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Associations between economic loss, financial strain and the psychological status of Wenchuan earthquake survivors

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This study examines the effects of economic loss on the life satisfaction and mental health of Wenchuan earthquake survivors. Economic loss is measured by earthquake impacts on the income and houses of the survivors. The correlation analysis shows that earthquake impact on income is significantly correlated with life satisfaction and depression. The regression analyses indicate that earthquake impact on income is indirectly associated with life satisfaction and depression through its effect on financial strain. The research highlights the importance of coping strategies in maintaining a balance between economic status and living demands for disaster survivors.

Keywords: China, depression, disaster survivors, economic loss, financial strain, life satisfaction

Introduction

Disasters, especially those that lead to significant loss of life, widespread damage to property and serious and ongoing economic difficulties for the community, tend to trigger severe, lasting and pervasive psychological problems (Freedy et al., 1993; Green, 1995; Norris et al., 2002a; Norris et al., 2002b). Studies were conducted to examine the factors associated with the psychological status of disaster survivors. The reviews of literature by Gibbs (1989), Lewin et al. (1998), Brewin et al. (2000), Norris (2005) and Norris et al. (2002b) indicate that the factors of age, gender, ethnicity, socioeconomic status, severity of exposure to disaster, family factors, pre-disaster functioning and personality, secondary stressors and psychosocial resources—including ways and beliefs of coping, social support and resource loss—influence the psychological status of disaster survivors. However, little attention has been paid in examining the association between the economic loss and psychological status of disaster survivors despite the variety of significant factors found.

The economic loss caused by disasters may be directly associated with the psychological status of survivors. The theory of conservation of resources (Hobfoll, 1989, 2002)—wherein resources include objects, personal characteristics, conditions and energies—state that stress and accompanying negative emotions occur when an actual or threatened loss in resources or a lack in an expected gain in resources transpire. The economic loss in disasters may also be indirectly associated with the psychological

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status of survivors through its influence on financial strain, which is frequently associated with psychological status (for example, Huang, 2012; Marmot et al., 1997; Webley and Nyhus, 2001; Weich and Lewis, 1998). There are at least two potential ways through which economic loss in disasters influences the financial strain of survivors. First, the disasters may destroy the survivors' income resources, such as farmland, or the closing of factories or companies, which result in the loss of jobs of the survivors and lead to financial strain. Second, the disasters may damage the infrastructure of the affected areas, such as roads, and increase the price of goods and living products because of the higher transportation cost, which eventually leads to financial strain for the survivors.

