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Research paper

Post-traumatic stress disorder and depression among adult survivors 8 years after the 2008 Wenchuan earthquake in China

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ABSTRACT

Background: The Wenchuan earthquake was China's worst natural disaster of the past three decades. Although the psychological sequelae of disasters can last for many years, the long-term sequelae and their risk factors tend to receive little research attention.

Objectives: The objectives of the present study were to estimate the prevalences of symptomalogical PTSD and depression among survivors 8 years after the Wenchuan earthquake, and to identify the shared and unshared risk factors associated with PTSD and depression, using data from a cross-sectional survey.

Methods: 1369 participants were recruited from two different sites in the areas that were severely affected by the earthquake. Symptomalogical PTSD was assessed by the Impact of Event Scale-Revised (IES-R). The Chinese edition of the Center for Epidemiologic Studies Depression Scale (CES-D) was used to assess depression. Traumatic exposure to the Wenchuan earthquake was assessed using an exposure checklist designed by this study.

Results: Eight years after the Wenchuan earthquake, 11.8% of the respondents had symptomalogical PTSD, and 24.8% of respondents had probable depression. The results also indicated that female gender, low education, poor perceived health, and traumatic experiences after the earthquake were associated with higher odds of both PTSD and depression among survivors. Direct exposure to the earthquake was associated with comorbid symptomalogical PTSD and depression (OR=1.86; 95% CI=1.42, 2.44). Those having only depression were more likely to be unmarried/divorced/widowed, and to have experienced fear at the time of the earthquake (OR=1.34; 95% CI=1.04, 1.72), while those with only symptomalogical PTSD were likely to be from the township of Yongan as opposed to Guangji (OR=1.86; 95% CI=1.06, 3.31).

Limitations: This is a cross-sectional study, and thus is insufficient for determining causal relationships with regard to chronic PTSD or depression.

Conclusions: The results of this study indicate that symptomalogical PTSD and depression persist among many survivors of the Wenchuan earthquake, 8 eight years later. Objective earthquake exposure is associated with symptomalogical PTSD, while subjective exposure is associated with long-term depression.

1. Introduction

Globally, people in less developed countries and regions are more likely to be affected by natural disasters, and a huge number of people die from all kinds of disasters in these countries (Wang et al., 2000). However, due to limited financial support and public attention, little post-disaster research is conducted in developing countries. China is an earthquake-prone country, and since 1950, half of the deaths that were caused by natural disasters in China were caused by earthquakes, which also caused great economic damage (Hou et al., 2016; Jin, 2014). PTSD and depression are the most common mental disorders following earthquakes. PTSD prevalence estimates vary widely, with most being in the 20–40% range, in disaster-focused studies (Bromet et al., 2016). Recent reviews have suggested that nearly 1 in 4 earthquake survivors develop PTSD (Dai et al., 2016). Considering these facts, there is a need for more research on the mental health consequences of severe earthquakes in China.

The Wenchuan earthquake was China's worst natural disaster of the past three decades. On May 12, 2008, a magnitude 8.0 earthquake struck the area around Wenchuan County, in the northwestern part of

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Sichuan province. It left 69,227 people dead, 374,643 injured, 17,923 missing, and millions homeless (SCIOC, 2008). Large studies showed that PTSD was the most prevalent mental disorder among survivors of the Wenchuan earthquake (Hong and Efferth, 2015). Kun et al. (2009) reported that the prevalence of probable Post-traumatic Stress Disorder (PTSD) was 45.5% in the heavily damaged Beichuan County two and half months after the earthquake. Studies of the impact of the Wenchuan earthquake on the mental health of its survivors found that female gender, older age, lower household income, ethnic minority status, low educational level, living in a shelter or temporary house, death or a bodily injury in one's family, and household damage, were important risk factors associated with PTSD among adults (Kun et al., 2009; Wang et al., 2009; Zhang and Ho, 2011; Zhang et al., 2011). Disaster-related psychological sequelae can last for many years, but the long term sequelae and their risk factors tend to receive little research attention. A recent systematic review found that the number of journal articles published on the health consequences of an earthquake tend to drop dramatically 2 years after its occurrence (Xiao et al., 2011). To the best of our knowledge, very few studies to date have focused on the long term mental health effects of this disaster. Eight years have passed, and no existing study has examined the long term prevalences of mental disorders and related predictors among Chinese adult earthquake survivors. More research on the long-term psychiatric outcomes of the Wenchuan earthquake is needed.

