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Depressive Symptoms in Bereaved Parents in the 2008 Wenchuan, China Earthquake: A Cohort Study

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Abstract

This study sought to expand the literature on bereavement and response to natural disasters by reporting the prevalence, severity, and correlates of depressive symptoms among bereaved and nonbereaved parents of the 2008 Wenchuan Earthquake in China. Bereaved ($n = 155$) and nonbereaved ($n = 35$) parents from the Xiang'e township in China were interviewed at 18 months (Wave 1) and 24 months (Wave 2) following the earthquake. From Wave 1 to Wave 2, rates of probable depression fell for both bereaved (65.8% to 44.5%) and nonbereaved parents (34.3% to 20.0%). The depression index of both groups also decreased, but only significantly among bereaved parents. Of bereaved parents, those with fewer years of education had more severe symptoms at both waves. Depressive symptom severity of bereaved mothers improved over time, but that of bereaved fathers remained unchanged. Not becoming pregnant again after the earthquake was significantly linked to worse depressive symptoms in both waves, but this was not significant when age was added to the model. Bereaved parents may need more postearthquake supportive services, with fathers, individuals with fewer years of education, and parents who are not able to become pregnant again after the earthquake being particularly vulnerable.

Substantial evidence indicates that depressive symptoms are among the most common psychological reactions after natural disaster exposure, especially earthquakes (Fullerton & Ursano, 2005; Norris et al., 2002). The rates of probable depression following earthquake exposure range from 13.9% to 32% in children and adolescents (Fan, Liu, Zheng, & Cui, 2010; Kolaitis et al., 2003; Roussos et al., 2005), and from 10.5% to 49.6% in adults (Ehring, Saiqa, & Paul, 2011; Önder et al., 2006; Zhang, Shi, Wang, & Liu, 2011). There appears to be a dose response such that the greater the extent of the damage incurred from the earthquake (e.g., housing damage and property loss), the greater the number of depressive symptoms experienced by victims (Ba olu, Kilic, alciolu, & Livanou, 2004; Fan et al., 2011; Susan & Jannay, 1991). Most of the earthquake literature, however, has neglected the topic of parental bereavement of children, even though compared to nonbereaved parents, bereaved parents are more likely to exhibit depressive reactions following the child's death (Martinson, Davies, & McClowry, 1991; Rogers, Floyd, Seltzer,

Greenberg, & Hong, 2008). Further, the literature on bereavement related to cancer and malignancy also reported similar trends, such that compared to non-bereaved parents, bereaved parents were 1.4 times more likely to suffer from depression (Kreicbergs, Valdimarsdóttir, Onelöv, Henter, & Steineck, 2004). Even 9 years after the child's death from cancer, 22% of bereaved parents still met criteria for clinical depression (McCarthy, Clarke, Ting, Anderson, & Health, 2010).

Prior disaster literature has shown consistent findings of low education conferring a risk for depressive symptoms following earthquakes (Ba olu, alciolu, & Livanou, 2002; Kılıç & Ulusoy, 2003; Kisac, 2006). With regard to gender, inconsistent findings were reported such that some literature found compared to male survivors, female survivors showed a higher risk for developing depressive symptoms (Armenian et al., 2002; Sattler et al., 2006; Susan & Jannay, 1991), whereas other studies suggested no gender differences in depressive reactions (Acierno et al., 2007; Martinson, et al., 1991). These studies, however, all used cross-sectional designs and participants were not solely bereaved parents. Thus, longitudinal investigations focused specifically on bereaved parents are needed to identify whether gender and education are stable or unchangeable predictors of depression in this population. Additionally, the course of depressive symptoms of adult earthquake survivors is also unclear. Some reported that adult survivors' depressive symptoms remained unchanged over time (Kisac, 2006; Norris et al., 2007; Watanabe, Okumura, Chiu, & Wakai, 2004), whereas others observed consistent reductions in symptoms (O'Donnell, Creamer, & Pattison, 2004; Udomratn, 2009) or stable symptoms followed by a period of symptom reduction (Ohta et al., 2003). Whether bereaved parents show similar patterns of depression as nonbereaved survivors of earthquakes is unknown and warrants further study.

