Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Disaster Psychiatry in Taiwan: A Comprehensive Review

Huei-Wen Angela Lo 1, Chao-Yueh Su 2, Frank Huang-Chih Chou 3,4*

1 Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan
2 Department of Nursing, I-Shiou University, Kaohsiung City, Taiwan
3 Kai-Suan Psychiatric Hospital, Kaohsiung City, Taiwan
4 Meiho University, Pingtong County, Taiwan

1. Introduction

In the past two decades, natural disasters have caused millions of deaths worldwide, and hundreds of millions of people have suffered from various types of physical or mental traumas. Disasters change patterns of thinking and the concept of security among members of a community, which highlights the importance of mental rehabilitation in disaster psychiatry. Mental rehabilitation is not only a short-term intervention, but also involves long-term follow-up and referral of cases to regular psychiatric management. We used PubMed (http://www.ncbi.nlm.nih.gov/pubmed) to search for papers related to the Chi-Chi Earthquake and the Morakot Typhoon published between January 2001 and November 2011. We found that 33 articles are involved in seven topics. The most common disaster-related psychiatric diagnoses were major depressive episodes and posttraumatic stress disorder. The prevalence of posttraumatic stress disorder ranged from 8.0% to 34.3% in Taiwan after the 1999 Earthquake. However, lifetime and current prevalence for psychiatric disorders ranged from 1% to 74%, affecting women twice more than men. Because disasters are becoming increasingly common, it is vital to train a sufficient number of specialists with guidelines for standard clinical treatment, and to create a standard operating procedure for reducing traumatic conditions.

Natural disasters have caused millions of deaths worldwide, and hundreds of millions of people have suffered from various types of physical or mental traumas. Disasters change patterns of thinking and the concept of security among members of a community, which highlights the importance of mental rehabilitation in disaster psychiatry. Mental rehabilitation is not only a short-term intervention, but also involves long-term follow-up and referral of cases to regular psychiatric management. We used PubMed (http://www.ncbi.nlm.nih.gov/pubmed) to search for papers related to the Chi-Chi Earthquake and the Morakot Typhoon published between January 2001 and November 2011. We found that 33 articles are involved in seven topics. The most common disaster-related psychiatric diagnoses were major depressive episodes and posttraumatic stress disorder. The prevalence of posttraumatic stress disorder ranged from 8.0% to 34.3% in Taiwan after the 1999 Earthquake. However, lifetime and current prevalence for psychiatric disorders ranged from 1% to 74%, affecting women twice more than men. Because disasters are becoming increasingly common, it is vital to train a sufficient number of specialists with guidelines for standard clinical treatment, and to create a standard operating procedure for reducing traumatic conditions.

2. The classification of disaster

Neria et al classified disasters into three categories: (A) man-made disasters, (B) technological disasters, and (C) natural disasters, which affect millions of people around the world every year. Natural disasters (e.g., earthquakes and hurricanes) and man-made disasters (e.g., traffic accidents, acts of terrorism, and wars) can cause psychological trauma with long-lasting consequences.

The impact of a mass disaster or man-made trauma on an individual is a composite of two major elements: (A) the catastrophic event itself and effects of media coverage and (B) the vulnerability of the individual affected by the event. Affected individuals may include survivors, rescue workers, and vulnerable populations affected by media coverage.
3. The relationship between psychiatric disorders and disaster

Many studies have shown evidence of psychological sequelae in disaster survivors, including posttraumatic stress disorder (PTSD), major depressive episodes (MDE), substance abuse, sleep disorders, anxiety, panic attacks, and other symptoms. The most common disaster-related psychiatric diagnoses are MDE and PTSD, which are closely associated and this continues to gain attention in trauma outcome research. In addition, rescue workers such as nurses, firefighters, and soldiers incur a high prevalence of psychiatric disorders after disaster rescue. These individuals would also benefit from mental rehabilitation.

4. PTSD in disaster survivors

A systematic review of PTSD following disasters by Neria et al concluded that the post-disaster burden of PTSD is substantial. According to the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV) diagnostic criteria, PTSD has three core psychopathologies: (A) reexperiencing, (B) numbness and avoidance, and (C) hyper-arousal. The DSM-IV diagnostic criteria for PTSD allow clinicians to specify whether the disorder is chronic (if the symptoms have lasted 3 months or more) or exhibits delayed onset (if the onset of symptoms was 6 months or more after the stressful event).

