Impact of personality and social support on posttraumatic stress disorder after traffic accidents

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Abstract

This study aims to investigate the relationships of personality and social support with posttraumatic stress disorder (PTSD) after traffic accidents.

The 90 Symptom Checklist (SCL-90) and Eysenck Personality Questionnaire (EPQ) were completed 1 week after trauma. The Checklist-Civilian Version (PCL-C) was surveyed 3 months after discharge.

PCL-C score of 38 was used as cutoff point. The older age and lower education significantly increased the PTSD incidence. SCL-90 score was positively correlated with PTSD symptom score. The psychoticism (P) (0.230) and neuroticism (N) (0.302) was positively correlated with PTSD symptom score in a linear relationship. Objective support, subjective support, exploitation degree, and social support were negatively associated with PTSD scores. Force symptoms, psychoticism, subjective support, introversion, and extroversion could explain 65.0% of degree of variation for PTSD with the estimated standard error of 4.758.

PTSD associated social factors include force symptoms, psychoticism, subjective support, introversion, and extroversion.

Abbreviations: EPQ = Eysenck Personality Questionnaire, PCL-C = PTSD checklist-civilian, PTSD = posttraumatic stress disorder, SCL-90 = 90 Symptom Checklist.

Keywords: personality, posttraumatic stress, social support, traffic accidents

1. Introduction

In accordance with the new biology-psychology-social medicine model, mental health is becoming more and more important to improve life quality.[1] The mental distress caused by posttraumatic stress disorder (PTSD) could significantly decrease patient's productivity.[2] Therefore, early identification of PTSD may avoid subsequent mental disorders and benefit vast trauma patients.

In modern life, acute trauma, such as traffic accidents or terrorist attacks, may happen every day,[3] and its psychological impact should not be ignored. Heron-Delaney et al[4] showed that the prevalence rate of PTSD after road traffic crash varied from 6% to 45% based on 51 prevalence estimates across 35 studies. In addition, Tachikawa et al[5] showed that patients were in generalized anxiety after traffic accidents. Half patients were diagnosed with PTSD, and about half people experienced travel terror after traffic accidents, presenting as avoidance of travel or constantly recall of past car accident. Patients are in psychological imbalance after a trauma event, with at least moderate psychological stress.[6] Therefore, promotion of the psychological rehabilitation is of great importance to prevent subsequent mental disorders.

According to recent estimates, 5% males and 10% to 12% females suffer from PTSD after traffic accidents, and the rate may be as high as 60% to 80% for victims of rape.[7–9] PTSD is one of the most common mental diseases for traffic accident survivors with serious and long-lasting impact if untreated. Detailed clinical presentations are described in the PTSD Checklist-Civilian (PCL-C) and the Diagnostic IV Statistical Manual of Mental Disorders. The symptoms of the PTSD mainly include emotional numbing, dysphoria, aroused intrusion, and dysphoric arousal.[10] However, not all survivors would develop PTSD.[11] Therefore, it is important to explore the factors contributing to PTSD. Currently, PTSD risk factors like social and family support and personalities are understudied. Therefore, these PTSD determinants should be identified and targeted in the future preventive interventions.

2. Methods

2.1. Participants and procedures

All patients who underwent traffic accident and were admitted to the Department of Emergency, People's Hospital in Yanqi from March 2014 to October 2014 were recruited. Blood samples were collected on the first day of admission. The 90 Symptom Checklist (SCL-90) and Eysenck Personality Questionnaire (EPQ) were completed 1 week after trauma. The PCL-C and questionnaires regarding social support, stress, and posttrauma

coping were surveyed by telephone interview 3 months after discharge.

All the participants had written informed consent for this study, and the study was approved by the ethics review board of Xinjiang Medical University.

2.2. The inclusion and exclusion criteria

Patients were included if they met the following criteria: (1) experienced traffic accidents at the admission to hospital; (2) aged between 18 and 65 years; (3) were Han people; (4) had no history of mental illness, serious underlying chronic diseases, or severe stress in recent years.

Patients were excluded if they met the following criteria: (1) had brain injury, brain tumors, or any history of cancer; (2) died during the course of follow ups; (3) had minor injuries without hospitalization; (4) were physically unable for follow ups.