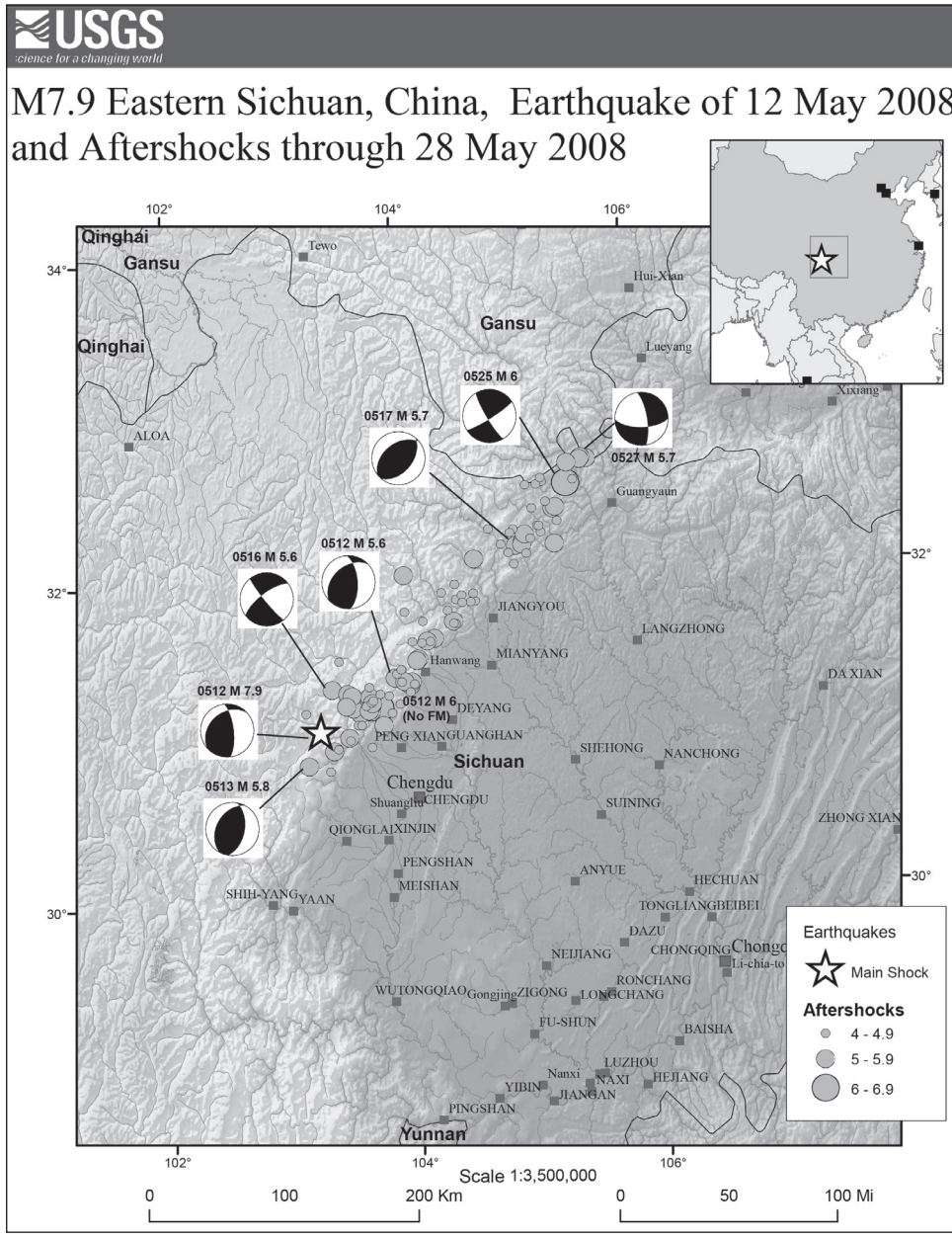
This study helps to fill the research gap by examining the association between economic loss and the psychological status of survivors of the Wenchuan earthquake. The mediating effects of financial strain on the relationship between economic loss and psychological status are also studied. The magnitude-8 Wenchuan earthquake hit Wenchuan County, Sichuan, China, and its neighbouring regions on 12 May 2008. The earthquake caused 69,226 known deaths, 17,923 missing people and 374,643 injured (State Council of the People's Republic of China, 2008). A total of 5.36 million buildings collapsed and more than 21 million buildings were damaged; the total economic loss of the quake was estimated at USD 86 billion (US Geological Survey, 2012).

Method

Participants

The participants of this study were aged 18 or above and survived the Wenchuan earthquake. They lived in five communities, one of which is located in the city of Chengdu and four in the city of Mianyang. Figure 1 shows that all five communities are near the epicentre of the earthquake and belong to the most severely earthquake-affected areas. The majority of houses in these areas were damaged. The communities were purposely chosen because of the contacts we had with the social welfare agencies working there who could help us with approaching residents. The non-probability sampling method was chosen for several reasons. First, the primary intention of this study was not to generalise the results to a broader population but to gain more insight into the subject of inquiry and to develop a solid foundation for further studies. Second, non-probability sampling is the most economic and expedient approach given the limited financial support available. The researchers approached and interviewed people mainly in parks, social work agencies' activities rooms, and tea houses where local people gathered through an introduction by the social service agency staff. People aged less than 18 were excluded because of their financial dependence on their parents, which makes estimating the economic loss from the earthquake difficult.

Figure 1. Map of the Wenchuan earthquake



Source: US Geological Survey (2008).