There are studies (Meert et al., 2011; Rogers et al., 2008) reporting that as compared to the nonbereaved parents, bereaved parents exhibit more depressive symptoms and higher levels of psychological distress. Previous reports suggested that helping bereaved individuals find greater meaning in life may help moderate grief (Keese, Currier, & Neimeyer, 2008). Following the Wenchuan earthquake, local authorities suspended China's single-child family planning policy that has been in effect since the late 1970s, allowing bereaved parents in earthquake areas to bear children (Qin, Luo, Li, Wang, & Li, 2009). The Second West China Hospital in Sichuan province carried out a postearthquake fertility assistance program to help bereaved families without surviving children (Qin et al., 2009). Outside of the natural disaster literature, reported infertility has been linked to an increase in the rates of probable depression in bereaved couples (Torrez, 2011), but to our knowledge, whether reproductive status (i.e., postdisaster pregnancy/postdisaster birth of a child) following earthquakes is a risk factor for depressive symptoms is unclear.

The May 12, 2008, earthquake that struck the Sichuan province had an epicenter in Wenchuan county. Following the earthquake, Xiang'e township, which belongs to Dujiangyan city, was severely hit. In Xiang'e township, 485 people were killed, 327 (67%) of whom were students at Xiang'e Middle School. Ninety-five percent of houses in the township collapsed, and 11 factories suffered from different degrees of damage, all of which nearly paralyzed the township's economy.

Following the earthquake, South China Normal University sent 16 mental health service teams to Dujiangyan city to provide psychological assistance. Two team members lived in Xiang'e township from March 2009 to May 2010 and offered mental services, including to parents bereaved of children in that township. Authors of this study were among service team members embedded in the township and living among its residents. Of note, Xiang'e township had 13 villages, most of which were located in the mountains, and our psychological assistance team was the first to serve these residents. Even so, due to limited number of the team members, we could not offer systematic psychotherapy; instead, bereaved parents were encouraged to tell their story. In response, the parents were offered with supportive services.

The identification of factors associated with worsening or lessening depressive symptomatology following natural disasters, as well as establishing patterns of depressive symptoms themselves, may help clinicians better identify individuals in need of treatment and may inform the design and study of public health disaster response strategies. Therefore, this study intended to extend the knowledge on depressive symptoms and correlates of child loss due to the earthquake. We aimed to (a) describe the occurrence, severity, and course of depressive symptoms among bereaved versus nonbereaved parents; (b) examine potential participants among bereaved parents possibly at greater risk for depressive symptoms; and (c) further examine whether individuals categorized as high risk at baseline were still at risk at follow-up.

Method

Participants and Procedures

Participants in the study were parents who lost a child in the May 12, 2008, Wenchuan earthquake, as well as a comparison group who did not lose their child. The inclusion criteria for the latter group were these: (a) exposure to the Wenchuan earthquake, but no child loss; (b) no child loss from other previous disasters or diseases; (c) having lived in the same village or community as the bereaved parents; and (d) having a similar gender, age bracket, educational background, and degree of housing and other property damage as those of the bereaved parents.

The authors, along with a volunteer in the process of advertising the supportive services, posted notices and handed out brochures recruiting for the study. It was made clear that this activity was a nongovernment initiative. The brochures and pamphlets/posters contained the contact details of the psychological assistance team. Those who received the brochures who were willing to get assistance from the service team were offered help. Interviews were conducted following the assistance.

Initial interviews were conducted between October 30, 2009 and November 22, 2009, approximately 18 months after the disaster (Wave 1). According to the list given by the local government, 596 parents lost their children in the earthquake, but the initial sample of participants was 390, as 206 parents left the area following the disaster. Of the 390 parents sought for initial interview, 110 were unavailable, 45 refused to participate, and 31 parents withdrew from the study during the interview. One mother was excluded because of a

history of psychiatric illness. Thus, 203 bereaved parents completed the interview at baseline. Forty parents not bereaved of children were chosen based on the criteria mentioned above, and were visited during the same period. They constituted the comparison group at baseline.

