Social support mobilization and deterioration after Mexico's 1999 flood: Effects of context, gender, and time

By: Fran H. Norris, Charlene K. Baker, Arthur D. Murphy, and Krzysztof Kaniasty

Abstract:

Samples of adults representative of Teziutlán, Puebla, and Villahermosa, Tobasco, were interviewed 6, 12, 18, and 24 months after the devastating 1999 flood and mudslides. The interview contained multiple measures of social support that had been normed for Mexico. Comparisons between sample data and population norms suggested minimal mobilization of received support and substantial deterioration of perceived support and social embeddedness. Social support was lowest in Teziutlán, which had experienced mass casualties and displacement, and among women and persons of lower educational attainment. Disparities according to gender, context, and education grew larger as time passed. The results provide compelling evidence that the international health community must be mindful of social as well as psychological functioning when disasters strike the developing world.

Keywords: disaster | social support | gender differences | Mexico | longitudinal studies

Article:

Excluding droughts and war, there are almost 500 incidents annually, worldwide, that meet the Red Cross' definition of a disaster (International Federation of Red Cross and Red Crescent Societies, 1999). Across these events, 50,000 people die, an additional 74,000 are seriously injured, 5 million are displaced from their homes, and over 80 million are affected in some way. Whether natural in origin or human-caused, disasters damage local infrastructures and strain the ability of local systems to meet the population's basic needs. For the survivors, disasters may engender an array of stressors, including threat to one's life and physical integrity, exposure to the dead and dying, bereavement, profound loss, social and community disruption, and ongoing hardship. Numerous studies have documented that disaster survivors suffer from a variety of

psychological problems, physical health problems, chronic problems in living, and resource loss (see Norris et al., 2002, for a comprehensive review).

Despite the salience and significance of recent disasters in the United States, overall, disasters have been more likely to strike developing countries (De Girolamo & McFarlane, 1996; Quarantelli, 1994). Disasters in developing countries are often quite severe in their impact, and survivors seldom have access to the high levels of financial and psychological assistance that disaster victims in the United States receive. Thus it is perhaps not surprising that previous research suggests that natural disasters are especially likely to engender posttraumatic stress and psychological distress when they occur in the developing world, which includes but is not limited to Latin America (e.g., Caldera, Palma, Penayo, & Kullgren, 2001; de la Fuente, 1990; Durkin, 1993; Goenjian et al., 2001; Lima et al., 1990; Lima, Pai, Santacruz, & Lozano, 1991; Norris, Murphy, Baker, & Perilla, 2004; Norris, Perilla, Ibañez, & Murphy, 2001). In fact, disaster location (United States, other developed country, developing country) was a stronger predictor of sample-level impact than either disaster type (mass violence, natural, technological) or sample type (child, adult, rescue/recovery) in Norris et al.'s (2002) review. Yet, studies of disasters in developing countries compose only a small fraction (14%) of published studies and, when desirable study characteristics, such as representative samples, standardized measures, and longitudinal designs, are taken into account, the numbers become exceedingly few.

This study examined an event that appeared to be like many that occur in Latin America, the 1999 Mexican flood. In October 1999, a stationary tropical depression in the Gulf of Campeche generated torrential rains, widespread flooding, and devastating mudslides in nine Mexican states. More than 400 people died, and at least 200,000 people lost their homes. Officials in Mexico characterized this event as the worst flooding disaster of the decade, if not of the century. To capture the variability in the way this event was experienced, we studied two different communities: Villahermosa, the capital of the coastal state of Tobasco, population 500,000, and Teziutlán, a mountain city in the state of Puebla, population 180,000. These communities anchored the geographic range of the disaster. The extent and duration of the flooding were actually worse in Villahermosa, but the sudden and unexpected mudslides in Teziutlán caused dramatic losses, bereavement, trauma, and universal displacement. The severity of this event made it an important and relevant context for studying the social and psychological consequences of disasters in Latin America.

One of the primary aims of our study was thus to examine the effects of this major disaster on social functioning, as manifest in perceived social support and social embeddedness. Social support refers to social interactions that provide individuals with actual assistance and embed them into a web of social relationships perceived to be loving, caring, and readily available in times of need. This general definition points to three major facets of social support: *social embeddedness* (quantity and types of relationships with others), *received support* (actual receipt of help), and *perceived support* (the belief that help would be available if needed) (Barrera, 1986). In a nutshell, *perceived support* refers to helping behavior that *might* happen, *received support* refers to helping behavior that *does* happen, and *social embeddedness* represents the most basic structural component from which these functional components emerge.