Procedures

A face-to-face interview approach using a questionnaire written in Chinese was adopted. Five graduates with either a bachelor's or master's degree in social work and who spoke the local dialect conducted the interviews. Thirty-three questionnaires were filled out by the respondents themselves: these were checked by the interviewers for

completeness. A significant difference in the years of formal education among these 33 respondents (mean = 10.03, standard deviation = 3.36) and other respondents (mean = 5.43, standard deviation = 4.05) was found ($t = 6.27$, $p < .001$). The data were collected in July and August 2012. Each interview lasted 25 to 40 minutes. Informed consent was obtained, and the anonymity and confidentiality of the replies were emphasised to encourage honest responses. Sixteen questionnaires from the 322 collected questionnaires were incomplete, which left a total of 306 completed questionnaires.

Measures

Psychological status was indicated by life satisfaction and depression. This study was conducted four years after the Wenchuan earthquake when the survivors' lives were likely to have returned to normal or to have become stable. Therefore we selected life satisfaction and depression, which are more stable psychological status indicators than post-traumatic stress disorder and anxiety. *Life satisfaction* was measured using the 5-item Satisfaction with Life Scale (SWLS) designed by Diener et al. (1985). The Chinese version of the SWLS translated by Shek (1998) and adopted elsewhere (for example, Huang, 2012; Sachs, 2003; Shek, 2005) was used. The construct validity of the Chinese SWLS was supported by its correlation with a single-item satisfaction measure (Leung and Leung, 1992). The Cronbach's alpha of the scale was 0.74 in this research.

Depression was measured using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D). The Chinese version of the 10-item CES-D translated by Wong (2009) was used in this study. The research indicated that this 10-item version of CES-D can be used in lieu of the 20-item version (Cheng and Chan, 2005). The Cronbach's alpha of the scale was 0.82 in this research.

Economic loss was more complex. No scale was found in the literature to measure the survivors' economic loss from disasters. Other academics and the frontline social service workers for the Wenchuan earthquake survivors suggested that asking the survivors to estimate their total economic loss would be a sensitive topic because such a question could trigger painful memories. Therefore, the respondents were only asked to indicate *earthquake impacts on income* and *house*, which are the two most important areas of their economic loss, on a 5-point Likert scale from none (= 1) to enormous (= 5), respectively.

Financial strain was measured using a 4-item scale developed by Chou and Chi (2002). In the scale, respondents answered three items about whether enough money was available for food, medical services and daily expenses using a 3-point scale ranging from 1 = enough to 3 = not enough. The fourth item asked the respondents to rate the difficulty in paying their monthly electricity, water and other bills using a 4-point scale, ranging from 1 = not difficult at all to 4 = very difficult. In this study, we changed the response to the fourth item to comply with the format of the responses of all the items. The sum of the scores of four items was computed, where the higher scores indicate great financial strain. The Cronbach's alpha of the scale is 0.84.

Control variables include socio-demographic variables, such as sex and education, social support and the impact of the earthquake, such as injury or death of relative(s) or friend(s), and life threat from the earthquake. Previous research indicated that the psychological problems of disaster survivors are associated with exposure to event and life changes (Armenian et al., 2002; Fukuda et al, 1999; Sumer et al., 2005), social support (Ke et al., 2010; Lowe et al., 2010) and education and gender differences (Basoglu et al., 2002; Basoglu et al., 2004; Ben-Zur and Zeidner, 1996).

Social support was assessed using the Social Support Questionnaire created by Doeglas et al. (1996). The questionnaire included five items on daily emotional support and four items on daily instrumental support. The participants rated the items across a Likert-type scale from 1 = seldom or never to 4 = often. The scale was translated into Chinese by the first author of this paper and was reviewed and revised by the second and third authors. The three authors are Chinese-English bilinguals and reached an agreement on the translated scale. An exploratory factor analysis (EFA) using the IBM Statistical Package for Social Sciences for Windows (IBM-SPSS, version 19.0) revealed that all nine items explain a 72.81 per cent variance, with the first principal component explaining a 58.22 per cent variance and the others explaining a 14.59 per cent variance, which suggests the uni-dimensional structure of the scale. The overall score was computed by adding the scores of all nine items, where the higher scores indicate greater social support. The Cronbach's alpha of the scale was 0.91.

