

Symptoms of Posttraumatic Stress Disorder Among Adult Survivors Three Months After the Sichuan Earthquake in China

Li Wang

Key Laboratory of Mental Health, and the Psychological Crisis Intervention Center,
Institute of Psychology, Chinese Academy of Sciences, Beijing, China

Yuqing Zhang, Wenzhong Wang, and Zhanbiao Shi

Psychological Crisis Intervention Center, Institute of Psychology, Chinese Academy of Sciences,
Beijing, China

Jianhua Shen

Department of Psychiatry, University of Toronto, Toronto, Canada

Ming Li

Department of Psychology, Beijing Forestry University, Beijing, China

Yong Xin

Department of Psychology, Southwest University of Science and Technology, Mianyang, China

The study investigated the symptoms of posttraumatic stress disorder (PTSD) and associated risk factors among adult survivors 3 months after the 2008 Sichuan earthquake in China. One thousand five hundred sixty-three earthquake survivors in two communities participated in the study. The prevalence of probable PTSD was 37.8% and 13.0%, respectively, in the two communities that were affected differently by the earthquake. The significant predictive factors for the severity of PTSD symptoms were female gender, subnationality, lower educational level, lower social support, and higher initial exposure level. The results indicate that PTSD is also a common mental health problem among earthquake survivors in China. Given inadequate knowledge and practices concerning the mental health of disaster victims in China, the information provided by this study is useful for directing, strengthening, and evaluating disaster-related mental health needs and interventions after the earthquake.

On May 12, 2008, an earthquake measuring 8.0 on the Richter scale occurred in Sichuan province of southwest China. During the earthquake, 69,227 people were killed, 374,643 injured, 17,923 listed as missing, and about 4.8 million were left homeless (official figures as of September 25, 2008 12:00 China Standard Time, retrieved from <http://www.scio.gov.cn/gzdt/ldhd/200809/t222722.htm>). The affected area was about 440,442 km², spanning three provinces and one autonomous region. People living far away from the epicenter, such as Beijing (1,500 km away) and Shanghai (1,700 km away) also felt the quake. It was the deadliest and strongest earthquake to hit China since 1976.

Natural disasters such as an earthquake can not only lead to economic losses, physical injuries, and deaths, but they can also

cause serious mental health problems. Previous studies have shown that posttraumatic stress disorder (PTSD) is a common mental health problem among victims of natural disasters both in Western countries (Acierno et al., 2007; Altindag, Ozen, & Sir, 2005; Brown, Fulton, Wilkeson, & Petty, 2000; McMillen, North, & Smith, 2000) and Asian countries (Kumaret et al., 2007; Lai, Chang, Connor, Lee, & Davidson, 2004; Shinfuku, 2002; van Griensven et al., 2006; Wang et al., 2000). The Asia–Pacific region had been strongly hit by natural disasters in the recent past (Ofrin & Salunke, 2006). In a review, Udomratn (2008) mentioned that the prevalence rate of PTSD related to natural disasters in this region was between 8.6% and 57.3% depending on assessment methodologies, instruments, and timing. As the largest country

This study was supported by the National Foundation of Natural Science (30840001) and Emergency Project to Provide Psychological Assistance in Wenchuan Earthquake Areas (KKCX1-YW-05) from the Knowledge Innovation Project of the Chinese Academy of Sciences.

Correspondence concerning this article should be addressed to: Zhanbiao Shi, Institute of Psychology, Chinese Academy of Sciences, 4A Datun Road, Beijing 100101, China. E-mail: shizb@psych.ac.cn.

© 2009 International Society for Traumatic Stress Studies. Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/jts.20439

in this region, China often experiences natural disasters; however, the psychological impact on disaster survivors has been the subject of very few studies comparatively (Liu et al., 2006; Wang et al., 2000), especially following such a destructive disaster.