5. The prevalence of PTSD in disaster survivors

The prevalence of PTSD ranged from 8.0% to 34.3% in Taiwan after the 1999 earthquake, measured about 25% in Turkey after the 1999 earthquake, and was reported to reach as high as 74% in Armenia after the 1988 earthquake. In a systematic review of the literature, Andrews et al found that delayed-onset PTSD in the absence of any previous symptoms is rare, whereas a delayed onset that represented an exacerbation or reactivation of prior symptoms accounted for 38.2% and 15.3% of military and civilian cases of PTSD, respectively. Generally, the lifetime and immediate prevalence rates for psychiatric disorders range anywhere from 1% to 74%, affecting women twice more than men. Furthermore, women report more symptoms of anxiety and depression than men.

6. Publications related to disaster in Taiwan acquired from a PubMed search

We used PubMed to search for papers related to the Chi-Chi Earthquake and the Morakot Typhoon, published between January 2001 and November 2011, and found 33 in total. The topics of articles cover: (A) prevalence of and risk factors for psychiatric disorders in different groups, (B) establishment of screening tests, (C) quality of life in survivors, (D) suicide rates following the disaster, (E) the effects of coping strategies in rescue workers, (F) the direct and indirect causes of and risk factors for PTSD and major depressive disorder (MDD) using structural equation modeling, and (G) various other topics. Table summarizes the research articles on the Chi-Chi Earthquake and the Morakot Typhoon related to psychiatry.

7. The theory of mental rehabilitation post-disaster

Reconstruction of life after a disaster can be a challenging process. Mental rehabilitation is a part of life reconstruction and requires a planned, comprehensive approach. Several years after the impact of the disaster, the prevalence of most psychiatric disorders will decline; however, rates of substance abuse and suicide have been shown to increase. Mental rehabilitation is not only important as a short-term intervention, but also as a long-term follow-up mechanism. It can also prove useful in identifying cases that should be referred for further psychiatric management. Hobfoll’s Conservation of Resources (COR) model has been well substantiated by previous studies on natural disasters. According to Hobfoll’s COR theory, resource loss is an important determinant of individual stress, physical and mental health, and vulnerability to developing PTSD. Brewin et al also found that although the effect sizes of all risk factors were modest, factors operating during or after the trauma such as trauma severity, lack of social support, and additional life stress, had somewhat stronger effects than did pre-trauma factors.

Multiple risk factors may combine to result in psychiatric illness. According to Hobfoll’s COR theory, resource loss is an important determinant of individual stress and physical and mental health, including PTSD. Our hypothesis states that an individual reaches a subthreshold of psychiatric illness and then develops the illness due to a decreasing availability of resources, an accumulation of risk factors, and/or a major stressful event. Furthermore, unresolved subclinical psychiatric symptoms caused by a disaster or major life event may increase a survivor’s sensitivity to future stresses. When faced with either stressful life events or trauma such as brain damage or deprivation of internal or external resources, individuals may become more vulnerable to psychiatric impairment and disorders such as PTSD. Our hypothesis states that an individual might reach a subthreshold for PTSD and then develop the illness due to a decreased availability of resources, an accumulation of risk factors such as personality traits or poor social interactions, or a major stressful life event. Furthermore, unresolved subclinical psychiatric symptoms caused by a disaster may increase a survivor’s sensitivity to future stressors.

8. The establishment of a standard operating procedure

Although the types of disasters faced in modern times may vary, it is vital to train a sufficient number of specialists and to develop a standard operating procedure (SOP) for reducing unfavorable conditions when a disaster occurs. Su et al endeavored to establish an SOP based on experience with mental rehabilitation efforts following the Chi-Chi Earthquake. They demonstrated that an Emergency Operation Center (EOC) should be set up as quickly as possible, generally within 1–8 h. The EOC should provide the central government with updates on the situation, as the scale of the EOC will depend on the degree of the emergency. Within 24–48 h, the EOC should assess the actual damage and coordinate “battle resources” such as manpower and equipment with the supporting teams in order to serve the real needs in the disaster area. Multiple rescue teams, including the administrative team, the public health and medical teams, and the engineering and rescue-worker teams, should be involved during the urgent initial stages. An emergency management system should be established to effectively intervene immediately after a disaster. Systematic mental rehabilitation should then be performed 1–3 months after the disaster.

