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Risk factors of severity of post-traumatic stress disorder among survivors with physical disabilities one year after the Wenchuan earthquake



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ABSTRACT

On May 12, 2008, a devastating earthquake measuring 8.0 on the Richter scale struck Wenchuan County and surrounding areas in China. This study aimed to assess post-traumatic stress disorder (PTSD) in the aftermath of the earthquake, and to evaluate factors of severity of PTSD symptoms among survivors with physical disabilities. We conducted a population-based cross-sectional survey and recruited 817 survivors with physical disabilities in three stricken areas. Assessment measures included the PTSD Checklist-Civilian Version (PCL-C) and the 12-item General Health Questionnaire (GHQ-12). Our study showed that 27.42% of the survivors with physical disabilities had PTSD symptoms one year after the Wenchuan earthquake. In the regression model, geographic location, female, suffering from paralysis following the earthquake, and going into a coma in the earthquake were associated with severe PTSD symptoms. Our findings suggest that a substantial proportion of physically disabled survivors of a big earthquake may have severe PTSD symptoms. The associated factors of PTSD identified in our study could inform the implementation of preventive programs for this population and give hint on the way to cope with this kind of disaster in the future.

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1. Introduction

Disability is a major facet of global disease burden for both individuals and societies (Zheng et al., 2014). According to the guidelines of the China Disabled Person's Federation (CDPF), physical disability is defined as “a loss of motor function of varying degrees or limitation in movements or activities resulting from deformed limbs or body paralysis or from deformity caused by damage to the structure or function of those body parts involved in mobility” (Zheng et al., 2014). By the end of 2010, there were approximately 85.02 million people living with disability in China, and physical disability constituted the largest subgroup, at 29.07% (China Disabled Person's Federation, 2012).

Unfavorable health status has been identified among people

with physical disabilities (Zheng et al., 2014). According to estimates from the second national disability survey, 7–8% of Chinese people with disability suffered from psychiatric disorders (Zhuoying, 2007). In the existing literature on disability in China, research has focused mainly on visual disabilities (Wenxue et al., 2013), intellectual disabilities (Xu et al., 2005), and hearing and speech disabilities (Li and Li, 1994); people with physical disabilities have not yet been well studied. Previous studies showed that physical disability could significantly affect mental health status, and the level of physical disability was associated with increased risk for post-traumatic stress disorder (PTSD) (Klein et al., 2007). Most of these related findings are from Western countries, however, which might not apply to the Chinese population.

Exposure to trauma has been associated with psychological distress and, in particular, the development of PTSD (Wu et al., 2014). For example, approximately 25% of survivors of a fire reported PTSD symptoms (Broberg et al., 2005), 22.1% of survivors of a tornado reported PTSD symptoms (Niederkrotenthaler et al.,

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2013), and 20–30% of Norwegian tourists developed PTSD in the aftermath of the 2004 tsunami (Hussain et al., 2013). Natural disasters result in immediate, significant loss of life and long-term physical disabling impairments such as spinal cord injuries, traumatic brain injuries, and amputations. Survivors with physical disabilities experience extremely traumatic events, and might have more severe mental health problems than the general population. However, there is extremely limited literature regarding their mental health in China.

The identification of factors related to PTSD may help clinicians detect patients who will develop PTSD and prevent the consequences that seem to be associated with it (Roberge et al., 2010). Previous studies recognized major risk factors of mental disorders, such as the intensity of exposure to trauma (Xue et al., 2015) and demographic characteristics (e.g. gender, age, marital status, and education level) (Acierno et al., 2007). Physical injury is another major risk factor for PTSD, facilitating PTSD possibly via psychological and neurobiological mechanisms (Koren et al., 2006). Spinal cord injury, a complex form of trauma that disrupts almost every system of the body and result in paralysis from below the waist or below the neck, was found to be associated with PTSD (Agar et al., 2006). In addition, controversy remains about whether PTSD could develop as a result of traumatic brain injury (TBI) (Bryant, 2011b), and further studies are warranted.

In recent years, several big earthquakes occurred in China, and the 2008 Wenchuan earthquake with a Richter-scale magnitude of 8.0 was the worst earthquake of China in three decades, which caused enormous casualties. According to the Ministry of Civil Affairs, there were 69,226 people killed, 374,643 injured, 17,923 listed as missing (Cheng et al., 2014). This disaster not only caused huge damage to people's personal and economic well-being, but also left indelible psychological trauma in survivors across Sichuan, Shanxi, and Gansu Provinces (Jia et al., 2010a).

As part of a public health emergency response, the Mental Health Center of the West China Hospital, in collaboration with many specialists in psychiatry in Sichuan Province, conducted a study in three stricken areas: Dujiangyan County, Chongzhou County, and Mianyang City. The study lasted one month, from April 2009 to May 2009. We hypothesized that PTSD symptoms were serious among survivors with physical disabilities of the Wenchuan earthquake, and some factors might be associated with PTSD in the population. The goals of this study were: (1) to explore the aftermath of the Wenchuan earthquake and describe PTSD symptoms among survivors with physical disabilities one year after the Wenchuan earthquake; and (2) to identify associated factors of severity of PTSD symptoms among this population.