Understanding basic mental health indicators following an occurrence of a disaster is essential for identifying vulnerable populations, implementing effective psychological assistance and interventions, and investigating disaster epidemiology. Although a large number of psychological aid workers, including clinical psychologists, psychiatrists, psychotherapists, and volunteer psychosocial workers came to the disaster-stricken areas after the earthquake (Sundram et al., 2008; Zhang & Sun, 2009), little is known about the mental health consequences of the disaster. As part of the psychological relief program supported by the Institute of Psychology, Chinese Academy of Sciences, we organized and conducted a community-based mental health investigation among adults in Beichuan Qiang Autonomous County (Beichuan County), which was most severely affected by the earthquake. Beichuan County includes Beichuan County Town and its subordinate countryside. Qiang is one of the 56 subnationalities in China. The main aims of the study were to estimate the prevalence of PTSD symptoms, identify risk factors for PTSD, and screen out those who needed further psychological help.

METHOD

Participants

Sampling was conducted in two temporary camp communities: Community A, located in Yongan Town (30 km from the Beichuan County Town) with over 3,000 people; Community B, located in Leigu Town (10 km from the Beichuan County Town) with over 5,000 people. The two communities were selected because (a) they were the two largest temporary camp communities in Beichuan County and were affected in different degrees by the earthquake, and (b) two of our psychological relief stations there were available for the investigation, offering further psychological help to those in need. Most of the people in Community A were originally the inhabitants of Beichuan County Town, which was almost completely destroyed—more than 6,000 people (approximately 60% of the population) were killed by the earthquake. Most of the people in Community B were originally the inhabitants of Leigu Town, a subordinate town in Beichuan County, in which 80% of the houses collapsed and more than 1,000 people (approximately 10% of this town's population) were killed.

The investigation covered all households in the two communities. Households here were defined as a group of persons sharing the same tent. Within each household, one member was randomly selected for participation based on her or his birth date. Eligible participants were those who were 16 years of age or older and had experienced the earthquake in the town. Individuals with mental retardation, dementia, or any other major psychosis

(e.g., schizophrenia, major depressive disorder, and organic mental disorders) were excluded. Among the eligible participants, the individual whose birthday was the closest to the date of the investigation was selected as the participant. If the individual was unavailable for the survey, the household member with the next closest birth date was selected. The procedure continued until one household member was identified as study participant. Consequently, 622 people ranging in age from 16 to 83 years (response rate, 92%) in Community A and 941 people ranging in age from 16 to 85 years (response rate, 89%) in Community B took part in the survey.

Measures

Exposure to the disaster was assessed by asking participants (a) whether they had been injured during the earthquake; (b) whether their family members or friends died from the earthquake; (c) whether they had witnessed someone's dying or death during and immediately after the earthquake; and (d) to rate their intensity of fear, feelings of horror, and helplessness during and immediately after the earthquake using a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*extremely*).

Posttraumatic stress disorder symptomatology was assessed using the Los Angeles Symptom Checklist (LASC; King, King, Leskin, & Foy, 1995). The checklist is an easily administered self-report scale designed to measure a broad range of anxiety symptoms. Seventeen of the total 43 items capture the reexperiencing, avoidance and numbing, and hyperarousal symptoms of PTSD. Each item is a word or phrase that is rated on a 5-point Likert scale ranging from 0 (*no problem*) to 4 (*extreme problem*), reflecting the extent to which the particular symptom was a problem for the respondent during the past one month. The LASC is a widely used PTSD evaluating instrument (e.g., Eriksson, Kemp, Gorsuch, Hoke, & Foy, 2001; Scott, 2007; Stander, Merrill, Thomsen, & Milner, 2007), and reliability and validity of this scale have been well documented (Orsillo, 2001). The Chinese version of the Los Angeles Symptom Checklist was adapted by a two-stage process of translation and reverse translation. Prior to the process, we had obtained permission to do the translation from Professor Foy, the primary author of the checklist. In the current analyses, the 17-item PTSD subscale was utilized as an indicator of PTSD severity. Missing data were replaced with the mean scores of the same symptom category. For a categorical diagnosis, the respondent must have responded positively (with a rating of 2 or higher) to at least one item assessing reexperiencing of the trauma, three items assessing avoidance and numbing, and two items assessing hyperarousal. As suggested by King et al. (1995), those who met all three criteria were identified as probable PTSD, whereas those who met any two of the three criteria were identified as probable partial PTSD. Alpha coefficient for the PTSD subscale was .91 in this study.