9. Clinical guidelines for post-disaster mental rehabilitation in Taiwan

Su et al offered a 14-part draft of potential clinical guidelines. The Taiwanese Department of Health also endeavored to publish a post-disaster mental rehabilitation book. Expert consensus concludes that every mental health rescue worker should receive 24 h of training on various topics, including: (1) the service concept of...
| Author(s) | Year | Study period after earthquake | Subjects | Purpose | Method |
|-----------|------|-------------------------------|----------|---------|--------|
| Chen et al | 2001 | Within 1 mo                   | 525 residents | Screening for psychiatric morbidity and posttraumatic symptoms among survivors in the early stages | Purposeful sampling |
| Chen et al | 2001 | Within 2 y                    | 210 residents | The Chinese version of the Davidson Trauma Scale, a preliminary study for validation | Translation, back-translation, and concurrent validity |
| Chang et al | 2002 | 6 mo later                    | 171 pregnant residents | Psychiatric morbidity and pregnancy outcome in a disaster area | Purposeful sampling |
| Hsu et al | 2002 | 6 wk later                    | 323 student residents | PTSD among adolescent earthquake victims in Taiwan | Purposeful sampling |
| Liao et al | 2002 | 2 mo later                    | 1104 rescue workers serving in the area hit by the earthquake | Association of psychological distress with psychological factors in rescue workers | Purposeful sampling |
| Lin et al | 2002 | 1 y later                     | 368 residents (268 residents ≥ 65 y old) | Geriatric survivors | Purposeful sampling |
| Shih et al | 2002 | Within 1 y                    | 46 nurses who worked in a hospital in the community | The impact of the 9-21 earthquake experiences on Taiwanese nurses as rescuers | Purposeful sampling |
| Yeh et al | 2002 | Within 16 d                   | 187 young, male military personnel who served as rescue workers | Characteristics of acute stress symptoms and nitric oxide concentrations in young rescue workers in Taiwan | Purposeful sampling |
| Chang et al | 2003 | 5 mo later                    | 84 male firefighters | Posttraumatic distress and coping strategies among rescue workers | Purposeful sampling |
| Chou et al | 2003 | 21 mo later                   | 461 residents | Establishment of a disaster-related psychological screening test | Population survey |
| Kuo et al | 2003 | 2 mo later                    | 120 bereaved survivors | Prevalence of psychiatric disorders and risk factors for PTSD and major depressive disorder among bereaved survivors | Purposeful sampling |
| Yang et al | 2003 | 3 mo later                    | 663 victims | Psychiatric morbidity and posttraumatic symptoms among earthquake victims in primary care clinics | Purposeful sampling |
| Chou et al | 2004a | 21–24 mo                      | 461 residents | Quality of life and related risk factors in Taiwanese earthquake survivors with different psychiatric disorders | Purposeful sampling |
| Chou et al | 2004b | 4–6 mo                        | 4223 residents | Prevalence of PTSD among professional and nonprofessional rescue workers involved in the 1999 Chi-Chi earthquake | Purposeful sampling |
| Guo et al | 2004 | 1 mo                          | 252 rescue workers | Psychiatric morbidity and posttraumatic stress symptoms and quality of life in young rescue workers in Taiwan | Random selection from two rural communities |
| Lai et al | 2004 | 10 mo                         | 252 residents | Full and partial PTSD among earthquake survivors in rural Taiwan | Purposeful sampling |
| Chou et al | 2005 | 4–6 mo                        | 442 residents | Development of psychiatric disorders among residents post-earthquake | Population survey |
| Yang et al | 2005 | During a 7-y period           | —            | Time-related trends of increased suicide rates | Time-series analysis |
| Seplaki et al | 2006 | Before and after the earthquake | 1160 older individuals | Variability in resilience to depressive symptoms in the aftermath of the 1999 earthquake | Longitudinal survey with interviews |
| Wu et al | 2006 | 33–36 mo                      | 405 residents | Prevalence and risk factors of posttraumatic stress symptoms and psychiatric morbidity diagnosed with different psychiatric disorders | Population survey |
| Chen et al | 2007 | 2 y later                     | 6412 earthquake survivors whose houses were destroyed | Prevalence and risk factors of posttraumatic stress symptoms and psychiatric morbidity | Purposeful sampling |
| Chou et al | 2007 | 6 mo, 2 y, and 3 y later       | 442, 461, and 405 residents | Dynamic population survey for risk factors for PTSD and major depression; prevalence of different psychiatric disorders 6 mo, 2 y, and 3 y after the earthquake | Population survey |
| Kuo et al | 2007 | 1 y later                     | 272 victims from temporary housing units | Incidence of PTSD among and the psychological health status of earthquake victims 1 y after the event | Purposeful sampling |
| Tsai et al | 2007 | 3 y later                     | 1756 respondents | Prospective evaluation of the relationship between the clinical course of posttraumatic stress symptoms and quality of life | Fixed cohort follow-up |
| Chang et al | 2008 | —                             | 193 firefighters | Modification effects of coping strategies on the relationship between rescue effort and psychiatric morbidity in earthquake rescue workers | Purposeful sampling |
| Wu et al | 2009 | —                             | 705 adolescent (Chi-Chi earthquake) | Examination of two models: (1) traditional social support; (2) supportive and detrimental social relations model | Using structural equation modeling (SEM) |
| Su et al | 2010 | 3 y later                     | 1756 respondents (post-Chi-Chi earthquake) | Predicting the longitudinal course of PTSD in survivors 3 y following a catastrophic earthquake using multivariate data presented 6 mo after the earthquake | Population-based survey |
| Tang et al | 2010 | 3 mo later                    | 271 adolescents | Direct and indirect causes of PTSD, MDD, and risk factors using a SEM model (Morakot typhoon) | SEM |
| Yen et al | 2011 | —                             | 271 adolescents | MASC-T | To construct validity of MASC-T Chinese version Cluster sampling |
| Yang et al | 2011 | 3 mo later                    | 271 adolescents (post-Morakot typhoon) | Prevalence rates of PTSD, its associated factors and co-occurring psychological problems | Cluster sampling |
| Su et al | 2011 | 3 y later                     | 4223 post-Chi-Chi earthquake respondents | Designing a standard operating procedure for psychiatric services | Population survey |
| Chen et al | 2011 | 1 y later                     | 120 Taiwanese aboriginal people aged ≥ 55 y old | Risk factors associated with PTSD symptoms in a middle- and old-age population who experienced Typhoon Morakot | Purposeful sampling |
post-disaster mental health; (2) administration and procedure: (a) linkage of post-disaster service and resource offers, (b) sensitivity to culture and religion; (3) intervention of post-disaster mental health service, include mental rescue lessons, high-risk group screening and suicide prevention as well as group therapy; and (4) clinical practice.

