



Research Article

SYMPTOMS OF TRAUMATIC STRESS IN MOTHERS OF CHILDREN VICTIMS OF A MOTOR VEHICLE ACCIDENT

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Background: Motor vehicle accidents (MVAs) are the main cause of Posttraumatic stress disorder (PTSD) in industrialized countries. This includes the frequently occurring but understudied situation of parents learning that their children were injured. However, unlike in other types of trauma survivors, little is known about the predictors of PTSD symptoms in mothers whose child has suffered an MVA. **Methods:** A group of 72 mothers and 28 fathers were prospectively assessed for peritraumatic distress, peritraumatic dissociation, and PTSD symptoms 1 and 5 weeks after their child had suffered an MVA. **Results:** Levels of peritraumatic distress and dissociation were comparable to other trauma victims, 18% of the mothers were considered to be suffering from probable PTSD. In mothers, significant positive correlations were found between PTSD symptoms and peritraumatic distress ($r = .34$) and dissociation ($r = .37$), whereas mothers' PTSD symptoms were associated with decreased peritraumatic dissociation in fathers ($r = -.37$). Even after controlling for covictim/witness status, peritraumatic distress was a predictor of mothers' PTSD symptoms, explaining 14% of the variance. **Conclusions:** Peritraumatic response and PTSD symptoms should be routinely assessed among parents whose child has experienced a traumatic event. *Depression and Anxiety 0:1-6, 2009.* © 2009 Wiley-Liss, Inc.

Key words: motor vehicle accident; peritraumatic distress; peritraumatic dissociation; mothers; PTSD

Motor Vehicle Accidents (MVAs) are the main cause of Posttraumatic stress disorder (PTSD) in industrialized countries.^[1] In France, data from 2008 revealed 76,767 MVAs responsible for 96,905 MVA victims, including 4,443 deaths. Although the prevalence of PTSD is high among those directly involved in

MVAs, a recent study found that 20% of mothers whose child had suffered an MVA, presented significant PTSD symptoms.^[2] In France, 15,946 children were injured in MVAs in 2007. These figures suggest that

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1 second-hand trauma exposure and PTSD among
 3 significant others might be underestimated and might
 5 represent an important issue in public health. However,
 7 unlike other types of trauma survivors, little is known
 9 about the predictors of PTSD symptoms in parents
 11 whose child has suffered an MVA. Assessing peritraumatic
 13 reactions would be useful to screen individuals at
 15 high risk for PTSD, as meta-analyses have identified
 17 peritraumatic response as one of the most robust
 19 predictors for PTSD.^[3] As peritraumatic responses
 21 have been reported to be strong predictors of PTSD
 23 symptoms in various groups of trauma survivors,
 25 including victims of MVAs,^[3-8] we aimed to replicate
 27 and extend this finding in a prospective study involving
 29 parents whose children were involved in an MVA.

31 Peritraumatic reactions mainly include reactions of
 33 distress and dissociation. Peritraumatic distress refers
 35 to the negative emotions (feeling helpless to do more,
 37 feeling sadness and grief, feeling frustrated or angry,
 39 etc.), as well as the perceived life-threat and bodily
 41 arousal (feeling afraid for one's safety, feeling worried
 43 about the safety of others, experiencing physical
 45 reactions like sweating, shaking, pounding heart, etc.)
 47 experienced during and immediately after the trauma.^[9,10]
 49 Peritraumatic dissociation is defined as a way
 51 of processing information during and immediately after
 53 the trauma, which involves an altered perception of
 55 time, place, and self: moments of losing track of time or
 57 blanking out; finding oneself acting on "automatic
 59 pilot"; a sense of time changing during the event; the
 event seeming unreal; a feeling of floating above the
 scene; a feeling of body distortion; confusion as to what
 was happening to one's self and others; being unaware
 of things that happened during the event; and
 disorientation.^[3,11-13] Other identified risk factors
 associated with the development of PTSD among
 relatives include being present at the time of the
 accident for parents, the child younger age, and the
 child diagnosed with PTSD.^[14]

51 The present prospective study was conducted among
 53 mothers and fathers whose child had been victim of an
 55 MVA. It was hypothesized that, 5 weeks after the
 57 accident, a significant proportion of parents would
 59 suffer from acute PTSD symptoms. According to our
 second hypothesis, levels of peritraumatic distress and
 dissociation measured in the first week after the
 accident would prospectively predict the levels of
 PTSD symptoms.