2.3. Screening of PTSD symptoms

PTSD PCL-C[12] and Diagnostic IV Statistical Manual of Mental Disorders were formulated by the Division for PTSD, US National Center of Behavioral Sciences, including 17 aspects of PTSD symptoms (Appendix 1): 1–5 on intrusion symptoms (5 to 25 points), 6–12 on avoidance symptoms (5 to 35 points), and 13–17 on alertness symptoms (5 to 25 points). Personal feelings about the past month were asked and scored 1 to 5: 1 as "no," 2 as "a little," 3 as "moderate," 4 as "a considerate degree," and 5 as "extreme." The severity of PTSD was judged based on the total score, ranging from 17 to 85 points.

Currently the CAPS-DX[13] is used as gold standard for PTSD diagnosis with high sensitivity and validity. And, it is also widely used as the PTSD self-evaluation because of its concise content, low cost and high efficiency.[12] It is shown[14] that the total score of PCL-C was significantly correlated with the total score of CAPS-DX with high consistency. The PCL-C validity evaluation on PTSD symptoms[15] also showed its simplicity and effectiveness. Compared with the CAPS - DX, the effective rate of PCL-C is 86% for PTSD diagnosis.[16] The normal reference range of PCL-C is between 45 and 50,[17] and reduction in PCL-C reference is beneficial to diagnostic sensitivity. Therefore, 38 point was used as the cutoff point in the actual screening, in accordance with other studies.[14,18,19]

2.4. Surveys on the social factors contributing to PTSD

The survey included general patients' demographics, mental health assessment, and personality evaluations. The demographics included age, sex, marriage status, occupation, education, and economic income.

SCL-90 scale was used for mental health assessment with 90 questions scored 1 to 5: 1 as "no," 2 as "a little," 3 as "moderate," 4 as "a considerate degree," and 5 as "extreme," Score of 1 point was considered as PTSD negative, and 2 points or more were considered as PTSD positive. The higher the score is, the more severe the symptoms are. The scale reflected the 9 mental symptoms contributing to PTSD, including somatization, compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobia, paranoid, and psychosis.

The Chinese version EPQ[20] was used with a total of 85 questions. In addition to EPQ, the Chinese version also consisted of T table and dimension classification, including introversion and extroversion (E), neuroticism (N), and psychoticism (P).

2.5. Statistical analysis

SPSS 13.0 was used for statistical analysis. Measurement data was expressed as mean±standard deviation. Single factor analysis of variance (pair-wise comparisons using LSD method) or t test was used to compare PCL-C scores among groups. Pearson correlation analysis was used to analyze the correlation of PCL -C score with EPQ, social support, and SCL-90 scores. Multivariate linear regression was used to analyze the factors affecting PCL-C. $P < .05$ was considered statistically significant.

3. Results

3.1. General characteristics

A total of 200 patients met the inclusion criteria and 166 patients completed all the surveys. There were 106 males and 60 females with age ranging from 18 to 65 years and average of 38.75 ± 1.13 years.

3.2. PCL-C scale

The PCL-C scale of all patients was calculated. The average intrusion score was 8.34 ± 3.16, average avoidance score was 11.67 ± 4.22, average alertness score was 7.45 ± 2.56, and average total score was 27.45 ± 8.04.

To determine demographic characteristics of trauma patients, they were grouped by age, sex, marriage, and education, as shown in Figure 1. The alertness score was significantly higher in patients older than 40 years compared with that of other patients ($P = .049$). The alertness factor of patients with high school education was higher than that of those with above high school education ($P = .000$). There were no statistically significant differences in intrusion, avoidance and average total score among groups. The above results indicate that older age and lower education may increase the PTSD incidence.

3.3. Screening of PTSD symptoms

To determine the PTSD prevalence, PCL-C scale was used for screening PTSD symptoms to increase the diagnostic sensitivity and specificity with 38 as cutoff value. The score of 38 was used as the cutoff score in the actual screening to increase sensitivity and decrease misdiagnosis rate. The PCL-C score was used as diagnostic criteria. Patients with score of more than 38 were determined as positive. Of the 166 trauma patients, there were 25 patients with PCL-C score above 38 points and PTSD symptoms.

3.4. PTSD symptoms analysis

To determine the characteristics of PTSD symptoms of the patient cohort, the frequency of PTSD symptoms was analyzed, as shown in Table 1. In this study, among all symptoms, trouble of sleeping was of the highest frequency (23 patients) and avoidance was of the lowest frequency (12 patients). Thus, the frequency of intrusion and alertness was similar among all patients.