10. Conclusion

The frequency of disasters in modern times has highlighted the value of disaster psychiatry and the importance of mental rehabilitation. It is necessary to strengthen professional awareness regarding the treatment of posttraumatic stress disorder, depression, and panic disorder. A two-stage rapid screening strategy may also prove effective, despite the typical limitations on resources following a disaster. In a two-stage survey method, the initial questionnaire can help identify high-risk groups and keep track of these individuals for mental rehabilitation, which can be an effective labor-saving method. It is also vital to train a sufficient number of specialists on the guidelines for clinical intervention and to create an SOP for mitigating traumatic conditions when any disaster occurs.

References

1. Kokai M, Fujii S, Shinfuku N, Edwards G. Natural disaster and mental health in Asia. Psychiatry Clin Neurosci 2004;58:110–6.
2. Lo AH, Chen CC, Chou FH, Chang HT. The comparison of prevalence of post-traumatic stress symptoms between post-Chi-Chi earthquake survivors and post-Morales flood survivors. Taiwan J Psychiatry (Taipei) 2011;25:167–79.
3. Chou FH, Su TT, Chou P, Ou-Yang WC, Lu MK, Chen IC. A Survey of psychiatric disorders in a Taiwan village population six months after a major earthquake. J Formos Med Assoc 2005;104:308–17.
4. Chou FH, Ou-Yang WC, Tsai KY, Chou SS, Chen MC, et al. Epidemicologic psychiatric studies on post-disaster impact among Chi-Chi earthquake survivors in Yu-Chi, Taiwan. Psychiatry Clin Neurosci 2007;61:370–8.
5. Su CY, Tsai KY, Chou FH, Liu RY, Lin WK. A three-year, follow-up study of the psychosocial predictors of delayed and unresolved PTSD in Taiwan Chi-Chi earthquake survivors. Psychiatry Clin Neurosci 2010;64:239–48.
6. Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. Psychol Med 2008;38:467–80.
7. Su CY, Chou HC, Tsai KY, Lin WK. The establishment of a standard operation procedure for psychiatric service after an earthquake. Disasters 2011;35:587–605.
8. Sapir DG. Natural and man-made disasters: the vulnerability of women-headed households and children without families. World Health Status Quarterly 1993;46:227–33.
9. Chou FH: The Follow Up Study on Psychiatric Diseases among 921 Earthquake Earthquake victims in rural Taiwan. Can J Psychiatry 1993;38:22–5.
10. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Huang MW. Quality of life and related risk factors in a Taiwanese population 3 years post-earthquake. Aust N Z J Psychiatry 2006;40:355–61.
11. Chou FH, Chen IC, Su TT, Ou-Yang WC, Chien IC, Lu MK, Huang MW. Quality of life and related risk factors for a Taiwanese population 3 years post-earthquake. Aust N Z J Psychiatry 2007;41:90–6.
12. Sapir DG. Natural and man-made disasters: the vulnerability of women-headed households and children without families. World Health Status Quarterly 1993;46:227–33.
13. Chou FH, Chou PH, Su TT, Lin SC, Lu MK, Ou-Yang WC, et al. Three-year follow-up study on the relationship between posttraumatic stress symptoms and quality of life among earthquake survivors in Yu-Chi, Taiwan. J Psychiatry Res 2007;41:90–6.
14. Wu HC, Chou P, Ou-Yang WC, Su TT, et al. Survey of quality of life and related risk factors for a Taiwanese village population 3 years post-earthquake. Aust N Z J Psychiatry 2006;40:355–61.
15. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Huang MW. Quality of life and related risk factors in a Taiwanese population 3 years post-earthquake. Aust N Z J Psychiatry 2007;41:90–6.
16. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Huang MW. Quality of life and related risk factors in a Taiwanese population 3 years post-earthquake. Aust N Z J Psychiatry 2007;41:90–6.
17. Chen CC, Yeh TL, Chen CC, Lee CK, Lee IH, Lee LC, Jeffery KJ. Psychiatric morbidity and posttraumatic symptoms among earthquake victims in primary care clinics. Gen Hosp Psychiatry 2003;25:253–61.
18. Wang X, Gao L, Shinfuku N, Zhang H, Zhao C, Shen Y. Longitudinal study of earthquake-related PTSD in a randomly selected community sample in north China. Am J Psychiatry 2000;157:1269–76.