Before the interview, these two groups provided informed consent to participate in initial interviews and follow-up interviews, and were also told that they were free to withdraw from the study at any time. Also, the volunteering nature of the work and the purpose of the interview were introduced at the beginning of an interview, and small gifts such as washing powder were delivered when an interview was finished. All study procedures were reviewed and approved by the Human Research Ethics Committee, South China Normal University.

Follow-up interviews were conducted from May 1, 2010 to May 20, 2010, approximately 2 years after the earthquake (Wave 2). Because of being out of their home, 45 bereaved parents and 5 parents from the comparison group withdrew. Three bereaved parents had newly conceived children and were excluded from data analysis for consistency. Thus, the final groups were 155 and 35, respectively. For bereaved parents, it was found that the respondents who did not participate in Wave 2 ($n = 48$, $M = 0.54$, $SD = 0.11$) and those who did ($n = 155$, $M = 0.53$, $SD = 0.09$) had similar scores on the depression index (see below), hence the dropouts did not affect the overall results, $t(202) = 0.10$, ns , Cohen's $d = 0.05$.

The 18-month and 24-month assessment periods were chosen for two reasons. First, most of the bereaved parents were reluctant to talk about topics on their current life, let alone sensitive issues such as their deceased children, prior to 18 months following the disaster. Second, 17 parents who became pregnant again in Wave 1 successfully gave birth in Wave 2, and the majority of the bereaved parents moved from temporary housing (e.g., boarding rooms, wood sheds) to new residential buildings. It was hypothesized that these two positive life events might provide opportunities to observe positive changes in depressive symptoms.

The age range for bereaved parents was 26 to 47 years ($M = 38.7$, $SD = 3.5$) with a median age of 36.5 years, 42 were father/mother dyads in the same households. For the comparison group, the age range was 26 to 47 years ($M = 39.6$, $SD = 5.6$), two were father/mother dyads in the same households. The other demographic and earthquake-related information can be seen in Table 1. No significant differences were found in the distribution of age or other demographic and earthquake-related variables between the groups.

Measures

Interviews were conducted using the Zung Self-Rating Depression Scale (SDS). The SDS is a 20-item self-rating scale with four rating points ranging from 1 = *never* to 4 = *regularly*. The possible values for SDS scores range from 20 to 80, and a depression index—that ranges from 0 to 1—can be computed by summing all items and dividing by 80. The Chinese version of the SDS was modified by Liang Shu in 1999, and has been widely applied throughout China (Shu, 1999). As found in Shu (1999), 0.50 can be taken as a cutoff point for depression index. In this study, internal consistency (Cronbach's α) in Wave 1 and Wave 2 were .66 and .74, respectively, which is above the acceptable level. The Pearson correlation between two waves was .36 ($p < .001$).

Demographic and earthquake exposure data were obtained by asking participants about gender (0 = *males*, 1 = *females*), age (years), years of education (0 = *less than or equal to 5 years*, 1 = *more than 5 years*), whether they had been pregnant again or reproductive (0 = *yes*, 1 = *no*), degree of damage from housing collapse (0 = *none or mild*, 1 = *severe*), and degree of damage to other property (0 = *none or mild*, 1 = *severe*).

Data Analysis

To compare sample characteristics of the bereaved group and the comparison group, we used χ^2 tests. Pairwise *t* tests were employed to examine changes over time of probable depression. A one-way repeated analysis of variance (ANOVA) model and a one-way repeated analysis of covariance (ANCOVA) model were employed to examine change over time in the depression index of each participant from the bereaved group. Gender, age, education years, reproductive status, house collapse, and property loss were used as between-subject variables, respectively, with time as a within-subject factor and depression index as the dependent variable. All analyses were performed using the Statistical Package for Social Science (SPSS) 17.0.

Results

In Wave 1, the rates of probable depression of the bereaved group and comparison group were 65.8% (102 parents) and 34.3% (12 parents), respectively, $\chi^2(1, N = 190) = 23.94, p < .001$. In Wave 2, the rates fell to 44.5% (69 parents) and 20.0% (7 parents), respectively, $\chi^2(1, N = 190) = 11.26, p < .001$.