METHODS

PARTICIPANTS

51 Mothers of children aged 8-17 admitted to the emergency room
 53 (ER) of the Toulouse University Hospital following an MVA were
 55 enrolled from January 2006 to 2008. The present exploration of
 57 parents' PTSD symptoms is part of a larger study investigating the
 59 consequences of MVAs in children. Participation in the larger study
 required completing a number of self report measures, therefore
 children under 8 were excluded. The other noninclusion criteria for

61 this study were: mothers under the age of 18, and either the mother
 63 or her child living more than an hour drive from the assessment
 65 centre, not speaking fluent French, suffering from mental retardation,
 67 psychotic disorders, and severe medical conditions. Throughout this
 69 period, 592 children aged 8-17 (out of a total of 1,049 children aged
 71 0-17) were admitted to the ER of the Toulouse University Hospital
 73 and 304 mother-child dyads were approached. During the enroll-
 75 ment period, 246 families met the study criteria, 94 (38%) agreed to
 77 participate in a psychological assessment 1 week after the MVA.
 79 Families refused to participate either because one of the parents or
 81 the child was not interested in the study ($n = 50$), because the MVA
 83 was not severe and the child had no injury ($n = 30$), because they were
 85 not available for the baseline assessment ($n = 19$), or because the child
 87 was already in treatment with a psychiatrist ($n = 10$). An additional 43
 89 families declined to participate in the study for other reasons (leaving
 91 on vacation, parents divorcing...) or without giving reasons. Of the
 93 94 mothers, 72 returned for followup 5 weeks later. Mothers who did
 95 accept to participate had children younger than those who refused,
 97 and had children who were more frequently hospitalized after
 admission to an ER than those of mothers who refused. Those who
 completed the study included co-victims (18.1%, $n = 13$), and
 mothers who witnessed the accident (6.9%, $n = 5$) or were abruptly
 informed of the accident (75%, $n = 54$). Peritraumatic distress and
 dissociation data, as well as written informed consent were collected
 by a Masters-level experienced psychologist at the first encounter.
 Acute PTSD symptoms were gathered at the second encounter. The
 final sample's ($n = 72$) mean age was 41.7 years old ($SD = 6.2$) and
 91.7% ($n = 66$) of the participants were of French origin. Forty-nine
 mothers (69%) reported having been exposed to a previous
 potentially traumatic event and 15.5% reported lifetime PTSD prior
 to child MVA. No significant difference was found between the
 dropouts (23.4%) and the study completers regarding socio-demo-
 graphic characteristics, peritraumatic distress and dissociation data.
 Among the 72 children (42 boys, 30 girls), 31.9% ($n = 23$) were
 pedestrians, 38.9% ($n = 28$) were car passengers, and 29.2% ($n = 21$)
 were riding a bicycle. The mean age of the children was 12.4 years old
 ($SD = 2.6$) and 31.9% of them spent at least one night in hospital.
 Forty-six fathers were also enrolled in the study (mean age = 40.94
 years ($SD = 5.3$)), 28 of whom were reassessed at the 5-week follow-
 up interview. The medical and demographic characteristics of study
 participants are listed in Table 1.

MEASURES

99 The objective severity of the child's physical injury was assessed
 101 and classed as follows: (1) visit to the ER without hospitalization; (2)
 103 visit to the ER followed by one night in hospital at the most; and (3)
 105 visit to the ER followed by more than one night in hospital.

107 As the trauma was not directly experienced by some parents, the
 109 peritraumatic period was operationally defined for parents having
 111 directly experienced the trauma (as witnesses or victims) as beginning
 113 at the time of the MVA, and for those who were absent, as beginning
 115 at the time they received the information of their child having been
 victim of an MVA.