The following three factors are potential predictors of symptomalogical PTSD following an earthquake: traumatic experience(s) before the earthquake, traumatic exposure to the earthquake, and traumatic experience(s) after the earthquake (Cénat and Derivois, 2015). In previous studies, the term “direct exposure” referred to experiencing or witnessing the traumatic stressor, and “indirect exposure” was defined as learning about “death, serious harm, or threat of death or injury experienced by a family member or other close associate” (Zimering et al., 2006). Other studies have indicated that traumatic stress scores are associated with high subjective fear during exposure (Lonergan, 2014). In this study, we defined subjective exposure as fear at the time of the earthquake. Although many studies have found that direct and indirect exposure are highly associated with both depressive and Symptomalogical PTSD (Zimering et al., 2006), findings about the relationship of PTSD and depression to subjective exposure have been inconsistent. For example, one study suggested that impaired fear inhibition may be a specific biomarker of Symptomalogical PTSD (Jovanovic et al., 2010). Another study found during-disaster fear to be highly correlated with depression (Tang et al., 2014). The difference in findings may be due to differences in cultural context, study design, and/or sampling methods.

In addition, some studies have compared the shared and unshared predictors of depressive and symptomalogical PTSD among adult earthquake survivors. One study found that being female, having a low income level and having a low perceived level of social support were all associated with both depression and PTSD (Wu et al., 2013). Another study found traumas such as loss of both parents and, to a lesser degree, loss of a father to be significant risk factors for depression, but not for PTSD, among adolescents (Goenjian et al., 2009). To what extent do these findings apply to survivors of the 2008 earthquake in China?

The objectives of the present study were to estimate the prevalences of symptomalogical PTSD and depression among survivors 8 years after the Wenchuan earthquake, and to identify the shared and unshared risk factors associated with PTSD and depression, using data from a cross-sectional survey.

2. Methods

2.1. Study design and participants

This study is based on a community-based, cross-sectional survey conducted among survivors of the 2008 Wenchuan earthquake in February 2016, eight years later. Participants were recruited from two different sites in the area that was severely affected by the earthquake. The first survey site was the township of Yongan (115.7 km from the epicenter) in Beichuan County, which is located in a mountainous area. Over 90% of the buildings in Yongan were damaged in the earthquake. The earthquake killed 15,645 people and left 26,916 people injured, and 1023 missing in Beichuan County. The second site was the township of Guangji (58.3 km from the epicenter) in Mianzhu County, which is located on a plain. Over 96% of the buildings in Guangji were damaged in the earthquake. It has been confirmed that 11,098 people were killed, 36,468 people were injured, and 298 people missing in Mianzhu County. These two townships were selected because both are close to the epicenter but at somewhat different distances, both suffered severe destruction in the earthquake, and both had similar socioeconomic and demographic characteristics before the earthquake.

This cross-sectional study used a combined multistage systematic sampling and convenience sampling design to select participants. In the first stage, 12 of the total 29 villages were randomly selected from the two survey townships. In the second stage, households, rather than individuals, were systematically selected, using village registration information, as the basic unit for the entire survey. But in a small number of villages, many former residents were no longer residing in their homes, making such systematic sampling unfeasible; in these villages, non-random sampling methods were therefore also used. Adults over age 16 in each household were selected for participation. The actual samples achieved amounted to a total of 1369 adults. A higher than 90% response rate was achieved. These samples were representative of two townships that were severely affected by the Wenchuan earthquake.

Face-to-face interviews were conducted, in Mandarin Chinese and in the local dialects and languages, by 22 college students from Mainyang Normal University. All of the interviewers were thoroughly trained before the survey. The training involved the following five sessions: introduction, sampling design and procedures, review of the questionnaire, methods and techniques of interviewing, and potential difficulties in conducting the survey. The interviewers were required to show their identification and explain the aims of the study prior to requesting permission to enter the participants' houses. They read each question out to the respondents, and then wrote down their answers on the questionnaire. The average interview time was 1 h.

The study protocol was approved by the Institutional Review Board of Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China. All participants gave consent after being informed about the aim of the survey and their right to refuse to participate.

3. Measurement

3.1. Main outcome measures

Probable Symptomalogical PTSD: symptomalogical PTSD was assessed by the Impact of Event Scale-Revised (IES-R) (Weiss and Marmar, 1997), a self-report instrument widely used in the field of traumatic stress. It includes 22 items used to measure the three major symptom clusters of PTSD: Intrusion, avoidance, and hyper-arousal. The IES-R's measures have been found to have good and stable psychometric properties (Creamer et al., 2003). The Chinese version of the IES-R has been found to have satisfactory psychometric properties, comparable to those of the original English version (Chen et al., 2007; Wu and Chan, 2003). In this study, the IES scale was used to investigate only posttraumatic symptoms related to the Wenchuan earthquake. The participants were asked to indicate the frequency of their distress using 4 response options (0=not at all, 1=seldom, 3=sometimes, 5=often) (Chan et al., 2012; Chan et al., 2011, 2012;

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