The mean depression index of the bereaved group fell significantly from Wave 1 ($M = 0.53, SD = 0.09$) to Wave 2 ($M = 0.50, SD = 0.09$), $t(153) = 3.89, p < .001$. The mean depression index, however, of the comparison group also fell from Wave 1 ($M = 0.48, SD = 0.08$) to Wave 2 ($M = 0.45, SD = 0.10$), but the decrease was not significant, $t(33) = 1.83, p > .05$.

We found that the main effect of gender was not significant ($F < 1$), while that of time was significant, $F(1, 150) = 6.51, p = .012$, partial $\eta^2 = .041$, which was qualified by a significant Gender $\times$ Time interaction, $F(1, 150) = 5.44, p = .021$, partial $\eta^2 = .034$. Planned contrast analyses suggested that from Wave 1 to Wave 2 the depression index of males remained unchanged, $F < 1$, while that of females decreased significantly, $F(1, 306) = 13.00, p < .001$. Further, the main effect of education— $F(1, 150) = 8.49, p = .004$, partial $\eta^2 = .053$ —and time— $F(1, 150) = 13.17, p < .001$, partial $\eta^2 = .079$ —were both significant, but their interaction was not. The main effect of reproductive status— $F(1, 150) = 5.37, p = .022$, partial $\eta^2 = .034$ —and time— $F(1, 150) = 14.99, p < .001$, partial $\eta^2 = .089$ —were both significant, but their interaction was not. Because it is less likely for elderly women to conceive as compared to young women, age was added to the model when examining changes in the depression index of parents with different reproductive status. With age in the model, the main effect of time and reproductive status as well as their interaction were all not significant. Additionally, neither the main effect nor the interaction of house collapse or property loss was significant.

Discussion

Among 155 bereaved and 35 nonbereaved parents who survived the May 12, 2008, earthquake in China's Xiang'e township, nearly 66% ($n = 102$) of parents exceeded the selected cut score for probable depression at 18 months following the disaster (Wave 1) and the figure was nearly 45% ($n = 69$) at 24 months following the disaster (Wave 2). Rates of depression were significantly higher among bereaved parents than among nonbereaved parents, which was consistent with the bereavement literature (Kreicbergs et al., 2004; McCarthy et al., 2010; Rogers et al., 2008), as well as the literature on other earthquake disasters (Ehring et al., 2011; Fan, et al., 2010; Önder et al., 2006). Rates of probable depression in the current study were somewhat higher than those reported in previous earthquake studies (Kolaitis et al., 2003; Roussos et al., 2005), which might be explained by the differences in earthquake magnitude, instruments, survey time, sample characteristics, and culture. Furthermore, participants in this study endured traumas related to both the earthquake itself as well as the trauma of losing their only child, which could increase the likelihood of depressed mood and symptoms.

Longitudinally, rates of probable depression in bereaved and nonbereaved parents in this sample fell by nearly 20%. This is consistent with some previous reports (O'Donnell et al., 2004; Udomratn, 2009), but inconsistent with other scholars' findings (Kisac, 2006; Norris, et al., 2007; Watanabe et al., 2004). The decrease of probable depressive rates may be explained by social support. First, in Wave 1, the majority of villagers had limited community interaction and support because they lived in isolated mountain homes. In Wave 2, however, they could move into consolidated buildings and participate in community activities to develop a social support system. Second, from Wave 1 to Wave 2, 17 of the 23 pregnant couples experienced childbirth, and the remaining 6 pregnant couples also prepared to give birth. These parents gained more care and support from their families, neighbors, and relatives after reproduction and pregnancy. Therefore, new living conditions and newborns may have a strong link with social support in the present study, as social support is a protective factor for depression (Armenian et al., 2002; Watanabe et al., 2004).

This study contributes to three new pieces of evidence about bereaved parents following earthquake disasters and changes in depressive symptoms over time. First, unlike most of the literature on natural disasters (Ba olu et al., 2002; Sattler et al., 2006), we did not find that females were at a greater risk for developing probable depression, which added support to previous reports (Acierno et al., 2007; Martinson et al., 1991). We found, however, that depressive symptoms of females were more severe only in Wave 1, but not in Wave 2. This was further confirmed by a significant time by gender interaction, which indicated that depressive symptoms of bereaved mothers improved over time whereas that of bereaved fathers remained unchanged. These different trajectories could be related to gender-specific factors, such as reproduction (e.g., healing effects of pregnancy and childbirth for bereaved mothers).