The other control variables were *sex* (0 = male, 1 = female); *age* (in years); *education* (in years of formal education); *self-rated health* through the question: 'How would you rate your present health?' (1 = very poor to 5 = very good); *marital status*; *religion*; and *ethnicity*. Three variables for the earthquake impact were also included. *Life threat* was assessed through the question: 'Did you feel your life was in danger during the earthquake?' (0 = no, 1 = yes). *Injury or death of family member(s)* (0 = no, 1 = yes) was the direct impact of the earthquake on the respondents' family members. *Injury or death of relative(s) or friend(s)* (0 = no, 1 = yes) was the direct impact of the earthquake on their relative(s) or friend(s).

Data analyses

The data were coded and analysed using IBM-SPSS (version 19.0). All questionnaires were checked for completeness prior to data entry. Two respondents suddenly broke into tears when the interviewers asked about the earthquake impact. The interviewers stopped asking them questions and attended to their needs. The two missing values were replaced with 'yes' for life threatening, injury or death of family member, injury or death of relative or friend, and to 'enormous' for earthquake impacts on house and income because their reaction toward the question seemed to imply such experiences. Correlation analyses were performed to determine if the independent variables were significantly associated with the dependent variables. The control variables were then examined using regression analysis.

Results

Descriptive statistics

Table 1 shows the frequency distribution of the nominal and ordinal variables, and the means and standard deviations of the interval variables. The marital statuses of the 306 respondents were 81.4 per cent married, 4.9 per cent single, 12.4 per cent widowed, 0.3 per cent separated and 1.0 per cent divorced. The widowed, single, separated and divorced variables were combined into one response category for further analyses. For ethnicity, 60.8 per cent were Han, 38.9 per cent were Qian and 0.3 per cent were Zang. Qian and Zang were combined into one response category for further analyses. For religion, 25.0 per cent did not have religion, 15.0 per cent were Buddhists, 1.3 per cent were Christian and 57.8 per cent followed a folk religion. Buddhism, Christian and folk religion were combined into one response category for further analyses.

Table 1. Descriptive statistics of the variables (N = 306)

Variables	Percentage	M(SD)	Range
Male (vs. female)	29.4(70.6)	–	–
Married (vs. single or others)	81.4(18.6)	–	–
Han (vs. Qian or others)	60.8(39.2)	–	–
No religion (vs. religions)	25.8(74.2)	–	–
Self-perceived health		–	1–5
Very poor	5.6		
Poor	19.0		
Neutral	29.7		
Good	31.0		
Very good	14.7		
Life threat: no (vs. yes)	22.5(77.5)	–	–
Injury or death of family member: no (vs. yes)	69.0(31.0)	–	–
Injury or death of relative or friend: no (vs. yes)	60.1(39.9)	–	–
Earthquake impact on house		–	1–5
None	6.9		
A little	12.7		
Medium	7.8		
Serious	23.2		
Enormous	49.3		
Earthquake impact on income		–	1–5
None	17.6		
A little	13.4		
Medium	13.1		
Serious	20.9		
Enormous	35.0		
Age	–	52.49(15.61)	18–88
Years of formal education	–	5.93(4.22)	0–18
Financial strain	–	7.61(2.32)	4–12
Social support	–	29.15(6.59)	9–36
Satisfaction with Life Scale	–	21.99(4.47)	5–30
Depression	–	6.70(5.18)	0–26

Notes: M = mean, SD = standard deviation.

Source: authors.

