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Does Prior Trauma Predict Negative Posttraumatic Appraisal in Motor Vehicle Accident Survivors?

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Abstract

Psychological investigation by Ehlers and Clark in 2000 suggested that negative posttraumatic appraisal is associated with the development and maintenance of posttraumatic Stress Disorder (PTSD). In their cognitive model of PTSD, they propose that prior trauma predicts negative posttraumatic appraisal. Meta-analyses have shown that prior trauma is also one of the predictors of PTSD. Negative posttraumatic appraisal might then mediate the relationship between prior trauma and PTSD, but this hypothesis has yet to be examined. The aim of this study was to examine whether prior trauma predicts negative posttraumatic appraisal, through a secondary analysis of the Tachikawa Cohort of Motor Vehicle Accident Study data. The final sample with complete data at 1 and 6 months post-motor vehicle accident (MVA) comprised 96 patients. Negative posttraumatic appraisal was assessed using the posttraumatic Cognitions Inventory at 1 month and 6 months post-MVA. Total number of prior traumas reported by the participants was assessed at 1 month post-MVA. After controlling for confounding variables, multiple regression analysis showed that number of prior traumas was a significant predictor of negative posttraumatic appraisal at 1 month post-MVA (B=2.84, p= .02, 95% CI [.44, 5.24]), but not at 6 months post-MVA (B=2.10, p=0.20, 95% CI [-.96, 5.15]). The hypothesis tested was partly supported given that number of prior traumas had a significant effect on negative appraisal in the early phase among MVA survivors, but prior trauma failed to predict posttraumatic appraisal at the chronic phase.

Keywords: posttraumatic stress disorder; Negative posttraumatic appraisal; Prior trauma; Motor vehicle Accident; Cohort study

Introduction

In the cognitive model of posttraumatic stress disorder (PTSD) proposed by Ehlers and Clark (2000), negative appraisal is associated with the development and maintenance of PTSD [1]. Negative cognition induced by a traumatic experience can be assessed by the posttraumatic Cognitions Inventory (PTCI) [2]. Negative posttraumatic appraisal has been found in cross-sectional studies to be associated with the development of PTSD [2-4] and in longitudinal studies to predict PTSD [5-7]. There is clear evidence then that negative posttraumatic appraisal is associated with PTSD or disability [8].

Prior trauma was shown to be a predictor of PTSD by two meta-analyses [9,10]. Moreover, in a cognitive model of persistent PTSD, Ehlers and Clark (2000) propose that prior trauma predicts negative posttraumatic appraisal. Renewed trauma may act as a powerful cue for memories of earlier trauma if some sensory components of the experiences overlap, serving to reactivate some of the emotional responses to the earlier trauma [1]. Negative posttraumatic appraisal might therefore mediate the relationship between prior trauma and PTSD, but this has yet to be examined.

We hypothesize that the more prior traumas experienced, the more prone an individual is to negative posttraumatic appraisal. In this study we test this hypothesis by examining whether prior trauma was predictive of negative posttraumatic appraisal in trauma survivors.

Materials and Methods

Subjects and Procedure

This study was a secondary analysis of the Tachikawa Cohort of Motor Vehicle Accident (TCOM) Study data [11] and was approved by the Research Ethics Committee of the National Disaster Medical Center (NDMC), Tokyo. We analyzed the data of participants who completed evaluations of PTSD symptoms and posttraumatic appraisal at 1 month after Motor Vehicle Accident (MVA).

Participants admitted to the intensive care unit of NMDC between 30 May 2004 and 8 January 2008 were recruited consecutively. The inclusion criteria were: (a) MVA-related severe physical injury causing a life-threatening or critical condition; (b) consecutive admittance to the acute critical care center; (c) aged 18–69 years; and (d) native Japanese speakers. The exclusion criteria were: (a) diffuse axonal injury, brain contusion, or subdural and subarachnoid bleeding detected by computed tomography and/or magnetic resonance imaging (with the exception of concussion), because the presence of traumatic brain injury creates considerable difficulties when assessing psychological responses to injury; (b) cognitive impairment, defined as a score of <24 on the Mini-Mental Scale Examination; (c) suffering from schizophrenia, bipolar disorder, drug (non-alcohol) dependence or abuse currently, or epilepsy prior to MVA; (d) serious psychological symptoms such as suicidal ideation, self-harm behavior, or dissociation assessed by trained psychiatrists (YM, DN), or a severe physical condition receiving

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mechanical ventilation, coma, or waiting for consecutive surgeries, preventing the patient from tolerating the assessments; and (e) living or working at a location more than 40 km from NDMC. These participants particularly unlikely to be followed up because it takes almost half day for visit to NDMC by public transportation.