Social support was measured with the Perceived Social Support Scale (Blumenthal et al., 1987). The scale consists of 12 items; each item is scored using a 7-point Likert scale ranging from 1 (*strongly*

disagree) to 7 (*strongly agree*). Reliability and validity of the Chinese version of the Perceived Social Support Scale are supported (e.g., Huang, Jiang, & Ren, 1996; Ye, Shen, Jiang, Xu, & Ren, 1999). Alpha coefficient for the scale was .91 in this study.

Procedure

The survey took place on an average of 90 days ($SD = 4$ days) after the earthquake. The interviewers included trained clinical psychologists, psychotherapists, and psychology graduate students. Before giving self-report questionnaires to the participants, interviewers obtained oral consents and introduced the aim and significance of the survey in detail. Some participants ($\approx 5\%$) had difficulty understanding the written materials because of their relatively low education level: Investigators orally asked the items and individually filled in the questionnaires for these participants.

Data Analysis

Univariate descriptive statistics were computed for sample characteristics (sex, age, subnationality, marital status, and educational level), trauma exposure indicators (being injured, bereavement, witnessing death, intensity of initial fear), social support, and PTSD symptomatology (probable PTSD, probable partial PTSD, at least one symptom positive, and PTSD severity). Chi-square (χ^2) tests were used to evaluate differences in categorical variables, and t tests were used to evaluate differences in continuous variables. Bivariate associations between PTSD severity and each of the other variables were evaluated with regression analyses. Variables with p -values $< .05$ were included in a simultaneous multivariate regression model with PTSD severity as the dependent variable to evaluate the significance of each predictor after controlling all the other predictors. All analyses were conducted with SPSS (Version 11.5 for Windows).

RESULTS

The demographic data of the two samples are presented in Table 1. The participants in Community B were older, less educated, and more likely to be of Han nationality than were the participants in Community A (all p s $< .01$). With respect to trauma exposure indicators, more participants were injured, bereaved, and had witnessed death in Community A than in Community B (all p s $< .01$). Compared with the participants in Community B, the participants in Community A rated higher scores on intensity of initial fear and rated lower scores on perceived social support (see Table 1).

The PTSD symptomatology of the two samples is summarized in Table 1. The prevalence of probable PTSD in Community A was significantly higher than the rate in Community B. When the probable PTSD cases were excluded, there was no statistical difference between the two samples in terms of the prevalence

of probable partial PTSD. More participants reported moderate problems in at least one of the symptom clusters in Community A than in Community B. Regarding PTSD severity, the participants in Community A rated higher scores on the symptom checklist compared with the participants in Community B.

Using the data of all 1,563 participants, bivariate associations between PTSD severity and demographic variables, trauma exposure indicators, social support, and community variables were assessed with regression analyses. The results are summarized in Table 2. Except age ($M = 42.29$, $SD = 16.35$, range: 16–85, $\beta = .03$, ns) and marital status (Single/divorced/separated/widowed, $\beta = .01$, ns), all the other predictive variables were significantly associated with PTSD severity ($M = 19.82$, $SD = 12.29$, range: 0–66). The two most important predictors of PTSD severity were intensity of initial fear ($M = 2.73$, $SD = 1.06$, range: 1–4, $\beta = .36$, $p < .01$) and original location being affected by the earthquake (Community A, $\beta = .27$, $p < .01$).

To determine the relative importance of each predictor after controlling all the other predictors, variables significantly correlated with PTSD severity were included in a simultaneous multivariate regression model with PTSD severity as the dependent variable. The results indicated that all the selected variables were still significant predictors of the PTSD severity, and the two most important predictors were still intensity of initial fear ($\beta = .29$, $p < .01$) and community variable (Community A, $\beta = .21$, $p < .01$; see Table 3).

DISCUSSION

The current study investigated the prevalence of probable PTSD, and clinical and subclinical distress levels among adult survivors 3 months after the Sichuan earthquake in China. One community was severely affected by the earthquake: The prevalence rate was 37.8% for probable PTSD, 39.0% for probable partial PTSD, and 80.4% for at least one symptom positive. The other community was affected relatively less severely: The prevalence rate was 13% for probable PTSD, 37.9% for probable partial PTSD, and 72.7% for at least one symptom positive. These results were comparable to those reported in postdisaster populations elsewhere (e.g., Chen et al., 2001; McMillen et al., 2000; Tsai et al., 2007; Udomratn, 2008). The findings indicate that PTSD is a common mental health problem after exposure to a natural disaster and that the more severely a population is affected by a disaster, the more likely it develops PTSD.

