

The relationship between earthquake exposure and posttraumatic stress disorder in 2013 Lushan earthquake

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Abstract. The objective of this study is to explore the relationship between earthquake exposure and the incidence of PTSD. A stratification random sample survey was conducted to collect data in the Longmenshan thrust fault after Lushan earthquake three years. We used the Children's Revised Impact of Event Scale (CRIES-13) and the Earthquake Experience Scale. Subjects in this study included 3944 school student survivors in local eleven schools. The prevalence of probable PTSD is relatively higher, when the people was trapped in the earthquake, was injured in the earthquake or have relatives who died in the earthquake. It concluded that researchers need to pay more attention to the children and adolescents. The government should pay more attention to these people and provide more economic support.

1. Introduction

Earthquake is one of the most common natural disasters, and may cause great loss of life and property [1, 2]. Adolescents are thought to be vulnerable to the impact of disasters [3], because they lack the experience, skills, and resources to independently cope with issues that may impact their mental health [4]. A lot of studies suggest that children and adolescents may develop posttraumatic stress symptoms after exposure to earthquake.

Previous systematic reviews have documented that posttraumatic stress disorder (PTSD) is the most commonly studied and probably the most frequent psychopathology in the aftermath of disasters [5, 6]. The prevalence of PTSD ranged from 2% to 67% [7]. These discrepancies are attributable to the magnitude of the quake and the number of casualties, differences of earthquake exposure situation, differences in the criteria for case definition methods of case identification, and different intervals of follow-up after the quake [8]. What's more, exposure to the traumatic disaster-related experiences was found to be one of the most important factors among those listed above in the development of psychiatric symptoms [8].

In the past 40 years, there are many people are concerned about the mental health status of earthquake survivors, especially in children and adolescents [9, 10]. To our knowledge, there are few study, to explore the difference of PTSD between each earthquake exposure items.

The objective of the present study was to assess the difference prevalence of posttraumatic stress disorder among children and adolescent exposed to Lushan earthquake. We hypothesized that children and adolescent was hurt and tapped have a higher PTSD. Then, we hypothesized that children and adolescent whose relatives get hurt or dead, have a high PTSD.



2. Methods

2.1. Sampling

The survey in Longmenshan thrust after Lushan earthquake three years, we conducted a cross-sectional survey in heavily damaged counties (Tianquan, Lushan, Baoxing) three years after the Lushan earthquake. A total of 3944 children and adolescents completed questionnaire survey, and aged 13 to 18 years old. The exclusion criterion was an unfinished assessment of probable PTSD, and respondents suffering from severe communication problems such as dementia, psychotic disorder and so on.

2.2. Procedures

The survey teams participated in a 3-day training program given by a psychologist, a statistics expert and three psychiatrists from the West China School of Public Health Sichuan University. From 25 to 29 March 2016, the trained teams were assigned to the counties based on the prearranged schedule. The team members helped those with difficulties to note down the answers and assisted them in completing the survey.

2.3. Measures

The assessment questionnaire consisted of two parts. The first part included information about basic demography. The second part was the earthquake experience scale and the PTSD of the Children's Revised Impact of Event Scale (CRIES-13). The degree of exposure to the earthquake was assessed using a earthquake exposure scale. About the earthquake experience scale, exposure to the Lushan earthquake was measured using a self-report binary scale (yes/no) to assess whether the respondent exposed in these items.

The prevalence of PTSD were assessed using the Children's Revised Impact of Event Scale. CRIES-13 is a newly developed 13-item scale which adapted from the IES-8 [11]. Each question is answered on a four-point scale, and scored 0, 1, 3, 5 respectively. The total score indicates severity of post-traumatic stress reactions and ranges from 0 to 65. Previous studies suggested a cutoff point of 30 to detect probable PTSD [11, 12]. The scale has demonstrated its satisfactory internal, good convergent validity and good reliability [13].

2.4. Statistical Analysis

All statistical procedures were completed using the SPSS 17.0 Statistical Package for Social Sciences. Simple descriptive statistics such as frequencies, numbers and proportions were used. Comparisons the different between the probability of PTSD and earthquake exposure items with and without probable PTSD were analyzed using odds ratio (OR).