Trained research nurses with a degree in clinical psychology (HN) or trained psychiatrists examined each patient immediately after admittance to the intensive care unit (baseline assessment) and obtained data on demographic variables (e.g., age, sex, and education). At 1 month and 6 months follow-up, trained psychiatrists (YM, DN) conducted a face-to-face structured clinical interview.

Measures

We used the Impact of Events Scale-Revised (IES-R) to assess the level of symptomatic responses to the specific traumatic stressor of MVA in the past week. The degree of distress is examined on three subscales (i.e., intrusion, avoidance, and arousal) and each item is rated on a 5-point scale (0=*not at all*, 4= *extremely*). We used the PTCI [2] to assess post-trauma cognitions about oneself, the world, and self-blame. The scale has three subscales (negative cognitions about self, negative cognitions about world, and self-blame) and 33 items, each rated on a 7-point Likert scale (1=*totally disagree*, 7=*totally agree*). Internal consistency, factor validity, and construct validity of the Japanese version PTCI have been verified [12]. Both the IES-R and PTCI were administered at 1 month and 6 months post-MVA. Total number of prior trauma experiences for each participant was collected at the 1 month follow-up as an objective measure of trauma history [13].

In the structured interview conducted immediately after the MVA, data were collected on general socio-demographics, detailed information about the MVA, and a sense of life-threat during the MVA. Education level was converted into three dummy variables according to the Japanese educational system: graduation from junior high school was used as a reference (0); and 1, 2, and 3 were assigned, respectively, to graduation from high school, graduation from junior or technical college, and graduation from university or higher [14]. History of psychiatric illness and family history of psychopathology were determined by asking the patients whether they or a family member had ever visited a psychiatrist and for what reason.

Statistical Analysis

We examined the correlation between IES-R and PTCI, both at 1 and 6 months post-MVA using Spearman's rank correlation coefficient test. Then we selected liner regression model because we considered that PTCI showed normal distribution. In a model for the predictive value of the number of prior traumas, multiple regression analysis was performed to examine the relationship between prior trauma and the PTCI adjusted for the 6 confounding variables, which were selected that are well-established pre traumatic risk factors across trauma type: age, being female, history of psychiatric illness, family history of psychopathology, lower education level [9,10], and sense of life threat, which is a trauma-related perception that has been reported to predict PTSD [10]. Statistical significance was established at a p-value less than .05. Data analysis proceeded as follows: Step 1, number of prior traumas; and Step 2, incremental variance explained by history of psychiatric illness, family history of psychopathology, sense of life threat during MVA, and education. Finally, multiple regression analysis was performed to examine the relationship between prior trauma and the each of the PTCI subscales adjusted for the 6 confounding variables. Data analysis proceeded as follows: Step 1, number of prior traumas; Step 2, incremental variance explained by age and sex; and Step 3, incremental variance explained by history of psychiatric illness, family history of psychopathology, sense of life threat during MVA, and education. All statistical analyses were performed using the SPSS statistical software package version 21.0J for Windows (SPSS, Tokyo, Japan).

Results

Of 344 patients eligible for the study, 300 gave written informed consent to participate. Of these 300 participants, 204(68.00%) were lost to follow-up, leaving 96 who completed the interview and questionnaires at both 1 and 6 months post-MVA. One-month follow-up assessments took place on a median of 39 (26-71) days post-MVA. The subject sample (N= 96) differed significantly from those lost to follow-up (N=204) in regard to age (t=2.17, p=.031, df=298), sex (χ^2= 11.80, p=.001, df= 1), and ISS score (t=2.79, p=.006, df=151.60), indicating that the sample comprised patients who were more likely to be female, older, and severely injured than those who dropped out. Demographic data for the subject sample are shown in Table 1. Six participants (6.3%) met the criteria for PTSD at both 1 month and 6 months.