Among the demographic variables of interest, we found that women and those with a lower educational level would experience more severe PTSD symptoms. Previous studies have revealed that women are likely to develop PTSD (e.g., Breslau, Davis, Andreski, Peterson, & Schultz, 1997; Chen et al., 2001; Frans, Rimmö, Åberg, & Fredrikson, 2005; Lai et al., 2004). Kessler and his colleagues found that the overall lifetime prevalence of PTSD among

Table 1. Demographic Variables, Trauma Exposure Indicators, Social Support, and PTSD Symptoms in Two Samples

Variable	Community A (<i>n</i> = 622)				Community B (<i>n</i> = 941)				Statistical test
	<i>n</i>	%	<i>M</i>	<i>SD</i>	<i>n</i>	%	<i>M</i>	<i>SD</i>	
Demographic variables									
Sex									<1 ^b
Male	278	44.7			417	44.3			
Female	344	55.3			524	55.7			
Age (years)			40.96	15.38			43.17	16.92	-2.64 ^{c**}
Nationality ^a									31.84 ^{b**}
Han	129	20.7			383	40.7			
Qiang	479	77			537	57.1			
Marital status ^a									<1 ^b
Single/divorced/separated/widowed	177	28.5			241	25.6			
Married	431	69.3			640	68.0			
Education ^a									50.81 ^{b**}
Less than high school	226	36.3			498	52.9			
High school	249	40.0			233	24.8			
More than high school	118	19.0			188	20.0			
<i>Trauma exposure indicators</i>									
Being injured ^a									12.30 ^{b**}
No	468	74.6			776	82.5			
Yes	138	22.2			144	15.3			
Bereavement ^a									85.38 ^{b**}
No	175	28.1			483	51.3			
Yes	442	71.1			444	47.2			
Witnessing death ^a									19.50 ^{b**}
No	380	61.1			667	70.9			
Yes	235	37.8			253	26.9			
Intensity of initial fear			2.83	1.02			2.67	1.09	2.99 ^{c**}
Social support (PSSS)			59.06	11.85			60.80	11.60	-2.88 ^{c**}
PTSD symptomatology									
Probable PTSD	235	37.8			122	13.0			130.86 ^{b**}
Probable partial PTSD	151	39.0			310	37.9			<1 ^b
At least one symptom positive	500	80.4			688	72.7			10.86 ^{b**}
PTSD severity			23.91	13.17			17.12	10.86	11.12 ^{c**}

Note. PSSS = Perceived Social Support Scale; PTSD = posttraumatic stress disorder; partial PTSD = partial posttraumatic stress disorder.

^aNumbers within categories may not add up to the presented *N* for some variables due to missing values. ^b χ^2 value. ^c*t* value.

p* < .05. *p* < .01.

women was over twice compared to that of men (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Kumar et al. (2007) also reported that women were nearly three times as likely as men to exhibit PTSD symptoms after the December 2004 tsunami in India. Lower educational level has been noted as a risk factor for PTSD in some studies (e.g., Lai et al., 2004; Palmieri, Canetti-Nisim, Galea, Johnson, & Hobfoll, 2008; van Griensven et al., 2006). The possible underlying mechanism is that lower educational level may be associated with lower resilience, including poorer coping skills,

lower self-esteem, and lower insight, etc., which made victims have difficulties in recovering from trauma.

An interesting finding of this study was that compared with Han (another subnationality in China) people, Qiang people reported more severity of PTSD symptoms even after controlling all the other predictors. Given that loss is an important predictor of PTSD (Hobfoll, 2001), one possible explanation is that the earthquake led to more loss for Qiang people than Han people. Beichuan is the only Qiang autonomous county in China, and

Table 2. Summary of Bivariate Associations Between PTSD Severity^a and Each Predictor

Variable	<i>B</i>	<i>SE B</i>	β
Female	2.84	0.62	.12**
Age	0.02	0.02	.03
Nationality (Qiang)	4.14	0.66	.16**
Single/divorced/separated/widowed	0.18	0.72	.01
Educational level	-1.05	0.41	-.07*
Being injured (yes)	5.17	0.80	.16**
Bereavement (yes)	5.37	0.62	.22**
Witnessing death (yes)	4.59	0.67	.17**
Intensity of initial fear	4.23	0.28	.36**
Social support ^b	-0.06	0.03	-.06*
Community (A)	6.80	0.61	.27**

Note. PTSD = Posttraumatic stress disorder.