3.5. Correlation analysis of PTSD symptom score and SCL-90

To determine the association of self-reported symptoms right after trauma and PTSD incidence, the correlation of PTSD symptom score and SCL-90 was analyzed, as in Table 2. The SCL-90 score was positively correlated with PTSD symptom
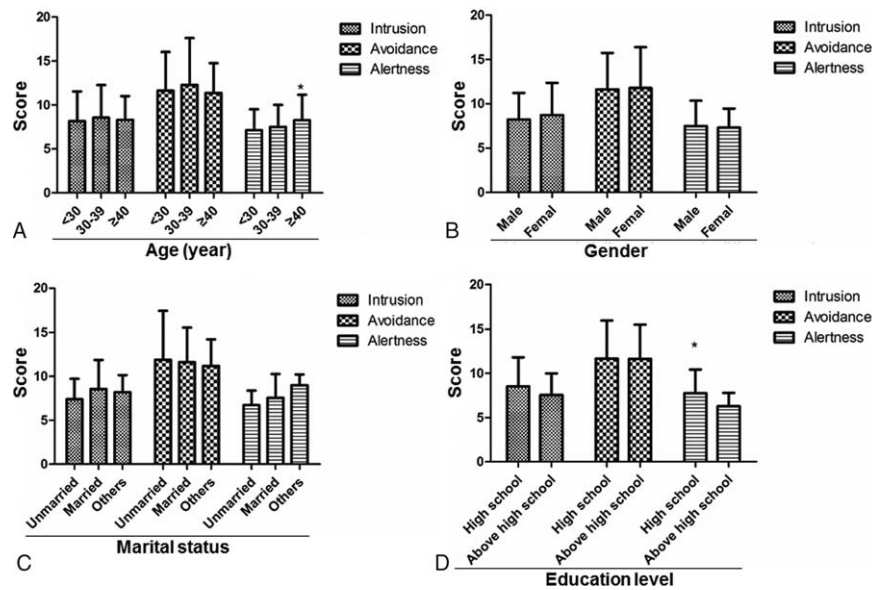
Figure 1. PCL-C score stratified by demographics. The scores of intrusion, avoidance, and alertness in different age group (A) ([*]compared with the age < 30 yrs, $P < .05$), in different sex groups (B), in different marital status (C), and in different education level (D) ([*]compared with the education of above high school, $P < .001$).

score, including somatization (0.596), force (0.702), sensitive interpersonal relationship (0.619), depression (0.637), anxiety (0.671), hostility (0.629), terror (0.537), paranoia (0.577), and psychosis (0.682). The above indicated that the earlier mental status changed, the more likely PTSD symptoms would appear later.

3.6. Correlation analysis of PTSD symptom score and personality factors

To determine the association with PTSD and personality, the correlation of PTSD symptom score and personality factor was analyzed, as in Table 3. The psychoticism (P) (0.230) and neuroticism (N) (0.302) was positively correlated with PTSD symptom score in a linear relationship. Patients who had

difficulty to adapt to the environment were more likely to develop PTSD. Neuroticism indicates emotional instability that is affected by external factors, and patients with greater neuroticism tended to have more PTSD symptoms. The above indicated the close relation between emotional stability and PTSD development.

3.7. Correlation analysis of PTSD symptom score and social support

To determine the correlation of PTSD symptom score and social support, the correlation was analyzed, as in Table 4. The objective support, subjective support, exploitation degree, and social support were significantly associated with PTSD scores with correlation coefficient of −0.268, −0.300, −0.507, and −0.303 respectively. The objective support, subjective support,

Table 1

PCL-C frequency of symptoms (%).

PCL-C symptoms		Frequency (n)	Rate (%)
Intrusion	Repeated, disturbing memories, thoughts, or images of a stressful experience from the past	21	84
	Repeated, disturbing dreams of a stressful experience from the past	21	84
	Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)	18	72
	Feeling very upset when something reminded you of a stressful experience from the past	20	80
	Having physical reactions (eg, heart pounding, trouble breathing, or sweating) when something reminded you of a stressful experience from the past?	18	72
Avoidance	Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it	12	48
	Avoid activities or situations because they remind you of a stressful experience from the past	15	60
	Trouble remembering important parts of a stressful experience from the past	14	56
	Loss of interest in things that you used to enjoy	16	64
	Feeling distant or cut off from other people	14	56
	Feeling emotionally numb or being unable to have loving feelings for those close to you	17	68
	Feeling as if your future will somehow be cut short	13	52
Alertness	Trouble falling or staying asleep	23	92
	Feeling irritable or having angry outbursts	21	84
	Having difficulty concentrating	19	76
	Being "super alert" or watchful on guard	22	88
	Feeling jumpy or easily startled	16	64

Table 2

Correlation analysis of PTSD symptoms and SCL-90.