Table 2 shows IES-R score, PTCI scores, and number of prior traumas along with the means and standard deviations of the measures at each time point. Table 3 shows the correlations between the IES-R score and PTCI scores. There was a strong correlation between IES-R and PTCI over time, with individuals who reported high symptom levels at 1 month also likely to report high symptom levels at 6 months. Table 4 shows the results of regression analysis for negative posttraumatic appraisal after controlling for confounding variables. Number of prior traumas was a significant predictor of negative posttraumatic appraisal at 1 month post-MVA (B=2.84, p=.02, 95% CI [.44, 5.24]), but not at 6 months post-MVA (B=2.10, p=0.20, 95% CI [-.96, 5.15]). Table 5 presents the results of regression analysis for the PTCI subscales at 1 month post-MVA. Number of prior traumas was a significant predictor of negative cognitions about world (B.14, p=.01, 95% CI [.03, .24]).

	M (SD)
Age (years)	39.23 (15.63)
Injury severity score	11.08 (9.19)
	N (%)
Sex, female	33 (34.4)
Marital status	
-Married or has partner	48 (50.0)
-Never married	41 (42.7)
-Divorced or widowed	7 (7.3)
History of psychiatric illness	6 (6.3)
Family history of psychopathology	12 (12.5)
Sense of life threat during MVA	33 (34.4)
Highest level of education	
Junior high school	17 (17.7)
High school	36 (37.5)
Junior or technical college	25 (26.0)
University or higher	18 (18.8)
Status during MVA Vehicle driver Motorcycle driver Passenger Bicyclist Pedestrian Single-car accident	 23 (24.0) 37 (38.5) 9 (9.4) 16 (16.7) 11 (11.5) 22 (22.9)

Table 1: *Baseline demographics of motor vehicle accident survivors (N=96).*

	1 month		6 months	
	Mean (SD)	M (range)	Mean (SD)	*P*
IES-R	14.56 (13.94)		11.42 (12.69)	.005
PTCI	88.41 (25.25)		95.25 (31.41)	.028
Negative self cognitions	2.27 (.85)		2.47 (1.14)	.069
Self-blame	3.36 (1.51)		3.49 (1.42)	.204
Negative world cognitions	3.43 (1.09)		3.71 (1.15)	.018
Number of prior traumas	2.18(2.2)	2(0-10)		

Table 2*:* Psychological characteristics of motor vehicle accidentsurvivors (N=96)

Measure	1	2	3	4	5	6	7	8	9
1. 1 month IES-R	.								
2. 6 month IES-R	.70**								
3. 1 month PTCI total score	.53**	.49**							
4. Negative self cognitions	.55**	.53**	.89**						
5. Self-blame	.05	-.03	.47**	.18					
6. Negative world cognitions	.44**	.43**	.70**	.52**	.18				
7. 6 month PTCI total score	.23*	.42**	.46**	.45**	.22*	.31**			
8. Negative self cognitions	.22*	.49**	.38**	.49**	-.00	.24*	.92**		
9. Self-blame	-.05	-.13	.29**	.09	.76**	-.00	.41**	.15	
10. Negative world cognitions	.31**	.36**	.33**	.26*	.07	.47**	.76**	.61**	.16

Note. IES-R = Impact of Event Scale-Revised; PTCI = posttraumatic Cognitions Inventory. * = p < .05, ** = p < .01

Table 3: Correlations and Descriptive Information for Impact of Event Scale-Revised and posttraumatic Cognitions Inventory Measures (N=96).

We found a wide range for the number of days from the MVA trauma to the first assessment. We considered the numbers of days from the MVA trauma to first assessment would be entered in the regression model as another covariate. Therefore, we additionally performed to examine the relationship between prior trauma and the PTCI adjusted for the number of days from the MVA trauma to the first assessment by adding previous six covariates. Main result did not change and remained significant. The number of days from the MVA trauma to the first assessment was a significant predictor of negative posttraumatic appraisal at 1 month post-MVA (B=.74, *p*= .04, 95% CI [.03, 1.45]). The relationship between prior trauma and the each of the PTCI subscale adjusted for the seven covariates as indicated before was not changed (data not shown).

Discussion

This study found that exposure to a greater number of prior traumas was positively associated with negative posttraumatic appraisal at 1 month after trauma, which supports our hypothesis in part. That prior trauma was associated with the negative posttraumatic appraisal among our study sample is in line with the findings of Schnurr et al. (2004) that development of PTSD is related to factors that occur before, during, and after a traumatic event, whereas maintenance of PTSD is related only to factors that occur during and after the event [15]. The present study revealed that prior trauma has predicted negative appraisal not at 6 months but 1 month. Renewed trauma might link back to prior traumas and give it additional negative meaning. This might explain why the number of prior trauma experiences was associated with the posttraumatic appraisal of individuals in the early phase of PTSD.