In urban Latin America, the role of social networks in protecting vulnerable populations has been much debated since Lewis (1952, 1958) first described a "culture of poverty" among the urban poor in which mutual support networks played an important role. Gonzalez de la Rocha (1991), Lomnitz (1977), Reyes Morales (1994), and Velez-Ibañez (1983) have all described how the Mexican poor use family and other close relationships to mobilize resources in their struggles to overcome some of the vicissitudes inherent in poverty and political disenfranchisement. Others (Lloyd, 1980; Morris, 1991, Schmink, 1984) have found exchange and social support among friends and relatives to be less common or more limited in scope and duration. However, altogether, the anthropological literature indicates that, in Mexico, among all classes, social networks are critical to the development of a sense of community and well-being (Greenberg, 1989; Murphy & Stepick, 1991; Nutini, 1968).

Likewise, numerous studies have found that social support is a powerful protective factor in the aftermath of trauma (see Brewin, Andrews, & Valentine, 2000, for a review). However, it is complicated after disasters. Initially, at least typically, there is a strong *mobilization* of helping behavior (in the domain of received social support; Kaniasty & Norris, 1995) but later there is often a *deterioration* of perceived social support and social embeddedness (Arata, Picou, Johnson, & McNally, 2000; Bland et al., 1997; Harvey et al., 1995; Kaniasty & Norris, 1993; Norris & Kaniasty, 1996; Palinkas, Downs, Petterson, & Russell, 1993; Solomon, Bravo, Rubio-Stipec, & Canino, 1993).Many things can lead to postdisaster declines in social support and social functioning (see Kaniasty & Norris, 2004, for a recent review). Because disasters affect entire indigenous networks, the need for support may simply exceed its availability, causing expectations of support to be violated. Relocation and job loss—and even death following the most severe events—remove important others from victims' supportive environments. Disaster victims often abandon routine social activities, leaving fewer opportunities for companionship and leisure. Social networks become saturated with stories of and feelings about the event and may escape interacting. Whereas victims want and need to be listened to, they and others in their social environments may not necessarily wish to be the listeners. Physical fatigue, emotional irritability, and scarcity of resources increase the potential for interpersonal conflicts and social withdrawal. Thus, fairly soon, mutual helping and cohesion yield to conflict and disharmony; the mobilization of support yields to deterioration of support. Eventually, however, it is assumed that perceptions of social support "bounce back" to pre-event levels as the community and individuals recover.

The deterioration of social support appears to occur at multiple levels ranging from intimate dyads to family and friendship networks to entire communities (Cohan & Cole, 2002; Gleser, Green, & Winget, 1981; McFarlane, Policansky, & Irwin, 1987). The trauma experienced by disaster survivors has two facets, *individual trauma*, the personal impact of the disaster, and *collective trauma*, the impairment of the prevailing sense of community (Erikson, 1976). In Kaniasty and Norris's (1993) 10-county study of the Kentucky floods, personal loss (individual-level severity of exposure drawn from interview data) was more strongly related to decreases in perceived kin support, but community destruction (county-level severity of exposure drawn from archival data) was more strongly related to decreases in non-kin support and social participation, reflecting a community-wide tendency for residents to feel less positive about and less connected to their social networks. Such findings suggest that when predicting individuals' social support, it is not only their own losses that matter but also the severity of losses and degree of recovery

experienced by the community-at-large. It is reasonable to anticipate that natural disasters involving mass casualties and displacement would be more likely to threaten the functioning of entire networks than would natural disasters characterized primarily by property damage and loss.

Thus, from the outset, we believed that survivors of the 1999 mudslides in Teziutlán were at high risk for deterioration of social support because of the way in which they experienced this event. Families from various *colonias* (neighborhoods) across the city where hills had collapsed were relocated together to a new *colonia* that was isolated from the city as a whole. Families were provided with plots and building materials and moved in one by one over the first few months as they created habitable shelters. The majority of residents lost at least one family member, friend, or acquaintance in the mudslides. For most people, the new community was located far from the homes of family and friends, and the cost of a bus ride into town was the equivalent of 25% of a day's pay. Overall, isolation from, or even loss of, primary attachments was more common than not, making it quite predictable that Teziutlán survivors would find it difficult to feel reliably connected to others.