109 The *Peritraumatic Distress Inventory* (PDI^[9,15]) is a 13-item self-
 111 report measure assessing the level of distress experienced during a
 113 traumatic event (e.g. "I felt afraid for my safety," "I felt helpless to do
 115 more," "I was horrified by what happened," etc.). Each item is scored
 on a 5-point Likert scale, from 0 (not true) to 4 (extremely true). The
 total score obtained by summing the responses across all items ranges
 from 0 to 52 with higher scores indicating increased distress. The A2
 criterion (for trauma exposure) is met when item 1, 4, or 10 is rated as
 at least 3, as the study participant is considered to have suffered from
 clinically relevant peritraumatic distress. The PDI has been validated
 in French^[15] and was found to demonstrate good test-retest



1 **TABLE 1. Baseline medical and demographic**
 2 **characteristics of study participants**

	Mean or <i>n</i>	<i>SD</i> or %
5 <i>Characteristics of mothers (n = 72)</i>		
6 Age (years)	41.7	6.2
7 Caucasian	66	91.7
8 Marital status		
9 Living with significant other	54	75
Living alone	18	25
10 Professional status		
11 Employed	55	76.4
12 Unemployed	17	23.6
13 History of previous trauma exposure	49	68
14 History of lifetime PTSD before MVA	11	15.5
15 Exposure		
16 Co-victim	13	18.1
17 Witness	5	6.9
Abruptly informed	54	75
18 <i>Characteristics of children victims (n = 72)</i>		
19 Age (years)	12.4	2.6
20 Gender male	42	58.3
21 Status in the accident		
22 Car passenger	28	38.9
Riding bicycle	21	29.2
23 Pedestrian	23	31.9
24 Exposure		
25 ER without hospitalization	49	68
26 1 night in hospital at the most	13	18
> 1 night in hospital	10	14
27 <i>Characteristics of fathers (n = 28)</i>		
28 Age (years)	40.9	5.3
29 Professional status		
30 Employed	2	7
31 Unemployed	26	93

35 reliability, convergent and divergent validity as well as good internal
 36 consistency (Cronbach's α of .84 in our sample).^[9,10,15]

37 The *Peritraumatic Dissociative Experiences Questionnaire* (PDEQ^[11,12])
 38 is a 10-item self-report questionnaire assessing the degree of dis-
 39 sociation experienced during a trauma (e.g. "I had moments of losing
 40 track of what was going on—I blanked out or spaced out or in some
 41 way felt I was not part of what going on," "I found that I was on
 42 automatic pilot—I ended up doing things that I later realized I hadn't
 43 actively decided to do," "My sense of time changed—things seemed to
 44 be happening in slow motion," etc.). Each item is scored on a 5-point
 45 Likert scale ranging from 1 (not at all true) to 5 (extremely true). The
 46 sum of all items provides a total score that ranges from 10 to 50, with
 47 higher scores indicating increased dissociation. A score of 22 denotes a
 48 clinically significant peritraumatic dissociative response.^[16] The
 49 PDEQ also showed moderate to strong convergent validity, satis-
 50 factory test-retest reliability, and internal consistency (Cronbach's α
 51 of .90 in our sample).^[10-12]

52 To assess the symptoms of PTSD the *Posttraumatic stress disorder*
 53 *Checklist specific* (PCL-S) was used. The PCL-S is a 17-item
 54 instrument that parallels diagnostic Criteria B, C, and D for PTSD,
 55 as delineated in the DSM-IV.^[17] The PCL-S was designed for use as a
 56 self-report instrument, and is one of the only three well-established
 57 self-report instruments that closely assess each of the 17 DSM-
 58 defined PTSD symptoms separately.^[18] Each item is scored on a
 59 5-point Likert scale (1 = "not at all" to 5 = "very often"). The scale
 provides three subscores corresponding to the three main symptom
 clusters of the disorder: reexperiencing (items 1–5), avoidance (items