	PTCI at 1 month					PTCI at 6 month				
	B	*SE B*	β	95%*CI*	R^2	*B*	*SE B*	β	95%*CI*	R^2
Number of prior traumas	2.52	1.16	.22*	.23, 4.82	.05	2.39	1.45	.17	-.19, 5.27	.02
Number of prior traumas	2.84	1.21	.24*	.44,-5.24	.18	2.09	1.54	.15	-.96, 5.15	.14
Age	.22	.17	.13	-.12, .55		.25	.21	.12	-.18, .67	
Sex	5.04	5.64	.10	-6.17, 16.24		-9.30	7.17	-.14	-23.55, 4.95	
History of psychiatric illness	7.54	10.43	.07	-13.19, 28.27		7.67	13.26	.06	-18.69, 34.02	
Family history of psychopathology	-4.00	7.66	-.05	-19.23, 11.22		-3.38	9.74	-.04	-22.73, 15.98	
Sense of life threat during MVA	10.79	5.27	.20*	.32, 21.27		13.40	6.70	.20*	.08, 26.71	
Education 0: junior high school	ref					ref				
1: high school	2.88	7.18	.06	-11.38, 17.41		-2.52	9.12	-.04	-20.66, 15.61	
2: junior or technical college	12.10	7.84	.21	-3.49, 27.68		7.00	9.97	.10	-12.81, 26.82	
3: university or more	-5.23	8.24	-.08	-21.60, 11.15		-17.74	10.48	-.22	-38.56, 3.09	

Note. PTCI = posttraumatic Cognitions Inventory;* = *p* < .05

Table 4: Regression analysis for posttraumatic negative appraisal (N=96)

	SELF (range1-7)				BLAME (range1-7)				WORLD (range1-7)			
	B	*SE B*	β	R^2	*B*	*SE B*	β	R^2	*B*	*SE B*	β	R^2
Step1	.06	.04	.15	.02	.12	.07	.17	.02	.10	.05	.20	.04
Step2	.07	.04	.18	.06	.11	.07	.16	.00	.12	.05	.24*	.08
Step3	.07	.04	.17	.16	.10	.08	.15	-.03	.14	.05	.27*	.20

Note. * = *p* < .05,
Step 1: Number of prior traumas
Step 2: Number of prior traumas, age, and sex
Step 3: Number of prior traumas, age, sex, history of psychiatric illness, family history of psychopathology, sense of life threat during MVA, and education

Table 5: Regression analysis for posttraumatic Cognitions Inventorysubscales at 1 month (N=96)

On the other hand, prior trauma failed to predict posttraumatic appraisal at 6 months after trauma in this study. There are several possible reasons for this. First, prior trauma might cause biological vulnerability [16,17], which would lead directly to the development of PTSD without being mediated by negative posttraumatic appraisal. Second, negative posttraumatic appraisal may correct itself over time. It is important to recognize that participants in this study were not currently suffering from PTSD at baseline; most were on their way to recovery. Third, meta-analyses of PTSD predictors have found that the effect size of prior trauma is small, in the range of r= .12 to.17 [9,10].

The severity of posttraumatic stress was significantly correlated with negative posttraumatic appraisal, negative cognition about self, and negative cognition about world at 1 and 6 months, a finding that coincides with that of previous studies [3,5]. Moreover, the relationship between IES-R and self-blame was not significant, which is in agreement with previous studies involving MVA survivors [4,5].

In multiple regression analysis, the coefficient of determination was relatively low. Among the confounding variables we selected as risk factors for PTSD, a significant relationship was found between sense of life threat and posttraumatic appraisal. Given that the factors which occur during and after a traumatic event are important for maintenance of PTSD [15], the model in this study might not be suitable for predicting posttraumatic appraisal at the chronic phase because sense of life threat was the sole factor present during the MVA.

Prior trauma was associated with only the negative cognitions about world subscale on the PTCI. This association may be explained by the participants feeling the world is a more dangerous place after the traumatic event. Alternatively, Bryant and Guthrie (2005) suggests that people who believe the world is a dangerous place are more likely than others to interpret past events as traumatic and therefore report more traumatic experiences when recalling their history [6]. As for the cognitions about self-subscale, prior trauma did not predict it. Many of the subjects in the present study were survivors of a single-car MVA and their injury severity was not so severe. Experience of such an MVA might not reactivate emotional responses about self (e.g. "If I think about the event, I will not be able to handle it") related to the prior trauma.

