textsuperscript{a,b,c}, State anxiety\textsuperscript{a,b,c}, Depression\textsuperscript{a,b,c} PD did not significantly explain variance of PTSD severity at T3 over other variables in model. PD did not significantly improve prediction of PTSD caseness at T4 over other variables in model

Holeva & Tarrier (2001) Road traffic 12.2 Patients of two accident and emergency clinics contacted after M+F 265 2-4w 4-6m - - PDEQ (8 items, SR) PTSD caseness (PI, SR)\textsuperscript{a} LRA (F) Age; Sex; Severity of Previous injury; Acute Stress Disorder RTA Loss as a result of the accident caseness\textsuperscript{a}; Worry\textsuperscript{a}; Neuroticism\textsuperscript{a} PD was not significantly associated with PTSD caseness at T2 over other variables in model
<table>
<thead>
<tr>
<th>Study</th>
<th>Location/Cause</th>
<th>Sample Size</th>
<th>Gender</th>
<th>Gender Ratio</th>
<th>Age (mean ± SD)</th>
<th>Admission History</th>
<th>Diagnosis</th>
<th>Outcome Measures</th>
<th>Predictors</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kangas et al., (2005)</td>
<td>AU Cancer</td>
<td>12.2</td>
<td>(adults)</td>
<td>hospital discharge by mail</td>
<td>60.1 ± 12.2</td>
<td>Consecutive hospital admissions diagnosed with brain metastasis and history of 1st onset head and neck or lung malignancy</td>
<td>PDEQ (10 items, SR) PTSD severity and caseness</td>
<td>MRA (H), LRA (F)</td>
<td>Age; Gender; Treatment complications</td>
<td>Acute Stress Disorder caseness; Psychoticism; Lie-scale</td>
</tr>
<tr>
<td>Koopman et al., (1994)</td>
<td>USA Firestorm</td>
<td>12.8</td>
<td>(adults)</td>
<td>Recruited at a federal emergency management agency, evacuated university fraternities/sororities, non evacuated professional school near the fire</td>
<td>36.1 ± 12.8</td>
<td>Not reported</td>
<td>SASRQ (33 items, SR) PTSD severity</td>
<td>MRA (E, F)</td>
<td>Previous life stressors; Recent life stress</td>
<td>Anxiety; Loss of personal autonomy</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Event Type</td>
<td>Mean Age ± SD</td>
<td>Age Range</td>
<td>Sample Size</td>
<td>Gender</td>
<td>Time Period</td>
<td>PTSD Measure</td>
<td>PTSD Severity Measure</td>
<td>Methodology</td>
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<tr>
<td>Marshall &amp; Schell</td>
<td>USA</td>
<td>Community violence</td>
<td>24.3 ± 5.6</td>
<td>18-35</td>
<td>250</td>
<td>M</td>
<td>10d 3m 1y</td>
<td>PDEQ (7 items, SR)</td>
<td>PTSD severity SEM (PCL, SR)</td>
<td>Consecutively hospitalized at level I trauma facility; 12% with GCS score &lt;15 included; excluding them did not change results.</td>
</tr>
<tr>
<td>Michaels et al.</td>
<td>USA</td>
<td>Force, penetrating burns (adults)</td>
<td>37.2 ± 0.8</td>
<td>24h post-trauma</td>
<td>100</td>
<td>M+F</td>
<td>ca. 2w 6m</td>
<td>MCEPS (5 item, SR)</td>
<td>PTSD severity MRA (H) Age Assault General health</td>
<td>PD significantly added 8% explained variance of PTSD severity at T2 over other variables in model.</td>
</tr>
<tr>
<td>Murray et al.</td>
<td>UK</td>
<td>Road traffic accidents (18-59)</td>
<td>33.9 ± 12.3</td>
<td>ca. 1w 4w 6m</td>
<td>140</td>
<td>M+F</td>
<td>Pre-accident dissociative tendencies; Data driven processing during accident; Initial memory fragmentation and rumination</td>
<td>PTSD severity SDQ (7 items, SR) MRA (H)</td>
<td>PD did not significantly explain variance of PTSD severity at T3 over other variables in model (personal communication A. Ehlers, 2007).</td>
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</tr>
<tr>
<td>Schäfer et al., (2006)</td>
<td>D Road traffic accidents 18</td>
<td>Emergency departments of 5 representatively selected hospital</td>