6–12), and hyperarousal (items 13–7). Total scores range from 17 to
 85, with higher scores reflecting increased levels of PTSD symptoms.
 Scores >44 reflect a condition deserving clinical attention^[17-19] and
 in our study, correspond to a "probable PTSD" status. The French
 version of the PCL-S demonstrated satisfactory test-retest reliability
 and internal consistency (Cronbach's α of .91 in our sample).^[17,19]

STATISTICAL PROCEDURES

Statistical analyses were conducted with SPSS 15.0 (SPSS Inc.,
 Chicago, IL). Bivariate analyses, including χ^2 or Fisher's exact test
 were performed in order to identify factors associated with the
 probable PTSD group. Spearman's correlations were used to
 determine the strength of the association between a number of
 predictors and PTSD symptoms. A linear hierarchical multivariate
 analysis was performed with PTSD symptom scores as the dependent
 variable. Analyses were also conducted to verify the normality,
 linearity, multicollinearity, and homocedasticity assumptions. The α
 level was set at .05 using two-sided tests. There were no missing data.

RESULTS

Thirteen mothers (18.1%) and only one father
 (3.6%) met the criteria for probable PTSD 5 weeks
 after their child's MVA. No significant difference was
 found in socio-demographic data or in accident type
 between mothers with and without probable PTSD.
 Only four mothers were injured and no significant
 difference was found between mothers with and
 without probable PTSD. Peritraumatic and PTSD
 symptoms in mothers were not associated with age, sex,
 or the length of the child's period of hospitalization.
 However, being a co-victim or a witness increased the
 risk (44 vs. 9%; Fisher's exact test, $P = .002$; see Table 2)
 of developing probable PTSD.

No relationship was found between prior exposure to a
 potentially traumatic experience and the level of peritrau-
 matic dissociation or distress, nor with current PTSD.

A total of 22 mothers (30.6%) suffered from
 clinically significant peritraumatic dissociation and 40
 (55.6%) from peritraumatic distress. In mothers,
 peritraumatic distress and dissociation scores were
 positively correlated with PTSD symptoms,
 $r(72) = .34, P < .01$ and $r(72) = .37, P < .01$, respectively.
 Mothers' peritraumatic dissociation scores were posi-
 tively correlated with fathers' peritraumatic distress

5 **TABLE 2. Variables associated with probable PTSD in**
 6 **mothers**

	No PTSD ^a		Probable PTSD		Fisher's exact	<i>P</i>
	<i>n</i>	%	<i>n</i>	%		
Victim type					.002	
Co-victim or witness						
(<i>n</i> = 18)	10	56	8	44		
Others (<i>n</i> = 54)	49	91	5	9		

^aPCL = PTSD Checklist.



1 scores, $r(46) = .37$, $P < .05$; and mothers' PTSD
 3 symptoms were negatively correlated with fathers'
 peritraumatic dissociation scores, $r(35) = -.37$, $P < .05$
 (see Table 3).

5 A hierarchical multiple regression was then per-
 7 formed to assess the ability of peritraumatic variables
 (distress and dissociation) to predict PTSD symptoms
 in mothers, after controlling for the covictim/witness
 9 status. We entered covictim/witness status into
 step 1, which significantly predicted PTSD symptoms
 11 ($F(1, 71) = 11.63$, $P < .01$) and explained 14.2% (13.0%
 adjusted) of the variance. The mothers peritraumatic
 13 variables (PDI and PDEQ total scores) were then
 added in a second block. The model identified
 15 peritraumatic distress as the only significant psycholo-
 gical predictor of PTSD symptoms ($F(3, 69) = 8.81$,
 17 $P < .01$) and revealed a significant increase in the
 explained variance (R^2 change = 13.8%; adjusted R^2
 19 change = 11.8%; $P < .05$) (see Table 4).