We also believed it was important to examine whether observed effects of exposure on social support held equally for men and women. The few prior studies on gender differences in levels (rather than effects) of perceived social support have produced mixed results (Andrews, Brewin, & Rose, 2003; Bellman, Forster, Still, & Cooper, 2003; Pretorius, 1996; Prezza &Pacilli, 2002; Turner &Marino, 1994). Whether women and men differ in their postdisaster social functioning has not been studied, to our knowledge, but sex differences in psychological outcomes have been pervasive in disaster research, with women typically faring more poorly than men across a variety of disaster types, disaster locations, and sample types (Norris et al., 2002). Therefore, if the psychological consequences of disasters arise, at least in part, from the social consequences of disasters (Kaniasty & Norris, 1993; Norris & Kaniasty, 1996), it would follow that women in our sample would perceive lower support and embeddedness than would men.

In summary, we undertook this study to examine (a) the social consequences of the 1999 Mexican floods as manifest in perceived social support and social embeddedness and (b) the extent to which these consequences were influenced by context (disaster severity), gender, and time. We hypothesized, first, that Wave 1 sample means (6 months postdisaster) would be below population norms for these variables in Mexico. Second, we hypothesized that Wave 1 levels of perceived support and embeddedness would be lower in Teziutlán than in Villahermosa because of differences in the ways the event was experienced in these two contexts. Third, we hypothesized that Wave 1 levels of perceived support and social embeddedness would be lower among women than among men and furthermore that the effects of individual- and community-level exposure would be greater among women than among men. Finally, we hypothesized that perceived support and social embeddedness would improve over time. At Wave 4, 2 years postevent, we anticipated that means would approach normative values and that context and gender effects would not be found. We also examined the extent to which received support (actual helping behavior) was mobilized at Wave 1 to aid in interpreting the findings on perceived support.[1]

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[1] Both received support and perceived support can be conceptualized along the dimensions of type (emotional, informational, tangible) and source (family, friend, outsider). In this paper, we restrict our focus to the dimension of

As is recommended for investigations in non-Western or developing countries, we conducted a considerable amount of preliminary research on social support in Mexico before undertaking the present study. In an initial qualitative study (Ibañez et al., 2003), survivors of various disasters in Mexico described, in their own words, the reactions, helping, and coping efforts they observed following disasters in their communities. Although both emotional support and tangible support were received, the latter was mentioned far more often. No form of support was mentioned that could be characterized as culture-specific. Many respondents reported conflicts, lack of trust in authorities, fear of looting, and misrepresentations and abuses of aid.

A subsequent quantitative, comparative study (Norris, Murphy, Kaniasty, Coronel-Ortis, & Perilla, 2001) was conducted with Hispanic and non-Hispanic samples of disaster victims from the United States (Hurricane Andrew) and Mexico (Hurricane Paulina). Although levels of social support differed, the structure of social support did not in a series of multi-sample confirmatory factor analyses. Mexicans, like other people, relied primarily on family, followed by other primary support groups such as friends and neighbors. Altogether, the evidence from these preliminary studies established that social support is relevant for, and measurable in, Mexican disaster survivors.

METHODS

Sampling and Interviewing Procedures

Visits to the two selected communities revealed that identical sampling procedures would not be possible. In Villahermosa, the flood damage was extensive, and victims were dispersed across a large sector of the city. The context necessitated a probability sampling design to draw a random sample of adults representative of the afflicted population in purposively selected sectors, which had experienced flood damage. In Teziutlán, the stricken hillside communities were condemned, and all families were relocated to a new community outside of the original city. The size of the community did not necessitate sampling, and all households were included in the sampling frame. Despite the difference in approach, both strategies provided samples that were highly representative of the populations and settings.

The initial interviews were conducted 6 months postdisaster, in April 2000. From affected census tracts in Villahermosa, 653 households were sampled randomly in proportion to the tracts' population sizes. Of the 601 eligible households (non-eligible units were vacant lots or businesses), 530 were successfully contacted and the adult who answered the door was asked to provide a sociodemographic interview about the household. Of these households, 470 agreed to complete this initial interview. One adult resident was then randomly selected from each participating household and asked to participate in an in-depth psychological interview. Of these, 461 completed the psychological interview, for a final Wave 1 response rate of 77% of those assessed as eligible and 87% of those actually contacted. In Villahermosa, 318 or 69% of the Wave 1 participants were women.

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source. The importance of type of postdisaster social support was examined in previous studies of Hurricane Hugo (Kaniasty & Norris, 1995) and Hurricane Andrew (Kaniasty & Norris, 2000).