2. Methods

2.1. Participants

We conducted a population-based cross-sectional investigation one year after the Wenchuan earthquake. Our investigators consisted of professors, psychiatrists, nurses, psychologists, and post-graduate students from the West China Hospital, the Fourth People's Hospital of Chengdu City, the Third People's Hospital of Mianyang City, and the Demobilized Veterans' Hospital of Sichuan Province. They were all well trained on the questionnaire and investigation techniques, including mutual communication with participants by dialect.

The participants were eligible if they (1) had physical disability resulting from the Wenchuan earthquake, and were not physically disabled before the earthquake; (2) were conscious and their vital signs were stable; and (3) signed informed consent. Participants were excluded if they (1) were unwilling to participate or could not provide informed consent; and (2) had deficiency in or lack of language and communication problems.

2.2. Information of the study sites

The epicenter of the devastating Wenchuan earthquake was located at 30.98°N,

103.36°E, with depth of 19 km. The distance from the epicenter of the earthquake to Dujiangyan County, Chongzhou County, and Mianyang City was approximately 21 km, 48 km, and 80 km respectively. According to official statistics (Sohu news, 2008), the number of deaths and injuries resulting from the Wenchuan earthquake in these three stricken areas was estimated to be 21,605 and 167,732 in Mianyang City, 3069 and 4338 in Dujiangyan County, and 4276 and 26,413 in Chongzhou County and its surrounding areas in Chengdu City.

2.3. Sampling procedure

We used a multi-stage cluster random sampling method to recruit participants. In the first stage, we aimed to find out participants with physical disabilities resulting from the Wenchuan earthquake as defined by CDPF. In each county and city, we selected 4 areas as investigation sites. Finally, 2746 participants were screened, 898 were eligible, and 817 agreed to participate in our study. The proportion of the physically disabled people due to Wenchuan earthquake in the sampled areas was estimated to be 32.70% (898/2746), and the response rate was 90.98% (817/898). In the second stage, the General Health Questionnaire (GHQ-12) was used to assess general psychological distress, and the PTSD Checklist-Civilian Version (PCL-C) was used to find out those with PTSD symptoms from participants with physical disabilities. We also collected demographic and trauma-related data in this stage. The number of participants to be screened was estimated to be 771, based on the alpha at 0.05 ($Z=1.96$), admissible error being no more than 3% ($d=0.03$), and prevalence estimates of post-traumatic symptoms (23.0%) in a disaster study (Elhai et al., 2005). The overall non-response rate was 2.80%. The non-response rate for each question is shown in Table 1.

Investigators explained the aims of the study, procedures involved, and time required. Informed consent was obtained from each participant prior to interviewing. Participants were also told that they could choose not to answer any questions in the questionnaire and they were free to withdraw from the study at any time during data collection. Ethics approval for this study was obtained from the West China Hospital Ethics Committee.

2.4. Measures

2.4.1. PCL-C

Post-traumatic stress symptoms were measured with the PCL-C (Weathers et al., 1993). It is a standardized self-report rating scale comprising 17 items for assessing PTSD (Grubaugh et al., 2007). Participants indicated the extent of their experience in reference to the Wenchuan earthquake on a scale from 1 (not at all) to 5 (extremely). The Chinese version of the PCL-C has sound reliability and validity (Zhang et al., 2011). Scores 17–37 suggest no significant PTSD symptoms; scores 38–49 indicate some PTSD symptoms, and scores 50–85 indicate significant PTSD symptoms. Subjects with a cut-off score of 38 or higher were classified as having PTSD symptoms (Weathers et al., 1993).

The internal consistency (Cronbach's Alpha coefficient) of the PCL-C in our study was 0.94.

2.4.2. GHQ-12

The scale examines whether the respondent has experienced a particular symptom or behavior. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual). The GHQ-12 is brief, simple, and easy to complete. Its application in research settings as a screening tool is well documented. There is evidence that the GHQ-12 is a consistent and reliable instrument when used in the general population samples (Pevalin, 2000). The GHQ-12 was scored with the binary scoring method, collapsing adjacent responses to obtain a dichotomous scoring (0–0–1–1). This gives a total score ranging from 0 to 12, and higher total score indicates more severe psychological symptoms (Goldberg, 1992).

According to the GHQ-12 total score, all respondents could be classified into three risk strata for mental illness. Those at high risk, moderate risk, and low risk scored over 3, 2–3, and 0–1, respectively.

The internal consistency (Cronbach's Alpha coefficient) of the GHQ-12 in our study was 0.92.

2.4.3. Demographics

Demographic data included gender, age, marital status, ethnicity, and education level. Participants were divided into 4 categories: juveniles (< 18 years), young adults (18–44 years), middle-aged adults (44–59 years), and the elderly (≥ 60 years). Ethnicity was divided into Han Chinese, Tibetan, Qiang Minority, and others. Marital status was divided into unmarried, married, and divorced. Education level was divided into primary school or lower, middle school, and university or higher education. Surveyed participants were divided into several subgroups according to their earthquake-related experiences for statistical analysis purposes.

2.4.4. Earthquake exposure

According to previous literature, six questions were used to evaluate respondents' earthquake exposures: (1) Did you witness the injury of family

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