^aPTSD severity was measured by the PTSD subscale of the Los Angeles Symptom Checklist. ^bSocial support was measured by the Perceived Social Support Scale.

* $p < .05$. ** $p < .01$.

has been a major settlement of Qiang people for over 1,000 years. The majority (approximately 70,000, 60% of the county's population) of the people in Beichuan County are Qiang people. For Qiang people, family is paramount. They prefer large families in which several generations live together, and kinship is the center of their social networks (see Wang, 2008). As a minority subnationality with a limited population ($\approx 280,000$), the Qiang people lost too much during the earthquake. For example, they have more relatives' deaths ($\approx 20,000$ Qiang people were killed or listed as missing during the earthquake, <http://www.chinareviewnews.com/doc/1006/6/4/6/100664661.html>; http://news.xinhuanet.com/newscenter/2008-06/04/content_8312541.htm), and the social networks which provide major support for them were severely destroyed. In addition, the earthquake destroyed the Beichuan County Town, which not only caused the Qiang people to lose their historic hometown, but also annihilated most of their recorded historical and cultural heritage. Considering that cultural differences may cause people to have different perceptions and reactions to the same disaster (Marsella & Christopher, 2004), another possible explanation is that the cultural differences between the Qiang people and the Han people may be related to their experiencing different levels of PTSD symptoms. In an ongoing study, we have adopted ethnocultural and qualitative approaches in addition to quantitative methods to further explore this interesting issue.

Table 3. Summary of Simultaneous Multivariate Regression Analysis for Variables Predicting PTSD Severity^a

Variable	<i>B</i>	<i>SE B</i>	β
Female	1.77	0.60	.07**
Nationality (Qiang)	1.68	0.63	.07**
Educational level	-0.82	0.38	-.05*
Being injured (yes)	2.54	0.77	.08**
Bereavement (yes)	2.13	0.62	.09**
Witnessing death (yes)	2.86	0.65	.11**
Intensity of initial fear	3.38	0.28	.29**
Social support ^b	-0.08	0.03	-.08**
Community (A)	5.35	0.63	.21**

Note. $R^2 = .26$ ($p < .001$); PTSD = posttraumatic stress disorder.

^aPTSD severity was measured by the PTSD subscale of the Los Angeles Symptom Checklist. ^bSocial support was measured by the Perceived Social Support Scale.

* $p < .05$. ** $p < .01$.

com/newscenter/2008-06/04/content_8312541.htm), and the social networks which provide major support for them were severely destroyed. In addition, the earthquake destroyed the Beichuan County Town, which not only caused the Qiang people to lose their historic hometown, but also annihilated most of their recorded historical and cultural heritage. Considering that cultural differences may cause people to have different perceptions and reactions to the same disaster (Marsella & Christopher, 2004), another possible explanation is that the cultural differences between the Qiang people and the Han people may be related to their experiencing different levels of PTSD symptoms. In an ongoing study, we have adopted ethnocultural and qualitative approaches in addition to quantitative methods to further explore this interesting issue.

In the present study, we found that the trauma exposure indicators (being injured, bereavement, witnessing death, intensity of initial fear), social support, and community variables were all significant predictors for PTSD severity. Previous studies also reported that individuals with more traumatic experience, and/or with lower social support are more likely to develop PTSD (e.g., Chou et al., 2007; Eriksson et al., 2001; Kumar et al., 2007; Kuo et al., 2003).

It should be noted that after controlling all the other predictors, the two most important predictors of PTSD severity were intensity of initial fear and original location being affected by the earthquake. Intensity of initial fear represents the personal subjective experience to a disaster, which has been included in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*; American Psychiatric Association [APA], 1994) definition of Criterion A2. Original location during the earthquake represented the personal objective experience to the disaster. In this study, original location of the people in Community A was destroyed completely by the earthquake and more than 6,000 people ($\approx 60\%$ of the population) were killed. Hence, the people in Community A might have experienced more trauma as well as more severe trauma events such as witnessing death, the loss of loved ones, loss of property, and so on. In summary, these findings support the idea that the initial level of exposure to a disaster (both objectively and subjectively) plays a primary role in the development of PTSD symptomatology (Canino, Bravo, Rubio-Stipec, & Woodbury, 1990; King et al., 1996).