	SOA	OBA	SEA	DEA	ANA	OPA	FEA	PDA	PSA	PCL total scale	Intrusion	Avoidance	Alertness
SOA													
OBA	0.661△												
SEA	0.514△	0.765△											
DEA	0.644△	0.814△	0.764△										
ANA	0.665△	0.812△	0.767△	0.806△									
OPA	0.500△	0.732△	0.745△	0.702△	0.707△								
FEA	0.490△	0.683△	0.723△	0.701△	0.723△	0.585△							
PDA	0.444△	0.750△	0.840△	0.730△	0.768△	0.738△	0.682△						
PSA	0.589△	0.812△	0.822△	0.787△	0.827△	0.743△	0.662△	0.832△					
PCL	0.596△	0.702△	0.619△	0.637△	0.671△	0.629△	0.537△	0.577△	0.682△				
Intrusion	0.487△	0.573△	0.430△	0.432△	0.514△	0.448△	0.377△	0.387△	0.502△	0.822△			
Avoidance	0.492△	0.588△	0.574△	0.558△	0.560△	0.529△	0.501△	0.503△	0.560△	0.857△	0.527△		
Alertness	0.456△	0.526△	0.467△	0.548△	0.549△	0.550△	0.393△	0.505△	0.598△	0.712△	0.478△	0.391△	1.000

ANA = anxiety, DEA = depression, FEA = phobic anxiety, OBA = obsessive-compulsive, OPA = hostility, PDA = paranoid ideation, PSA = psychoticism, SEA = interpersonal sensitivity, SOA = Somatization.
△P < .01.

Table 3

Correlation of PTSD symptom score and personality factors.

	PCL-C	Intrusion	Avoidance	Alertness	Introversion and extroversion (E)	Neuroticism (N)	Psychoticism (P)
PCL-C	1.000						
Intrusion	0.822△						
Avoidance	0.857△	0.527△					
Alertness	0.712△	0.478△	0.391△				
Introversion and extroversion (E)	0.124	0.236△	−0.001	0.100			
Neuroticism (N)	0.302△	0.279△	0.250△	0.191*	0.118		
Psychoticism (P)	0.230△	−0.100*	0.169*	−0.081	−0.156*	0.312△	1.000

△P < .01.
* P < .05.

and utilization degree were negatively correlated with PTSD scores. The above indicates that voluntary social support is protective factors for PTSD development.

3.8. Multivariate linear regression analysis of susceptible factors for PTSD

To determine the susceptible factors for PTSD, multivariate linear regression analysis was performed. Total PCL-C score was used as dependent variable, and SCL-90 factors, personality, and social support were used as independent variables, namely somatization, force symptoms, interpersonal sensitivity, depression, anxiety, hostility, terror, paranoia, psychosis, introversion and extroversion, neuroticism, psychoticism, lie scale (L), total score of social support, objective support, subjective support, and

utilization degree. By gradual introducing excluding method, force symptoms, psychoticism, subjective support, and introversion and extroversion (E) were added into the regression equation and analyzed, as in Table 5. The goodness-of-fit R^2 was 0.660 and adjusted goodness-of-fit was 0.650, both close to 1. The above 5 variables could explain 65.0% of degree of variation for PTSD with the estimated standard error of 4.758. The PCL-C score was significantly correlated with all the variables in a linear relationship, which was in consistent with the scatterplot. The standardized regression residuals histogram was close to normal distribution. Therefore, in general, the regression can be used to study the relationship between the variables. The regression equation was PCL-C total score = 6.856 + 3.832 * Depressive symptoms + (−0.229) * P + (−0.0271) * subjective support + 4.142 * force symptoms + 0.086 * N.

Table 4

Correlation of PTSD symptom score and social support.

	Social support	Objective support	Subjective support	Support utilization	PCL-C score	Intrusion	Avoidance	Alertness
Social support	1.000							
Objective support	0.403△							
Subjective support	0.476△	−0.581△						
Support utilization	0.232△	−0.421△	0.389△					
PCL-C score	−0.268△	−0.300*	−0.507*	−0.303*				
Intrusion	−0.157△	−0.327*	−0.436*	−0.271*	0.822△			
Avoidance	−0.295*	−0.186*	−0.417*	−0.271*	0.857△	0.527△		
Alertness	−0.160*	−0.233*	−0.366*	−0.170*	0.712△	0.478△	0.391△	1.000

△P < .01.
* P < .05.