<td>Physical injuries allowed interview</td>
<td>M+F 48 1w 3m - -</td>
<td>ASD (5 items, SR) (IES-R, SR)T2</td>
<td>PTSD severity MRA (S) -</td>
<td>Injury of a relative Subjective distressT1; (personal communication I. Shafer 2007) anxietyT1; (personal communication I. Shafer 2007) explained variance of PTSD severity at T2 in stepwise analyses.</td>
<td>PD added no significantly explained variance of PTSD severity at T2 in stepwise analyses. When IES-R at T1 was ommitted in analyses, PD was significant and explained 13.7% of variance (personal communication I. Shafer 2007)</td>
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<tr>
<td>Shalev et al., (1996)</td>
<td>IL Accidents (82.3%), 14.3</td>
<td>Emergency room patients consecutively admitted to surgical or orthopedic wards</td>
<td>Excluded M+F 51 2-6d 6 m - -</td>
<td>PDEQ (8 items, SR) (SCID, OR)T2</td>
<td>PTSD caseness LRA (E); MRA (E) Age; Event severity Immediate physical, emotional, and cognitive responseT1; explained variance of PTSD caseness at T2</td>
<td>PD significantly predicted PTSD physical, emotional, and cognitive responseT1; (sensitivity 94.7%; specificity 30.8%) and explained variance of PTSD severity at T2 and State and trait anxietyT1; (29.4%) over other DepressionT5 variables in model</td>
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<tr>
<td>Study</td>
<td>Location</td>
<td>Event Type</td>
<td>Percentage</td>
<td>M/F</td>
<td>Age</td>
<td>Gender</td>
<td>Education</td>
<td>Trauma History</td>
<td>Immediate Physical, Emotional, and Cognitive Response</td>
<td>PTSD Caseness at T3 and Intrusions and Avoidance at T2 and T3</td>
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<tr>
<td>Shalev et al., (1998)</td>
<td>IL</td>
<td>Accidents</td>
<td>85%</td>
<td>M+F</td>
<td>86</td>
<td>1w</td>
<td>1m</td>
<td>4m</td>
<td>Event severity</td>
<td>PTSD caseness at T3</td>
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<tr>
<td></td>
<td></td>
<td>terrorist attacks</td>
<td>10%</td>
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<td></td>
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<td>witnessing violence</td>
<td>5%</td>
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<td>Van der Velden et al., (2006)</td>
<td>NL</td>
<td>Fireworks disaster</td>
<td>Not reported</td>
<td>M+F</td>
<td>662</td>
<td>2-3w</td>
<td>18m</td>
<td>4y</td>
<td>Event severity</td>
<td>PTSD caseness at T3</td>
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<td>Affected Dutch native residents</td>
<td>14.8 (adults)</td>
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<td>were asked by mail to participate</td>
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<td>PDEQ (8 items, SR)</td>
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<td></td>
<td>PTSD Severity (SRS-PTSD, SR; IES, SR)</td>
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<td>MRA (H)</td>
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<td>Age; Event severity</td>
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<td>LRA (H)</td>
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<td></td>
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<td>Gender; Disaster experiences</td>
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<td>Intrusions and avoidance (SRS)</td>
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<td>Psychological distress</td>
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<td></td>
<td>PD did not significantly predict variance of PTSD severity and intrusions and avoidance at T2 and T3 over other variables in model</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Event</td>