Several limitations to this study should be noted. First, the generalizability of our findings to all survivors of the Sichuan earthquake is limited by our two samples selected from Beichuan County, which was the county most severely affected by the earthquake. Given that the affected area was very large (about 440,442 km²), the prevalence of PTSD symptoms in other post-disaster populations would vary due to the different level of exposure to the earthquake. Second, the instrument we used to assess PTSD symptoms was originally developed and validated in a Western context. Although the LASC has been widely used in diverse cultural groups and has demonstrated high internal consistency

reliability in studies (e.g., Berthold, 1999, 2000; Lantz et al., 2006; O'Keefe, 1998), its cross-cultural applicability and clinical diagnostic validity in Chinese populations still needs to be clarified. Third, previous studies reported that prior psychiatric history is an important risk factor for developing current PTSD symptoms (e.g., Brewin, Andrews, & Valentine, 2000; van Griensven et al., 2006). In our study, we also listed a question to collect the prior psychiatric history of participants. However, our attempt was unsuccessful (almost no one filled in this question) because people in a traditional Chinese culture usually deny mental health problems unless they have been identified as major mental disorders by psychiatrists (given limited cognitive ability, people with major mental disorders were excluded in this study). As noted by researchers (e.g., Tang, 2007; Wang et al., 2000), many Chinese people tend to attribute their mental health problems to physical or external origins, rather than openly expressing them. To clarify the association between prior psychiatric history and current PTSD symptoms among survivors after the earthquake, further in-depth clinical interviews by a psychiatrist or a clinical psychologist should be employed. Fourth, there may be several additional trauma exposure indicators that are not included in this study, such as the number of deaths the survivors had witnessed, the number of family members they lost, and the severity of their property loss, etc. Associations between these additional indicators and PTSD symptoms should be examined in the future research.