19. Chou FH, Chen IC, Connor KM, Davidson JR, Lai TJ. Modification effects of coping on post-traumatic morbidity among earthquake rescuers. Psychiatry Res 2008;158:164–71.
20. Liao SC, Lee MR, Lee YJ, Weng T, Shih FY, Ma MH. Association of psychological distress with psychological factors in rescue workers within two months after a major earthquake. J Formos Med Assoc 2002;101:169–76.
21. Shih FJ, Liao YC, Chan SM, Duh BR, Gau ML. The impact of the 9-21 earthquake emergency services of Taiwanese rescuers. Jpn J Psychiatry Clin Neurosci 2002;55:659–65.
22. Yeh CB, Lieckman JF, Wan FJ, Shih IS, Lu RB. Characteristics of acute stress symptoms and nitric oxide concentration in young rescue workers in Taiwan. Psychiatry Clin Neurosci 2002;56:59–68.
23. Tsai KY, Chou P, Ou-Yang WC, Chien IC, Lu MK, Huang MW. Quality of life and related risk factors in a Taiwanese population 3 years post-earthquake. Aust N Z J Psychiatry 2007;41:90–6.
24. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Chou P. Establishment of a disaster-related psychological screening test. Aust N Z Psychiatry 2003;37:163–209.
25. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Chou P. Establishment of a disaster-related psychological screening test. Aust N Z Psychiatry 2003;37:163–209.
26. Andrews B, Brewin CR, Philpott R, Stewart L. Delayed-onset posttraumatic stress disorder: a systematic review of the evidence. Am J Psychiatry 2007;164:1129–36.
27. Breslau N, Davis GC, Andreski P, Peterson E. Traumatic events and post-traumatic stress disorder in an urban population of young adults. Arch Gen Psychiatry 1991;48:216–22.
28. Carr VJ, Lewin TJ, Webster RA, Hazell PL, Kenardy JA, Carter GL. Psychosocial sequelae of the 1989 Newcastle earthquake: I. Community disaster experiences and psychosocial morbidity 6 months post-disaster. Psychol Med 1995;25:539–59.
29. Chang CM, Lee LC, Connor KM, Davidson JR, Jeffries K, Lai TJ. Posttraumatic distress and coping strategies among rescue workers after an earthquake. J Nerv Ment Dis 2003;191:391–8.
30. Chou FH, Su TT, Ou-Yang WC, Chien IC, Lu MK, Chou P. Establishment of a disaster-related psychological screening test. Aust N Z Psychiatry 2003;37:163–209.
31. Tural U, Coskun B, Onder E, Corapciioglu A, Vidiz M, Kesepera C, Karakaya I. Psychological consequences of the 1999 earthquake in Turkey. J Trauma Stress 2007;20:531–42.
32. Hopf B. Conservation of Resources: A new attempt at conceptualizing stress. Am Psychol 1989;44:513–24.
33. Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for post-traumatic stress disorder in trauma-exposed adults. J Consult Clin Psychol 2000;68:748–66.
34. Chen CH, Lin SK, Tang HS, Shen WW, Lu ML. The Chinese version of the Disasters Trauma Scale: a practice test for validation. Psychiatry Clin Neurosci 2005;59:493–9.
35. Lin MR, Huang W, Huang C, Hwang HF, Tsai LW, Chiu YN. The impact of the Chi-Chi earthquake on quality of life among elderly survivors in Taiwan: a before and after study. Qual Life Res 2002;11:379–88.
36. Guo YJ, Chen CH, Lu ML, Tan HK, Lee HW, Wang TN. Posttraumatic stress disorder among professional and non-professional rescuers involved in an earthquake in Taiwan. Psychiatry Res 2004;127:35–41.
37. Yang YH, Xirasagar S, Chang HC, Huang YT, Lin HC. Suicide trends following the Taiwan earthquake of 1999: empirical evidence and policy implications. Acta Psychiatr Scand 2005;112:442–8.
38. Seplaki CL, Goldman N, Weinstein M, Lin YH. Before and after the 1999 Chi-Chi earthquake: traumatic stress and depressive symptoms in an older population. Soc Sci Med 2005;62:3121–32.
39. Chen CH, Tan HK, Liao LR, Chen HH, Chen CC, Cheng JJ, Chen CY, et al. Long-term psychological outcome of 1999 Taiwan earthquake survivors: a survey of a high-risk sample with property damage. Compr Psychiatry 2007;48:269–75.
48. Kuo HW, Wu SJ, Ma TC, Chiu MC, Chou SY. Posttraumatic symptoms were worst among quake victims with injuries following the Chi-chi quake in Taiwan. *J Psychosom Res* 2007;62:495–500.