21 **TABLE 3. Intercorrelations between mothers and**
 23 **fathers peritraumatic reactions and PTSD symptoms**

Variables	1	2	3	4	5	6
1. Mothers peritraumatic dissociation ^a		.75**	.12	.37*	.37**	.28
N		94	46	46	72	28
2. Mothers peritraumatic distress ^b			.06	.28	.34**	.12
N			46	46	72	28
3. Fathers peritraumatic dissociation ^a				.55**	-.37*	.28
N				46	35	28
4. Fathers peritraumatic distress ^b					-.01	.33
N					35	28
5. Mothers PTSD symptoms ^c						.20
N						28
6. Fathers PTSD symptoms ^c						

39 ^aPeritraumatic Dissociative Experiences Scale.

41 ^bPeritraumatic Distress Inventory.

43 ^cPTSD Checklist.

* $P < .05$; ** $P < .01$.

47 **TABLE 4. Summary of linear hierarchical regression**
 49 **analysis for variables predicting mothers acute PTSD**
symptoms ($n = 72$)

Variable	B	Std. Error	β
<i>Step 1</i>			
Co-victim/witness status	11.8	3.47	0.38*
<i>Step 2</i>			
Co-victim/witness status	7.41	3.47	0.24*
Peritraumatic distress	0.54	0.20	0.39*
Peritraumatic dissociation	0.02	0.22	0.01

57 Note: $R^2 = .14$ for step 1; $\Delta R^2 = .14$ for step 2 ($P < .01$).

59 * $P < .05$.

DISCUSSION

61 This study investigated the severity of the peritrau-
 63 matic response, the acute PTSD symptoms in parents of
 child victims of an MVA, as well as some of the
 65 predictive factors associated with PTSD symptoms.
 When comparing with studies on victims directly
 67 involved in MVAs, the results indicate that the propor-
 tion of mothers suffering from A2 criteria (55.6%)
 69 corresponds to that reported by Vaiva et al.^[20] (57%).
 However, the prevalence of mothers who suffered from
 peritraumatic dissociation in this study (30.6%) is lower
 71 to other studies' (79%).^[21] Five weeks after the accident,
 18% of the mothers were suffering from probable
 73 PTSD. This result suggests that this type of event may
 have consequences on relatives' lives. Results further
 75 showed that mothers with a probable PTSD had
 experienced more severe peritraumatic distress and
 77 dissociation compared to mothers without a probable
 PTSD, attesting to the clinical usefulness of the PDI to
 79 screen trauma victims. In fact, in a regression analysis,
 even after controlling for the co-victim or witness status
 81 (i.e. A1 DSM criteria) the intensity of peritraumatic
 distress (including intense fear) was the only peritrau-
 83 matic predictor of acute PTSD symptoms.

85 Our analyses failed to demonstrate a significant
 association between fathers' peritraumatic reactions
 and fathers' PTSD symptoms. This may be explained
 87 to a lack of statistical power as few fathers completed
 the study ($n = 28$) and only one of them fulfilled the
 89 criteria for probable PTSD. Another explanation might
 be gender differences in peritraumatic reactions as
 91 women's higher risk for posttraumatic adjustment have
 been suggested to stem from their stronger perceptions
 93 of threat and loss of control, higher levels of peritrau-
 matic dissociation, as well as gender-specific acute
 95 psychobiological reactions to trauma.^[22]

97 The results also indicate a negative association
 between paternal peritraumatic dissociation and ma-
 99 ternal PTSD. Fathers displaying little peritraumatic
 dissociation may have been perceived by the mothers as
 101 handling the situation better. A feeling of inadequacy
 compared to their husbands' response may have led to
 103 feelings of helplessness. Helplessness has been descri-
 bed as a mediator of PTSD symptoms.^[9] Another
 105 explanation might be that fathers suffering from little
 peritraumatic dissociation did not perceive the life-
 107 threat in the same way as their spouses and therefore
 offered them less support.