Notwithstanding these limitations, this study is one of few studies that investigated PTSD symptoms and risk factors among survivors following a very destructive natural disaster in a non-Western country. Our findings indicate that PTSD is also a common mental health problem among survivors after the earthquake, and that risk factors for PTSD include female gender, subnationality, lower educational level, lower social support, and higher initial exposure level. Given the lack of studies concerning the mental health of disaster victims in China, the information provided by this study is useful for directing, strengthening, and evaluating disaster-related mental health needs and interventions after a devastating natural disaster.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Acierno, R., Ruggiero, K. J., Galea, S., Resnick, H. S., Koenen, K., Roitzsch, J., et al. (2007). Psychological sequelae resulting from the 2004 Florida hurricanes: Implications for postdisaster intervention. *American Journal of Public Health, 97*(Suppl. 1), S103–S108.
- Altindag, A., Ozen, S., & Sir, A. (2005). One-year follow-up study of posttraumatic stress disorder among earthquake survivors in Turkey. *Comprehensive Psychiatry, 46*, 328–333.
- Berthold, S. M. (1999). The effects of exposure to community violence on Khmer refugee adolescents. *Journal of Traumatic Stress, 12*, 455–471.
- Berthold, S. M. (2000). War traumas and community violence: Psychological, behavioral, and academic outcomes among Khmer refugee adolescents. *Journal of Multicultural Social Work, 8*, 15–46.
- Blumenthal, J. A., Burg, M. M., Barefoot, J., Williams, R. B., Haney, T., & Zimet, G. (1987). Social support, type A behavior, and coronary artery disease. *Psychosomatic Medicine, 49*, 331–340.
- Breslau, N., Davis, G. C., Andreski, P., Peterson, E. L., & Schultz, L. R. (1997). Sex differences in posttraumatic stress disorder. *Archives of General Psychiatry, 54*, 1044–1048.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*, 748–766.
- Brown, E. S., Fulton, M. K., Wilkeson, A., & Petty, F. (2000). The psychiatric sequelae of civilian trauma. *Comprehensive Psychiatry, 41*, 19–23.
- Canino, G., Bravo, M., Rubio-Stipec, M., & Woodbury, M. (1990). The impact of disaster on mental health: Prospective and retrospective analyses. *International Congress on Mental Health, 19*, 51–69.
- Chen, C. C., Yeh, T. L., Yang, Y. K., Chen, S. J., Lee, I. H., Fu, L. S., et al. (2001). Psychiatric morbidity and post-traumatic symptoms among survivors in the early stage following the 1999 earthquake in Taiwan. *Psychiatry Research, 105*, 13–22.
- Chinareviewnews. (n.d.). 羌族一成人地震中遇难，族人反对迁离北川 [Ten percent Qiang people were killed in the earthquake, and the survivors refused to move away from Beichuan]. Retrieved June 5, 2008, from <http://www.chinareviewnews.com/doc/1006/6/4/6/100664661.html>
- Chou, F. H.-C., Wu, H.-C., Chou, P., Su, C.-Y., Tsai, K.-Y., Chao, S.-S., et al. (2007). Epidemiologic psychiatric studies on post-disaster impact among Chi-Chi earthquake survivors in Yu-Chi, Taiwan. *Psychiatry and Clinical Neurosciences, 61*, 370–378.
- Eriksson, C. B., Kemp, H. V., Gorsuch, R., Hoke, S., & Foy, D. W. (2001). Trauma exposure and PTSD symptoms in international relief and development personnel. *Journal of Traumatic Stress, 14*, 205–212.
- Frans, Ö., Rimmö, P.-A., Åberg, L., & Fredrikson, M. (2005). Trauma exposure and post-traumatic stress disorder in the general population. *Acta Psychiatrica Scandinavica, 111*, 291–290.
- Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology, 50*, 337–370.
- Huang, L., Jiang, Q. J., & Ren, W. H. (1996). 应对方式、社会支持与癌症病人心身症状的相关性研究 [Coping style, social support, and psychosomatic symptoms in patients with cancer]. *Chinese Mental Health Journal, 10*, 160–161.
- King, D. W., King, L. A., Foy, D. W., & Gudanowski, D. M. (1996). Prewar factors in combat-related posttraumatic stress disorder: Structural equation modeling with a national sample of female and male Vietnam veterans. *Journal of Consulting and Clinical Psychology, 64*, 520–531.
- King, L. A., King, D. W., Leskin, G., & Foy, D. W. (1995). The Los Angeles Symptom Checklist: A self-report measure of posttraumatic stress disorder. *Assessment, 2*, 1–17.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in The National Comorbidity Survey. *Archives of General Psychiatry, 52*, 1048–60.
- Kumar, M. S., Murhekar, M. V., Hutin, Y., Subramanian, T., Ramachandran, V., & Gupta, M. D. (2007). Prevalence of posttraumatic stress disorder in a coastal fishing village in Tamil Nadu, India, after the December 2004 Tsunami. *American Journal of Public Health, 97*, 99–101.
- Kuo, C. J., Tang, H. S., Tsay, C. J., Lin, S. K., Hu, W. H., & Chen, C. C. (2003). Prevalence of psychiatric disorders among bereaved survivors of a disastrous earthquake in Taiwan. *Psychiatric Services, 54*, 249–251.