There are several limitations of this study. First, the findings should be interpreted bearing in mind that the sample size was modest, the attrition rate was relatively high, and the sample was more likely to be female and to be severely injured than those who dropped out. Second, most individuals in this sample had relatively low-level PTSD symptomatology and therefore our findings may have limited generalizability to other populations with higher levels of PTSD symptomatology. Third, this study did not comprehensively evaluate prior trauma severity; the self-report method used has the potential for recall bias. Fourth, the subjects were MVA survivors and therefore our findings may have limited generalizability to populations with experience of other trauma events. Lastly, the number of days from the MVA trauma to the first assessment was associated with the negative posttraumatic appraisal. Further well-designed study with narrow time range would be necessary to know true relationship.

Our results suggest that the more prior traumas experienced, the more prone an individual is to negative posttraumatic appraisal in the early phase, but not chronic phase, of PTSD. Further studies are needed to examine the risk factors for posttraumatic appraisal.

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References

1. Ehlers A, Clark DM (2000) A cognitive model of posttraumatic stress disorder. Behaviour Research and Therapy 38: 319-345.
2. Foa EB, Ehlers A, Clark DM, Tolin DF, Orsillo SM (1999) The posttraumatic cognitions inventory (PTCI): Development and validation. Psychological Assessment 11: 303-314.
3. Beck JG, Coffey SF, Palyo SA, Gudmundsdottir B, Miller LM, et al. (2004) Psychometric Properties of the posttraumatic Cognitions Inventory (PTCI): a replication with motor vehicle accident survivors. Psychol Assess 16: 289-298.
4. Startup M, Makgekgenene L, Webster R (2007) The role of self-blame for trauma as assessed by the posttraumatic Cognitions Inventory (PTCI): a self-protective cognition? Behav Res Ther 45: 395-403.
5. O'Donnell ML, Elliott P, Wolfgang BJ, Creamer M (2007) posttraumatic appraisals in the development and persistence of posttraumatic stress symptoms. J Trauma Stress 20: 173-182.
6. Bryant RA, Guthrie RM (2005) Maladaptive appraisals as a risk factor for posttraumatic stress: a study of trainee firefighters. Psychol Sci 16: 749-752.
7. Ehring T, Ehlers A, Glucksman E (2008) Do cognitive models help in predicting the severity of posttraumatic stress disorder, phobia, and depression after motor vehicle accidents? A prospective longitudinal study. J Consult Clin Psychol 76: 219-230.
8. Friedman MJ, Resick PA, Bryant RA, Brewin CR (2011) Considering PTSD for DSM-5. Depress Anxiety 28: 750-769.
9. Brewin CR, Andrews B, Valentine JD (2000) Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. J Consult Clin Psychol 68: 748-766.
10. Ozer EJ, Best SR, Lipsey TL, Weiss DS (2003) Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. Psychol Bull 129: 52-73.
11. Matsuoka Y, Nishi D, Nakajima S, Yonemoto N, Hashimoto K, et al. (2009) The Tachikawa cohort of motor vehicle accident study investigating psychological distress: design, methods and cohort profiles. Soc Psychiatry Psychiatr Epidemiol 44: 333-340.
12. Nagae N, Masuda T, Yamada S, Kanetsuki M, Nedate K, et al. (2004) Development of a Japanese version of the posttraumatic cognition iventory (JPTCI): Prevalence of negative life events among university students (in japanese). Japanese Journal of Behavior Therapy 30: 113-124.
13. Asukai N, Hirohata S, Kato H, Konisi T (2003) Psychometrie properties of the Japanese language version of the clinician-administered PTSD scale for DSM-IV (in Japanese). Japanese Journal of Traumatic Stress 1: 47-53.
14. Matsuoka Y, Nishi D, Nakajima S, Kim Y, Homma M, et al. (2008) Incidence and prediction of psychiatric morbidity after a motor vehicle accident in Japan: the Tachikawa Cohort of Motor Vehicle Accident Study. Crit Care Med 36: 74-80.
15. Schnurr PP, Lunney CA, Sengupta A (2004) Risk factors for the development versus maintenance of posttraumatic stress disorder. J Trauma Stress 17: 85-95.
16. Bomyea J, Risbrough V, Lang AJ (2012) A consideration of select pre-trauma factors as key vulnerabilities in PTSD. Clin Psychol Rev 32: 630-641.
17. Nemeroff CB, Bremner JD, Foa EB, Mayberg HS, North CS, et al. (2006) posttraumatic stress disorder: a state-of-the-science review. J Psychiatr Res 40: 1-21.

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