Second, before partialling age's influence on the depression index, parents who neither became pregnant again nor gave birth to another child showed more severe depressive symptoms than their counterparts. A possible explanation is that witnessing the successful

pregnancy or reproduction of other bereaved couples in the same township may have increased their perceptions of inability to have a child, potentially worsening their grief and contributing to a sense of hopelessness. After accounting for the influence of age, however, no significant difference was found among parents with different reproductive statuses. The results suggest that initial findings may have been attributable to younger age, as older parents may have had lower expectations about bearing more children. Altogether, the above findings not only enrich the previous finding that infertility is a risk factor for depressive symptoms (Torrez, 2011), but also suggests that age might be a mediator between the reproductive status and the depression index of bereaved parents following the earthquake.

The third core finding concerns education and earthquake exposures. In both waves, compared to individuals with more education years, individuals with fewer education years were more likely to develop depressive symptoms, and their depressive symptoms were more severe. This finding is consistent with and also extends findings of prior earthquake-related literature (Ba olu et al., 2002; Kılıç & Ulusoy, 2003; Kisac, 2006), which suggests that low education was a relatively unchanged risk factor for depressive symptoms. Furthermore, differences in the extent of housing collapse and damage of other property had no significant association with severity of depressive symptoms. This is inconsistent with reports of past literature on natural disasters (Ba olu et al., 2004; Fan et al., 2011; Norris et al., 2002). One reason may be that although participants in our sample lost both their housing/property and their children, the trauma caused by child loss likely superseded the trauma resulting from loss of housing and property. Second, the participants in this study reported that the Post-earthquake Rebuild Program successfully assisted them with housing and property issues, which may have helped reduce their worries about financial expenditures in building a new house. Additionally, bereaved families received “consolation money” to purchase new furniture and restore their homes. Taken together, these factors may explain why housing and property damage did not cause a significant toll on depressive symptoms.

There are some specific limitations that should be noted when interpreting these important findings. They include small sample size of the comparison group (to avoid Type I error, many of the analyses are limited only to the bereaved group), a lack of data on levels of depression before the earthquake, and a lack of identification of other depression-related risk factors (e.g., death of a friend/family member, previous trauma, etc.).

Despite these brief limitations, our findings are important for better understanding postearthquake psychopathology (e.g., individual susceptibility) and how mental health response interventions can best be developed and applied. Concerning bereaved parents, fathers may be an underrecognized and underserved population in terms of psychological support and services, and interventions to specifically help bereaved fathers cope with depression may be warranted. Lower education was related to poor postearthquake response in this study. Although this finding may be reflective of disparities in socioeconomic status, there may be cognitive factors related to education level that underscore these findings. For instance, it may be that individuals with fewer years of education experience differences in locus of control than individuals with more education (e.g., believing that one has little control over negative events that occur to them) or that they utilize different cognitive

strategies that could impact presence of depressive symptoms (e.g., they may be more likely to use negative thinking, catastrophizing thoughts, and faulty attributions in response to disaster). As such, targeted interventions may assist individuals with lower education by helping them develop more adaptive and effective cognitive skills to reduce depression (e.g., thought reframing, reducing cognitive distortions, increasing internal locus of control).

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Table 1

Demographic and Earthquake Exposure Characteristics of Study Groups

Variables	Bereaved (<i>n</i> = 155)		Not bereaved (<i>n</i> = 35)	
	<i>n</i>	%	<i>n</i>	%
Gender				
Male	44	28.4	12	34.3
Female	111	71.6	23	65.7
Age (years)				
26–37	63	40.6	13	37.1
38–47	92	59.4	22	62.9
Education years				
5	100	64.5	22	62.9
>5	55	35.5	13	37.1
Pregnancy again or reproduction ^a				
Yes	79	51.0	–	–
House collapse				
None/mild	37	23.9	6	17.1
Severe	118	76.1	29	82.9
Property loss				
None/mild	30	19.4	8	22.9
Severe	125	80.6	27	77.1

^a Parents not bereaved of their child in earthquake areas were not allowed to bear an additional child.