Table 5

Regression analysis.

Regression model	Nonstandardized coefficient		Standardized coefficient		
	Coefficient	Standard error	Coefficient	T	P
Constant	6.856	3.218		2.131	.035
Depression symptoms	3.832	1.163	0.256	3.295	.001
Psychoticism (P)	−0.229	0.042	−0.284	−5.475	.000
Subjective support	−0.271	0.058	−0.241	−4.656	.000
Force symptoms	4.142	1.100	.0274	3.767	.000
Neuroticism (N)	0.086	0.038	0.107	2.271	.024

4. Discussion and Conclusions

In this study, PCL-C score of 38 points was considered as the cutoff value for PTSD diagnosis, and there were 15% patients with PTSD symptoms, below the 18.4% in Chossegros L's study.[21] The differences may be due to the different cultural background, type and scale of car accidents, evaluation tools, research methods and follow up length. Generally, people with PTSD may experience different kinds of stress, such as torture-related stressors, trauma, earthquake, and others.[22] In this study, the PCL-C score of 25 PTSD patients ranged from 38 to 52 points, and of them, 20 cases were between 38 and 46 points.

The 3 PTSD symptoms, namely intrusion, avoidance, and alertness, may decrease the quality life of patients even greater than trauma itself. Correlation analysis of the PTSD symptom score indicates that the above symptoms might appear simultaneously and frequently, causing severe mental distress to the patients.[23] In this study, it showed that there were 25 patients with PTSD symptoms and intrusion was of the highest frequency among all symptoms. It is speculated PTSD may be resulted from the significant psychological impact of trauma on the individual and family, presenting as psychosomatic reactions, such as constant flashbacks and concern about health and future recovery. The trauma may further lead to emotional and social avoidance.[24] In addition, in this study, it showed demographic factors contributing to PTSD symptoms, including younger onset age, culture, relatively low education, which were not consistent with Fichera G P's study.[25] Many studies showed that the role age played in PTSD may vary with the nature of trauma events,[26–28] but the study on PTSD of the elderly is just beginning. Patients with higher education may have better access to mental health resources.

It is shown that[29] 1 month after trauma may be the starting point for intervention to decrease the development of PTSD and alleviate the severity of associated symptoms. Mental health indicators at the starting point are widely studied,[30] but no such study has been reported in China. This study showed that patients after traffic accident may not develop PTSD and many other factors may potentially lead to the incidence of PTSD apart from mental status, personality, and social support. Major stress will leave a series of psychological effects on the body, such as anxiety, depression, somatization discomfort, and psychosis.[31–33] PTSD is caused by major stress, pain, fear, and physical distress.[34] This study showed the significant positive correlation between SCL-90 and PTSD symptom score, indicating that the more negative psychological level is, the more likely PTSD may occur. In this study, the higher PTSD score indicates declined mental health, presenting as force, depression, anxiety, hostility, paranoid and psychosis. Most PTSD symptoms may manifest as anxiety, impulsivity and strong adverse emotional responses. Multivariate linear regression analysis showed that the development of PTSD was positively correlated with psychological stress, which is consistent with other study.[35] Unlike the unprepared and quick incidence of traffic accidents, patients underwent terrorist attacks may feel isolated, helpless and powerless at the event, which would aggravate mental distress and directly lead to subsequent PTSD.[36]

Personality may lead to increased incidence of trauma and PTSD.[37] Individual personality is influenced by genetic and environmental factors that may differ from different psychological assessment.[38] This study showed the neuroticism (N) and psychoticism (P) are independent factors for PTSD symptom score, as in Holeva V's study.[39] There is strong correlation between PTSD and negative emotions, including neuroticism, avoidance, novelty-seeking, and self-transcendence, and hostility, anger, and anxiety.[40] These findings may assist in further uncovering the etiology, identification, and prevention strategies of PTSD.

This study also showed that social support, objective support, subjective support, utility degree, and total social support score are negatively correlated with PTSD symptom score, indicating the social support as protective factors for PTSD. Poor social support may prevent patients from adequately accepting trauma.[21] Jeremiah[41] showed high social support indicated decreased PTSD symptoms for women underwent child abuse and adult rape.

In conclusion, this study analyzed the mental status of 166 posttrauma patients using SCL-90, EPQ, and PCL-C. We found that PTSD associated social factors included force symptoms, psychoticism, subjective support, introversion, and extroversion. However, this study is from a single research center that is limited in the small sample size. Therefore, future studies from multiple centers with large study population are warranted for further analysis.

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