In Teziutlán, all 235 households provided with plots in the new community were selected and, of these, 209 were successfully contacted. Only one household refused the demographic interview. Of the 208 households that completed the demographic interview, 205 participants completed the psychological interview, for a final response rate of 87% of those eligible and 98% of those actually contacted. In Teziutlán, 133 (65%) of the 205 participants were women. The proportion of women did not differ between the two cities, $\chi^2(1, N = 666) = 1.08$, *ns*.

Attempts were made to reinterview all participants at points 12, 18, and 24 months postdisaster. In Villahermosa, 385 or 84% of the participants completed all four psychological interviews, as did 176 or 86% of the participants in Teziutlán. The proportions of women, 69% in Villahermosa and 67% in Teziutlán, did not change over time.

The proportion of women in the sample was higher than it should have been (55%) according to Mexican census data. Analyses of the sociodemographic data indicated that the bias occurred at the point of selection for the psychological interview, although the reason for this was not clear. This selection was made at the end of the demographic interview, well after the informant had provided the birthdays, birth years, and present residence status of each household member. Fieldwork supervisors reviewed audiotapes of each interview and verified that the interviewer selected the appropriate adult (the one with the most recent birthday) for the psychological interview regardless of who gave the sociodemographic interview or who was home at the time of that initial interview. Analyses of the household demographic data indicated that female participants were quite representative of the larger population of women, but male participants underrepresented younger, lower income, less-educated men. With effect sizes (*d*) in the range of .09 to .12, the magnitude of the bias appeared to be relatively small. The data may be weighted to produce a 55:45 ratio of women to men, but we did not do so for the present analyses because the sex distribution did not differ by city, and sex is included as a predictor in the regression equations.

All interviews were completed by trained, local interviewers in respondents' homes in private. The demographic interviews lasted about 1 hr, and psychological interviews lasted an average of 2 hrs. Demographic and psychological interviews were typically completed on separate days. Study procedures were approved by institutional review boards in the United States and Mexico and were reviewed for adherence to federal (United States) guidelines for conducting research in international settings.

Measures

Sex (male = 0, female = 1) and city (Villahermosa = 0, Teziutlán = 1) were dummy-coded for use in these analyses. *Teziutlán* represents a context—a combination of community-level severity and displacement that cannot be disentangled in our design. Three variables—age, education, and predisaster major depressive disorder (MDD)—were selected as covariates for the present study on the basis of their significant bivariate correlations with social support. Age and education were both measured in years. Predisaster MDD was assessed by using Module E of Version 2.1 of the Composite International Diagnostic Interview (CIDI), developed and translated into Spanish by the World Health Organization (WHO, 1997). The MDD module has been used previously with both Mexicans and Mexican Americans (Vega et al., 1998).

Exposure to the flood and landslides was assessed by four primary questions that asked about: (1) whether respondents had experienced the death of a friend or family member (bereavement); (2) whether they were injured or had experienced an illness as a direct consequence of the flood (injury); (3) whether they felt that they were in danger of losing their lives during the event (life threat); and (4) whether their dwellings were damaged to an extent perceived as *much* or *enormous* (property damage). A summary measure of severity of exposure was scored as the count of affirmative responses to these four items (range 0–4).

Perceived social support was assessed with the 22-item Provisions of Social Relations Scale ($\alpha =$ .92; Turner & Marino, 1994). This scale was influenced by Weiss' (1974) conceptualization of the provisions of social relationships (attachment, social integration, reassurance of worth, reliable alliance, and guidance). It has three subscales: Perceived Partner Support (six items, $\alpha =$ .88), Perceived Family Support (eight items, $\alpha =$ .94), and Perceived Friend Support (eight items, $\alpha =$ .97). Each subscale assesses feelings of closeness, willingness to take time to talk, communication of worth, ability to relax when together, confidence that the source would be there if needed, and the belief that the source has confidence in the respondent. Items were scored on a 5-point scale from *not at all true* to *extremely true*. All participants were administered the family and friend subscales; participants who were married or partnered were also administered the spouse/partner subscale. As described by Turner and Marino, the total score is the mean of applicable subscales.

Social embeddedness was assessed with a 10-item measure derived by the investigators ($\alpha =$ .71) on the basis of earlier measures. Initially open-ended response options were recoded into a 4-point scale (0, 1, 2–3, and 4+). The scale factors into three subscales measuring Household Embeddedness (two items; $\alpha =$ .53; e.g., number of times in a typical week respondent has fun with adults in the household), Family Embeddedness (three items; $\alpha =$ .73; e.g., number of relatives outside the home the respondent enjoys spending time with) and Friend Embeddedness ($\alpha =$ .72; e.g., number of friends the respondent enjoys spending time with; number of times respondent visits with friends in a typical week). To provide a structure analogous to the perceived support scale, Household Embeddedness was scored only for partnered respondents.