Table 2. Matrix of correlation coefficients

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Sex	–															
2. MS	.03	–														
3. ET	.17**	.01	–													
4. SH	-.00	.02	.03	–												
5. Age	-.15**	.14**	-.10	-.25***	–											
6. EIH	.04	.00	.12*	-.13*	.03	–										
7. EII	.16**	-.08	.39***	-.06	-.16**	.34***	–									
8. IR	.16**	-.01	.44***	.06	-.22***	.07	.45***	–								
9. IF	.10	.02	.30***	-.08	-.11*	.12*	.26***	.39***	–							
10. LT	.06	.12*	.21***	-.01	-.04	.03	.21***	.17**	.13*	–						
11. YF	-.13*	-.07	-.23**	.20***	-.52***	-.06	-.18**	-.12*	-.07	-.11*	–					
12. FS	.01	-.01	.13*	-.27***	-.01	.01	.37***	.21***	.09	.01	.20**	–				
13. SS	-.02	-.07	.04	.13*	.08	-.06	-.02	.05	-.08	.05	-.09	-.11	–			
14. RE	.11	-.08	.21***	-.13*	.10	.09	.20***	.22***	.07	-.07	-.35***	.12*	.16**	–		
15. DE	.11*	.07	.23***	-.17**	-.20***	.07	.31***	.23***	.16**	.23***	.07	.31***	-.29***	-.02	–	
16. LS	-.04	-.04	.01	.04	.40***	-.02	-.16**	-.09	-.13*	-.13*	-.24***	-.20***	.06	.13*	-.376***	–

Notes: N = 306; MS = marital status; ET = ethnicity; SH = self-perceived health; EIH = earthquake impact on house; EII = earthquake impact on income; IR = injury or death of relative or friend; IF = injury or death of family member; LT = life threat; YF = years of formal education; FS = financial strain; SS = social support; RE = religion; DE = depression; LS = life satisfaction.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed test).

Source: authors.

Predicting life satisfaction and depression

This study examined the associations among the economic loss, financial strain and psychological status of the Wenchuan earthquake survivors. Correlation analyses were performed to explore the associations among all variables before the regression analyses. Table 2 (see previous page) presents the matrix of Pearson's correlation coefficients for the variables. It deserves noting that 'earthquake impact on house' was not correlated with either life satisfaction or depression.

A regression analysis was performed to examine if earthquake impact on income predicts both life satisfaction and depression. The factors, which showed significant correlation with life satisfaction and depression, were entered into a regression equation. The results of the regressions are summarised in Table 3. The significant variables that predict life satisfaction are age, financial strain and life threat, which explains the 22 per cent variance in life satisfaction together with other variables. The significant variables in the regression on depression are social support, age, life threat and financial strain, which explains the 27 per cent variance in depression together with the other variables.

Mediating effect of financial strain

Regression analyses were performed using a four-step procedure to examine if financial strain mediates the relationship between economic loss and psychological status (Baron and Kenny, 1986; Judd and Kenny, 1981). Step 1 involves determining the significant relationship between economic loss and both life satisfaction and depression. Step 2 requires a significant association between economic loss and financial strain.

Table 3. Regression model on life satisfaction and depression

Independent variables	Life satisfaction		Depression	
	B (SE)	β	B (SE)	β
Male (vs. female)	–	–	.14(.57)	.01
Han (vs. Qian or others)	–	–	1.01(.61)	.10
Self-perceived health	–	–	-.63(.25)	-.14*
Injury or death of relative or friend: no (vs. yes)	–	–	.70(.65)	.07
Social support	–	–	-.20(.04)	-.26***
Age	.09(.02)	.33***	-.06(.02)	-.17**
Injury or death of family member: no (vs. yes)	-.60(.51)	-.06	-.14(.61)	-.01
Life threat: no (vs. yes)	-1.14(.57)	-.11*	2.21(.63)	.18**
Earthquake impact on income	-.08(.18)	-.03	.35(.21)	.10
Financial strain	-.41(.11)	-.21***	.39(.12)	.17**
No religion (vs. religions)	.89(.56)	.09	–	–
Years of formal education	-.11(.07)	-.10	–	–
R^2	.24		.29	
Adjusted R^2	.22		.27	
F (Sig.)	13.11***		12.25***	

Notes: *p<0.05; **p<0.01; ***p<0.001.