3. Results

3.1. Demographic Characteristics

The mean age of the sample was 15.21 years. The respondents who experienced two earthquakes is 89.2 %. The others earthquake experiences proportion are presented in Table 1.

Table 1. The earthquake exposure items proportion

Earthquake exposure items	Proportion	
	No	Yes
	N (%)	N (%)
Feel scared they would die	2440 (61.9)	1504 (38.1)
Trapped in the earthquake	3810 (96.6)	134 (3.4)
Were injured in the earthquake	3415 (86.6)	529 (13.4)
Witnessing relatives injured	2367 (60)	1577 (40)
Witnessing some be trapped	2775 (70.4)	1169 (29.6)
Witnessing someone injured	1870 (47.4)	2074 (52.6)
Having relatives die	3763 (95.4)	181 (4.6)
Witnessing someone die	2643 (67)	1301 (33)

3.2. The Relationship between Earthquake Exposure and PTSD

From table 2, the prevalence of PTSD in each type of earthquake experience (Yes/No) are present. The adolescence who not feel scared have a low prevalence of PTSD (3.4%), but the part of feel scared have a high PTSD ratio (12.9%). The people who experienced two earthquakes in Wenchuan and Lushang get the PTSD is 7.2%, and the people only experienced Lushan earthquake get the PTSD is 5.6%. We can see that the three type earthquake experiences: (1) Trapped in the earthquake, rescue worker rescued you. (2) Were injured in the earthquake at that time. (3) Have relatives who died in the earthquake, which have a high Prevalence rate of PTSD, comparing with who didn't experience the three types. When experienced, the prevalence of PTSD were 14.2%, 15.3%, 18.2%, respectively.

Table 2. The prevalence of PTSD and earthquake exposure items

Earthquake exposure items	PTSD Prevalence	
	No	Yes
	N (%)	N (%)
Feel scared they would die	82 (3.4)	194 (12.9)
Trapped in the earthquake	257 (6.7)	19 (14.2)
Were injured in the earthquake	195 (5.7)	81 (15.3)
Witnessing relatives injured	96 (4.1)	180 (11.4)
Witnessing some be trapped	138 (5.0)	138 (11.8)
Witnessing someone injured	81 (4.3)	195 (9.4)
Having relatives die	243 (6.5)	44 (18.2)
Witnessing someone die	130 (4.9)	146 (11.2)

About figure 1, it is the each experience, which experienced or not, with the proportion PTSD. We can see the change of the prevalence of PTSD, about whether experienced each one. It is obvious that, "Feel scared that he or she would die", "Were injured in the earthquake at that time", "Have relatives who died in the earthquake" the three type of earthquake experience, when experienced one of these, that the people with the prevalence of PTSD is increasingly bigger. Each of these increased by 9.5%, 9.6%, 11.7%, respectively.