49. Wu CH, Chen SH, Weng LJ, Wu YC. Social relations and PTSD symptoms: a prospective study on earthquake-impacted adolescents in Taiwan. *J Trauma Stress* 2009;22:451–9.

50. Tang TC, Yen CF, Cheng CP, Yang P, Chen CS, Yang RC, Huang MS, et al. Suicide risk and its correlate in adolescents who experienced typhoon-induced mudslides: a structural equation model. *Depress Anxiety* 2010;27:1143–8.

51. Yen CF, Tang TC, Yang P, Chen CS, Cheng CP, Yang RC, Huang MS, et al. A multidimensional anxiety assessment of adolescents after Typhoon Morakot-associated mudslides. *J Anxiety Disord* 2011;25:106–11.

52. Yang P, Yen CF, Tang TC, Chen CS, Yang RC, Huang MS, Jong YJ, et al. Posttraumatic stress disorder in adolescents after Typhoon Morakot-associated mudslides. *J Anxiety Disord* 2011;25:362–8.

53. Chen YL, Lai CS, Chen WT, Hsu WY, Wu YC, Wang PW, Chen CS. Risk factors for PTSD after Typhoon Morakot among elderly people in Taiwanese aboriginal communities. *Int Psychogeriatr* 2011;23:1686-91.