<td>Mean ± SD</td>
<td>Sample Size</td>
<td>Gender</td>
<td>Follow-up</td>
<td>Measure of PTSD</td>
<td>Data Collection</td>
<td>Percent with Mild TBI</td>
<td>Type of Accidents</td>
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<tr>
<td>Van Loey et al., (2003)</td>
<td>NL, B</td>
<td>Burn injuries</td>
<td>38.5 ± 13.5</td>
<td>Consecutive admissions to six burn centers</td>
<td>M+F</td>
<td>242</td>
<td>ADS-D (3 items, SR) for 2w, 8 w</td>
<td>Development of PTSD severity over 1 year (IES, SR)</td>
<td>Gender; Age Burned surface area; Length of hospitalization,</td>
<td>Gender; Age Burned surface area; Length of hospitalization,</td>
</tr>
<tr>
<td>Wittmann et al., (2006)</td>
<td>CH</td>
<td>Accidents</td>
<td>42.0 ± 12.9</td>
<td>Consecutive admissions to trauma ward of a university</td>
<td>M+F</td>
<td>214</td>
<td>PDEQ (10 items, OR)</td>
<td>PTSD severity MRA (H) Gender Type of Pre-existing accident; mental anxiety and depression; Subjective disorders; PTSD anxiety, and symptoms; TBI; Injury severity</td>
<td>PD did not significantly explain variance of PTSD severity, anxiety, and depression at T2 over other variables in model</td>
<td></td>
</tr>
</tbody>
</table>

PD = Post-traumatic stress disorder; ADS-D = Anxiety, Depression, and Somatization Disorder; MRA = Multilevel Random Effects Model; HLM = Hierarchical Linear Model; IES = Impact of Event Scale; SR = Self-report; OR = Other report; CAPS = Clinician-Administered PTSD Scale; HADS = Hospital Anxiety and Depression Scale; PDEQ = Peritraumatic Distress Evaluation Questionnaire; TBI = Traumatic Brain Injury; T2 = Two months; T3 = Three months; T4 = Four months; T5 = Five months; T6 = Six months; T7 = Seven months; T8 = Eight months; T9 = Nine months; T10 = Ten months; T11 = Eleven months; T12 = Twelve months.
Zatzick et al., (2002) USA Motor vehicle accidents; violent assault admissions of trauma surgery inpatients 34 ± 12 (14-65) PDEQ (8 items, OR) Development of PTSD severity over 1 year (random trauma; coefficient Gender; Age (PTSD CL CV, SR) HLM Prior Injury severity PTSD severity\(^1\); Depression\(^1\); Stimulants intake\(^2\); PD did not significantly explain the development of PTSD severity over 1 year over other variables in model

Notes Age=Mean ± SD in years Evaluation of results: + = independent predictive value for PD; - = no independent predictive value for PD T1-T4: 1st, 2nd, 3rd, and 4th survey respectively; d=days; w=weeks; m=months; y=years

Abbreviations ASD(-D)=criteria of acute stress disorder, dissociative symptoms during or immediately after the event
CAPS=Clinician Administered PTSD Scale
CL=Check List
CLPA=Cross-Lagged Panel Analysis
CV=Civial Version
ER=Emergency Room
F=Female
HADS=Hospital Anxiety and Depression Scale
HLM=Hierarchic Linear Model
IES(-R)=Impact of Event Scale (Revised)
LRA=Multiple Logistic Regression Analysis (H)=Hierarchical; (F)=Feed Forward; (E)=Enter
M=Males
MCEPS= Michigan Critical Events Perception Scale
MISS=Mississippi Scale for Combat related PTSD; CV=Civilian Version
MRA=Multiple Regression Analysis; (H)=Hierarchical; (F)=Feed Forward; (E)=Enter, (S)=Stepwise
N=Number of respondents in analyses
OR=Observer Rating
PD=Peritraumatic Dissociation
PDEQ=Peritraumatic Dissociative Experiences Questionnaire
PDS=Posttraumatic Diagnostic Scale
PI=PTSD Inventory
PSS=Posttraumatic Symptom Scale
HLM=Hierarchic Linear Model
SASRQ=Stanford Acute Stress Reaction Questionnaire
SCID=Structured Clinical Interview for DSM-IV
SDQ=State Dissociation Questionnaire
SEM=Structural Equation Modelling
SR=Self Rating
TBI=Traumatic Brain Injury