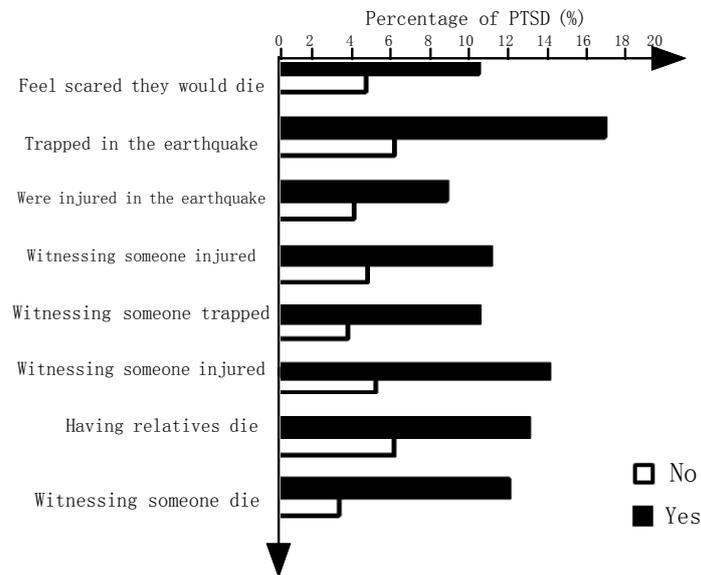


Figure 1. The comparing of PTSD about each exposure item

From table 3, we can found that the odds ratio (OR) is more higher, when people “Feel scared that he or she would die”, “Have relatives who died”, “Witnessing parents, relatives or good friends injured”, “Was injured” in the earthquake. What’s more, the people who feel scared that he or she would die in the earthquake have a highest OR.

Table 3. The PTSD odds ratio (OR) about each earthquake exposure items

Earthquake exposure	PTSD	Non-PTSD	OR	95% CI
Feel scared that he or she would die			4.259	(3.261,5.561)
Yes	194	1310		
No	82	2358		
Trapped in the earthquake			2.284	(1.383,3.772)
Yes	19	115		
No	257	3553		
Were injured in the earthquake			2.986	(2.263,3.940)
Yes	81	448		
No	195	3220		
Witnessing relatives injured			3.048	(2.358,3.939)
Yes	180	1397		
No	96	2271		
Witnessing some be trapped			2.558	(1.999,3.273)
Yes	138	1031		
No	138	2637		
Witnessing someone injured			2.292	(1.755,2.994)
Yes	195	1879		
No	81	1789		
Have relatives died			3.23	(2.167,4.814)
Yes	33	148		
No	243	3520		
Witnessing someone die			2.444	(1.910,3.126)
Yes	146	1155		
No	130	2513		

4. Discussion

To our knowledge, many people have studied the incidence of PTSD in after earthquake, and the conclusions are not the same. The precise prevalence of PTSD among children and adolescents is still unclear [14]. These discrepancies are attributable to the different intensities of the disasters involved, differences in the criteria for case definition, methods of case identification and the different time points when subjects were assessed post-trauma [8,14].

From the results, we can see, when experienced the three types of earthquake experiences: (1) Trapped in the earthquake, rescue workers rescued you; (2) Were injured in the earthquake at that time; (3) Have relatives who died in the earthquake, which have a high PTSD rate. It means that the people who was trapped or injured in the earthquake, or the death of their loved ones, there is a high proportion of people suffering from PTSD. And the adolescence who feel scared they would die have a high PTSD increase ratio, comparing those don't scared.

The proximity of exposure has been reported as important predictors of PTSD. The prevalence of PTSD varies depends on the type of disaster, severity of exposure to the trauma, duration since disaster and method of case identification among other factors [15]. PTSD symptoms among child tsunami survivors in Sri Lanka were directly related to the young survivor's severity of exposure to the disaster, as well as prior experiences of traumas and the loss of family members [16]. The severity of exposure to a natural disaster was associated strongly with children manifestations of acute PTSD symptoms [17].

If disasters resulted in death or injury of loved ones, the impact might increase and be further heightened when the children lost their pets and the familiar objects in their home and landmarks in the physical environment [18]. The children who experienced physical injuries and lived in most damaged places showed higher levels of PTSD symptoms scores [19]. Being physically injured and experiencing the death of a close family member with whom they lived at the time of earthquake were found to be significant risks for PTSD among the adolescent victims [12]. It has been suggested that subjective appraisal of exposure to traumatic events is implicated in the development of PTSD [20]. The intensity of a survivors' fear during the earthquake is considered as the strongest predictor of PTSD [21], with even earthquakes of relatively low magnitude causing PTSD in people who experienced high levels of fear [22]. The findings of the present study provide further evidence for the link between direct exposure to traumatic events and the severity of post-traumatic stress reactions in children [23].

5. Conclusion

This study has played an exploratory role in revealing the relationship between the prevalence of PTSD and earthquake exposure situations. It is documented that the people who was trapped or hurt or have relatives dead have a high PTSD prevalence. The government and schools should pay more attention to these part of children and adolescents.

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