- Lai, T. J., Chang, C.M., Connor, K. M., Lee, L. C., & Davidson, J. R. T. (2004). Full and partial PTSD among earthquake survivors in rural Taiwan. *Journal of Psychiatric Research*, 38, 313–322.
- Lantz, J., Townsend, C., Perry, L., Roberts, R., Shin, H., & Meese Putman, K. (2006, November). Traumatic bereavement, community violence exposure, & PTSD among Guatemalan aid workers. Paper presented at the International Society for Traumatic Stress Studies 22nd Annual Meeting, Hollywood, CA.
- Liu, A., Tan, H., Zhou, J., Li, S., Yang, T., Wang, J., et al. (2006). An epidemiologic study of posttraumatic stress disorder in flood victims in Hunan China. *Canadian Journal of Psychiatry*, 51, 350–354.
- Marsella, A. J., & Christopher, M. A. (2004). Ethnocultural considerations in disasters: An overview of research issues and directions. *Psychiatric Clinics of North America*, 27, 521–539.
- McMillen, J. C., North, C. S., & Smith, E. M. (2000). What parts of PTSD are normal: Intrusion, avoidance, or arousal? Data from the Northridge, California earthquake. *Journal of Traumatic Stress*, 13, 57–75.
- Ofrin, R., & Salunke, S. R. (2006). Disaster preparedness in the South East Asia region. *International Review of Psychiatry*, 18, 495–500.
- O'Keefe, M. (1998). Posttraumatic stress disorder among incarcerated battered women: A comparison of battered women who killed their abusers and those incarcerated for other offenses. *Journal of Traumatic Stress*, 11, 71–85.
- Orsillo, S. M. (2001). Measures for acute stress disorder and posttraumatic stress disorder. In M. M. Antony & S. M. Orsillo (Eds.), *Practitioner's guide to empirically based measures of anxiety* (pp. 255–307). New York: Kluwer Academic/Plenum.
- Palmieri, P. A., Canetti-Nisim, D., Galea, S., Johnson, R. J., & Hobfoll, S. E. (2008). The psychological impact of the Israel-Hezbollah War on Jews and Arabs in Israel: The impact of risk and resilience factors. *Social Science & Medicine*, 64, 1208–1216.
- Scott, S. T. (2007). Multiple traumatic experiences and the development of posttraumatic stress disorder. *Journal of Interpersonal Violence*, 22, 932–938.
- Shinfuku, N. (2002). Disaster mental health: Lessons learned from the Hanshin Awaji earthquake. *World Psychiatry*, 1, 158–159.
- Stander, V. A., Merrill, L. L., Thomsen, C. J., & Milner, J. S. (2007). Posttraumatic stress symptoms in Navy personnel: Prevalence rates among recruits in basic training. *Journal of Anxiety Disorders*, 216, 860–870.
- Sundram, S., Karim, M. E., Ladrado-Ignacio, L., Maramis, A., Mufti, K. A., Nagaraja, D., et al. (2008). Psychosocial responses to disaster: An Asian perspective. *Asian Journal of Psychiatry*, 1, 7–14.
- Tang, C. S. (2007). Assessment of PTSD and psychiatric comorbidity in contemporary Chinese societies. In J. P. Wilson & C. S. Tang (Eds.), *Cross-cultural assessment of psychological trauma and PTSD* (pp. 135–167). New York: Springer.
- Tsai, K. Y., Chou, P., Chou, F. H.-C., Su, T. T.-P., Lin, S.-C., Lu, M.-K., et al. (2007). Three-year follow-up study of the relationship between posttraumatic stress symptoms and quality of life among earthquake survivors in Yu-Chi, Taiwan. *Journal of Psychiatric Research*, 41, 90–96.
- Udomratn, P. (2008). Mental health and the psychosocial consequences of natural disasters in Asia. *International Review of Psychiatry*, 20, 441–444.
- van Griensven, F., Chakkraband, M. L. S., Thienkrua, W., Pengjuntr, W., Cardozo, B. L., Tantipiwatanaskul, P., et al. (2006). Mental health problems among adults in tsunami-affected areas in southern Thailand. *Journal of the American Medical Association*, 296, 537–548.
- Wang, M. (2008). *羌在汉藏之间：川西羌族的历史人类学研究* [Qiang is between Han and Tibetan: A historical anthropological study about Qiang nationality in west Sichuan]. Beijing: Publishing House of China.
- Wang, X., Gao, L., Shinfuku, N., Zhang, H., Zhao, C., & Shen, Y. (2000). Longitudinal study of earthquake-related PTSD in a randomly selected community sample in north China. *American Journal of Psychiatry*, 157, 1260–1266.
- Xinhuanet. (n.d.) 中国唯一的羌族自治县踏上漫漫重建路 [The only Qiang autonomous county in China has been proceeding on her reconstruction road]. Retrieved June 4, 2008, from http://news.xinhuanet.com/newscenter/2008-06/04/content_8312541.htm
- Ye, S., Shen, X., Jiang, Q., Xu, P., & Ren, X. (1999). 心理社会因素与手术康复的关系 (一) 临床调查与理论探讨 [Relationship between psychosocial factors and psychosomatic rehabilitation after surgery (I): Clinic survey and theory explore]. *Chinese Journal of Behavioral Medical Science*, 8, 199–201.
- Zhang, K., & Sun, X. (2009, August). Psychological rehabilitation and management after Wenchuan earthquake. Paper presented at the 17th World Congress on Ergonomics, Beijing, China.