Source: authors.

Table 4. Mediational analyses of life satisfaction

Independent variables	Step 1		Step 2		Steps 3 & 4	
	B (SE)	β	B (SE)	β	B (SE)	β
Age	.10(.02)	.33***	–	–	.09(.02)	.33***
IF	-.59(.52)	-.06	-	–	-.60(.51)	-.06
Life threat: no (vs. yes)	-.94(.58)	-.09	–	–	-1.14(.57)	-.11*
No religion (vs. religions)	-.92(.58)	-.09	-.11(.30)	-.02	.89(.56)	.09
Years of formal education	-.07(.07)	-.07	-.05(.03)	-.10	-.11(.07)	-.10
Earthquake impact on income	-.30(.17)	-.10	.49(.09)	.32***	-.08(.18)	-.03
Financial strain	–	–	–	–	-.41(.11)	-.21***
Ethnicity	–		-.22(.28)	-.05		
Self-perceived health	–		-.49(.11)	-.24***		
IR	–		.46(.29)	-.10		
R^2	.20		.21		.24	
Adjusted R^2	.18		.20		.22	
F (Sig.)	12.26***		13.36***		13.11***	

Notes: in step 2, the dependent variable is the financial strain. In steps 1, 3 and 4, the dependent variables are life satisfaction. IF = injury or death of family member: no (vs. yes); IR = injury or death of relative or friend: no (vs. yes).

*p<0.05; **p<0.01; ***p<0.001.

Source: authors.

Step 3 requires a significant association between financial strain and both life satisfaction and depression, controlling for economic loss. Step 4 requires a decrease in the coefficient from economic loss to both life satisfaction and depression after controlling for the financial strain. Table 2 shows that earthquake impact on income, ethnicity, religion, formal education, self-perceived health and injury or death of relative or friend are significantly correlated with financial strain. Therefore, these factors were controlled in the regression analysis on financial strain. Tables 4 and 5 show the results of the mediational analyses of life satisfaction and depression, respectively.

Table 4 shows that earthquake impact on income was not a significant variable in step 1. In step 2, earthquake impact on income was significantly associated with financial strain ($\beta = .32$, $p < .001$). In step 3, financial strain was associated with life satisfaction ($\beta = -.21$, $p < .001$) after controlling for the earthquake impact on income. In step 4, the inclusion of financial strain in the regression model resulted in a decrease in β value from -.10 in step 1 to -.03 for the association between earthquake impact on income and life satisfaction. These results indicate that the relationship between earthquake impact on income and life satisfaction was mediated by financial strain. The Sobel test (Sobel, 1982) revealed that the indirect effect of earthquake impact on income over financial strain to life satisfaction was significant ($z = -3.07$, $p < .01$) and that the variance of the indirect effect was -.20.

Table 5 shows that earthquake impact on income was significantly associated with depression ($\beta = .16$, $p < .01$) in step 1. In step 2, earthquake impact on income was associated with financial strain ($\beta = .32$, $p < .001$). In step 3, financial strain was associated

Table 5. Mediational analyses of depression

Independent variables	Step 1		Step 2		Steps 3 & 4	
	B (SE)	β	B (SE)	β	B (SE)	β
Male (vs. female)	.21(.58)	.02	–	–	.14(.57)	.01
Han (vs. Qian or others)	.98(.62)	.09	-.22(.28)	-.05	1.01(.61)	.10
Self-perceived health	-.83(.25)	-.18**	-.49(.11)	-.24***	-.63(.25)	-.14*
IR	.91(.65)	.09	.46(.29)	-.10	.70(.65)	.07
Social support	-.21(.04)	-.27***	–	–	-.20(.04)	-.26***
Age	-.54(.02)	-.16**	–	–	-.06(.02)	-.17**
IF	-.23(.62)	-.02	–	–	-.14(.61)	-.01
Life threat: no (vs. yes)	2.06(.64)	-.02	–	–	2.21(.63)	.18**
Earthquake impact on income	.54(.20)	.16**	.49(.09)	.32***	.35(.21)	.10
Financial strain	–	–	–	–	.39(.12)	.17**
No religion (vs. religions)	–	–	-.11(.30)	-.02	–	–
Years of formal education	–	–	-.05(.03)	-.10	–	–
R^2	.27		21		.29	
Adjusted R^2	.25		.20		.27	
F (Sig.)	12.16***		13.36***		12.25***	