109 The relationship between peritraumatic distress and
 PTSD symptoms may be explained by the fact that
 peritraumatic arousal enhances trauma-related memory
 111 and sensitizes the neurobiological systems. However,
 other variables might also be involved in this associa-
 113 tion such as the dysregulation of cortisol metabo-
 lism.^[13] Previous research has highlighted the
 114 association between peritraumatic dissociation and
 the development of PTSD symptoms.^[3] Our study
 115 confirms these results but suggests that peritraumatic



1 distress might be a better predictor than dissociation in
 2 mothers of MVA victims. Furthermore, Wittmann
 3 et al.^[23] reported that peritraumatic dissociation
 4 explained less than 3% of the variance of PTSD
 5 symptoms in accident survivors. Our results add to the
 6 body of evidence of a significant and relevant relation-
 7 ship between peritraumatic response and the develop-
 8 ment of PTSD symptoms.^[3,24-26] Peritraumatic
 9 arousal enhances trauma-related memory and sensitizes
 10 the neurobiological systems.^[27]

11 Although this outcome suggests that experiencing
 12 peritraumatic symptoms during or shortly after a
 13 potentially traumatizing event increases the probability
 14 of PTSD symptoms later in life, this should not be
 15 interpreted as proof for a causal relationship. Studies
 16 using a prospective design, including a measurement of
 17 peritraumatic response obtained during or very shortly
 18 after the potentially traumatic event occurred, are
 19 currently too scarce.^[3]

20 When looking at the influence of associated factors,
 21 and consistent with previous studies^[2,14] our results
 22 showed that PTSD symptoms in mothers were not
 23 associated with age, sex, or the length of the child's
 24 period of hospitalization. For direct victims of road
 25 traffic accidents, female gender, severe physical injury,
 26 perceived social deprivation, and sick leave were related
 27 to the diagnosis of PTSD 2 months after the
 28 accident.^[28]

31 LIMITS

32 Firstly, a limitation to the generalizability of our
 33 results might lie in the high rate (62%) of families that
 34 refused to participate in the study. Secondly, the
 35 relatively high drop-out rate was another limitation.
 36 Nearly one quarter (23.9%) of the participants did not
 37 participate in the 5-week follow-up interview. It is also
 38 estimated that 60% of the victims exposed to a
 39 traumatic event and developing acute PTSD will be
 40 in remission 1 year following the trauma. As a
 41 consequence, our results may not be stable during the
 42 entire year following the accident, and later data-
 43 collections points are warranted. However, victims who
 44 develop acute PTSD are at increased risk of suffering
 45 from chronic or persistent PTSD, therefore identifying
 46 them remains a very important issue. The measure-
 47 ment of PTSD using a self-reporting method rather
 48 than assessment by a clinician with a well-established
 49 structured clinical interview is another limitation.
 50 Finally, mothers and fathers of children involved in
 51 an MVA were invited to participate in the study;
 52 however, due to the low numbers of fathers who
 53 participated ($n = 46$), several analyses included only
 54 mother-related data.

57 CONCLUSION

58 Notwithstanding the above limitations, our findings
 59 suggest that parents abruptly informed about their

child's accident might be considered as potential PTSD
 sufferers. It would also be of interest to investigate, in
 future studies, PTSD symptoms in both parents.
 Today, mothers developing PTSD in such circum-
 stances are rarely detected and treated. If future studies
 confirm that more than 10% of mothers whose child
 has experienced an MVAs still suffer from PTSD
 symptoms 5 weeks postaccident, then screening meth-
 ods as well as secondary prevention techniques should
 be considered.

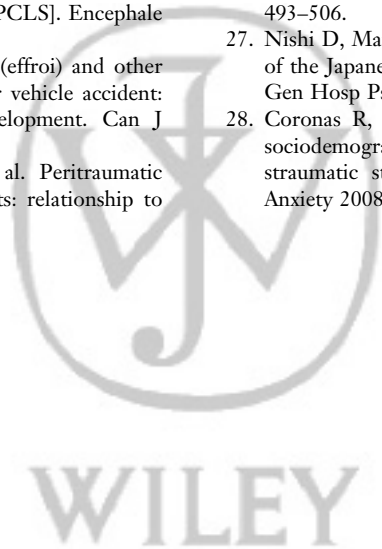
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