Notes: in step 2, the dependent variable is financial strain. In steps 1, 3 and 4, the dependent variables are life satisfaction and depression. IR = injury or death of relative or friend: no (vs. yes); IF = injury or death of family member: no (vs. yes).

*p<0.05; **p<0.01; ***p<0.001.

Source: authors.

with depression (β = .17, $p < .01$) after controlling for earthquake impact on income. In step 4, the inclusion in the regression model of financial strain resulted in a decrease in the β value from .16 in step 1 to .10 for the association between earthquake impact on income and depression. These results indicated that the relationship between earthquake impact on income and depression was mediated by financial strain. The Sobel test indicated that the indirect effect of earthquake impact on income over the financial strain to depression was significant ($z = 2.79$, $p < .01$) and that the variance of the indirect effect was .19.

No problem of multicollineality was notably found for all above regression analyses. The values of the variance inflation factor for all independent variables examined were below 2.0. The normal P-P plot of the regression standardised residuals showed that the residuals were normally distributed, and the scatter plot of the standardised residuals on the standardised predicted values showed no heteroskedasticity.

Discussion

This study examined the associations between economic loss, financial strain and psychological status of the Wenchuan earthquake survivors. Economic loss was measured by earthquake impacts on the incomes and houses of the survivors. Psychological

status was indicated by life satisfaction and depression. The correlation analysis showed that earthquake impact on income was significantly associated with both life satisfaction and depression. Earthquake impact on house was not correlated with both life satisfaction and depression. The regression analyses indicated that earthquake impact on income indirectly affected both life satisfaction and depression through its effect on financial strain.

The findings seemed to support the resource fit model of coping and stress, which hypothesises that the degree of fit or lack of fit between environmental demands and coping abilities determines people's well-being (French et al., 1974; French et al., 1982). Financial strain could be regarded as a lack of fit between the economic status and living demands of the Wenchuan earthquake survivors. The findings were also consistent with the transactional model of stress and coping and the concept of resilience, which emphasises the importance of coping resources and resilience to people's well-being in the face of loss or other stressful events (Bonanno, 2004; Lazarus and Folkman, 1984; Manyena, 2006; Westphal and Bonanno, 2007).

It should be noted that the Chinese government invested large sums of money in the recovery following the Wenchuan earthquake disaster. The *Regulations on Post-Wenchuan Earthquake Restoration and Reconstruction* and the *Paired Assistance Programme for Post-Wenchuan Earthquake Restoration and Reconstruction* issued by the State Council in 2008 stated that a total of CNY 370 billion (approximately USD 53 billion at the time) was invested. Although the government mainly focused on physical recovery, such as road and house reconstruction (Huang et al., 2011), the survivors were directly and indirectly aided in rebuilding damaged houses and gaining income through new job opportunities, respectively. A report on the Wenchuan earthquake recovery by the vice-governor of Sichuan (Wei, 2011) stated that the rural and urban families whose houses were damaged or destroyed in the earthquake received governmental financial aid of CNY 20,000 (approximately USD 2,850) and CNY 25,000 (approximately USD 3,600) on average, respectively. The government also provided other types of assistance, such as the reduction of tax and related fees, to help the survivors restore or rebuild their houses. These financial aids and concessions by the government alleviated the negative psychological status related to the damage of survivors' houses, which may partly explain the finding on the dissociation of earthquake impact on house with both life satisfaction and depression. The governmental recovery also created numerous job opportunities for local earthquake survivors, especially in the field of road and house reconstruction, which might have contributed to some survivors' income and therefore counteracted the impact of the earthquake on their income. This event may partly explain the finding that earthquake impact on income was not directly associated with psychological status in the regression analyses. Some of the people affected by the earthquake might also have other forms of compensation from insurance, private donations and community contributions. Further studies are warranted to identify and examine the detailed mechanism of the relationship between economic loss and the psychological status of the survivors.

The findings of significant associations between financial strain and both life satisfaction and depression were logically consistent with those of previous studies (for example, Marmot et al., 1997; Webley and Nyhus, 2001; Weich and Lewis, 1998). The findings that financial strain mediated the relationship between earthquake impact on income and both life satisfaction and depression expanded our understanding of the relationship between economic loss and psychological status of disaster survivors. These findings were understandable because the earthquake impact on income could add to the financial stress of the survivors either through a direct impact on their income resources or an indirect impact from the increased prices of products for daily living, as previously discussed. Maslow's (1970) need-gratification model also suggests that people tend to base their psychological well-being judgement on the gratification of five basic needs, among which physiological need is the most basic one. With financial stress, the disaster survivors were unable to satisfy their physiological need and, therefore, reported low life satisfaction and high depression.

Life threat and age were significantly associated with both life satisfaction and depression. A matter of life or death could possibly exert long-term negative impacts on people's lives. For age, the older survivors possibly had more life experiences and strategies to help cope with the earthquake outcome, which led to the reported greater life satisfaction and lower depression. Some studies also suggested that older disaster survivors have higher recovery resilience (Tichehurst et al., 1996; Thompson et al., 1993). The respondents in this research might not experience other natural disasters, but most, especially older respondents, experienced China's great famine from 1958 to 1962 (Zhou, 2012) and the cultural revolution from 1966 to 1976 (Esherick et al., 2006). Some of these survivors might have developed coping strategies from these human-created disasters, which helped them cope with the Wenchuan earthquake. The negative association found between social support and depression also reinforced the view that social-psychological support for people experiencing disaster and trauma is vital for effective coping (Bonanno, 2004; Hobfoll, 2002; Ke et al., 2010; Xu and He, 2012). Social and psychological resources are key in preventing and combating depression.

The limitations of this study should be addressed. First, the respondents were from five earthquake-affected communities, and the sample was not randomly selected. The generalisability of the findings was limited. Future studies may apply random sampling and may include research participants in more areas to improve the generalisability of the findings. Second, this study was cross-sectional, which prohibited making conclusions about the directionality of relationships. Future studies with a qualitative or a longitudinal design that requires performing repeated surveys could be used to establish causal relationships. Third, this study only focused on life satisfaction and depression, and economic loss was measured by earthquake impacts on income and house. Future studies may include more elements regarding psychological status, such as post-traumatic stress disorders and anxiety reactions, and more components of economic loss, such as the loss of collections and business interruption costs, to develop a better understanding of the present research topic. Fourth, this

study applied a self-reported measure, which might reflect some patterns of reporting biases or a personal bias such as biases related to social desirability. Future studies with other measures should be conducted. Fifth, the study was conducted four years after the Wenchuan earthquake. The psycho-economic impacts of the earthquake on the survivors might have been ameliorated by time and maturity factors. Nevertheless this was a sample and phenomenon infrequently studied and the study was better late than never. This study contributes to our understanding of the associations between economic loss, financial strain and psychological status of earthquake survivors in China, where little such research has been conducted to date.

The findings of this research imply the importance of reducing the financial stress of disaster survivors. Besides direct financial assistance, strategies may also be directed at improving survivors' financial skills or capacity and at changing the environment where financial decisions are made, as suggested by Taylor et al. (2011). Mental health or social welfare professionals may collaborate with financial professionals and development workers to implement such strategies. Asset-based policy through individual development accounts as suggested by Sherraden and Page-Adams (1995) may also be promoted to help disaster survivors with financial stress by developing individual financial management capacity and enhancing economic income.

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