Received social support was assessed by using the 36-item Inventory of Postdisaster Social Support ($\alpha =$ .92; Kaniasty & Norris, 2000). The total scale summarizes the emotional, informational, and tangible help received from family (12 items, $\alpha =$ .87), friends (12 items, $\alpha =$ .89), and outsiders (12 items, $\alpha =$ .89) during the past 2 months.

Standardization Procedures

Scores on all social support scales were standardized to values obtained in a sample of 2,509 adults randomly selected from four cities in Mexico, chosen to provide regional diversity (Hermosillo in the north, Guadalajara in the central region, Oaxaca in the south, and Mérida in the Yucatan). Response rates were, respectively, 76, 82, 79, and 70%. The normative study was conducted between 1999 and 2001. As in the disaster study, all persons were interviewed in their homes by trained indigenous interviewers. The proportion of women (64%) in the normative sample was equivalent to the proportion of women in the disaster sample. More detail about the

sampling and assessment procedures used in the normative study may be found in Norris et al. (2003). Raw scores in the disaster sample were standardized by subtracting the normative sample's mean, dividing that result by the normative sample's standard deviation, multiplying that result by 10, and adding 50. In other words, the norm for all measures is 50 with a standard deviation of 10.

RESULTS

Sample Characteristics

After deleting eight individuals who had missing exposure data, the n for the primary analyses was 658. Of these, 446 (68%) were women and 212 (32%) were men. Similar percentages of women (67%, $n = 300$) and men (69%, $n = 147$) were married or partnered (and thus completed the Perceived Partner Support and Household Embeddedness measures as well as the other social support measures). Participants averaged 37 years in age. There were no age differences between groups defined by city and sex. However, having 9 years of education, on average ($SD = 5$), participants in Villahermosa were more highly educated than participants in Teziutlán, who averaged only 6 years of education ($SD = 4$), $t(655) = 7.92$, $p < .001$. Women were more likely than men to have had one or more episodes of major depression prior to the disaster (17% of women vs. 9% of men), $\chi^2(1, N = 658) = 9.70$, $p < .01$.

Severity of Exposure by City and Sex

Table I provides descriptive data about the nature of the two communities' exposure. As expected, victims in Teziutlán were far more likely than victims in Villahermosa to have been bereaved, and they were somewhat more likely to have experienced *much* or *enormous* property damage. Contrary to our expectations, however, victims in Villahermosa were actually more likely than victims in Teziutlán to have been injured (including experiencing physical illness that was directly attributable to the flood), and the two groups were equally likely to have experienced life threat. Summing the four primary stressors indicated that Teziutlán victims were, overall, more highly exposed than were Villahermosa victims. They averaged 2.2 on this count, compared to 1.9 in Villahermosa, $t(656) = 3.17$, $p < .001$. Moreover, it should be recalled that all Teziutlán victims had been relocated, whereas only 3% of Villahermosa victims moved. Residents of Teziutlán also were more likely than residents of Villahermosa to report postdisaster conflicts and network changes.

Table I. Disaster Stressors by City and Sex (%)

Variable	All	By city		By sex	
		Villahermosa	Teziutlán	Men	Women
Bereavement	27.5	12.8	60.0***	31.1	25.8
Injury or illness	49.4	60.9***	23.9	43.9	52.0*
Life threat	70.1	68.9	72.7	63.7	73.1
Much property damage	48.6	44.2	58.5***	44.3	50.7
New conflict(s)	22.6	19.4	29.8**	21.2	23.3
Network change(s)	64.1	60.9	71.2**	67.0	62.8

Note. Higher than counterpart.
*$p < .05$. **$p < .01$. ***$p < .001$.

Women, overall, were more likely than men were to report that their lives had been in danger and that they had been directly injured in the floods or mudslides. Accordingly, women ($M = 2.0$) scored higher than did men ($M = 1.8$) on the summary count of severity of exposure, $t(656) = 2.08$, $p < .05$.

Social Support Mobilization: Comparison of Wave 1 Sample Means to Mexican Norms

All social support measures were scored to have a mean of 50 ($SD = 10$) in the normative sample. At Wave 1, total received support in the combined sample (Teziutlán and Villahermosa) exceeded the Mexican norm ($M = 51.5$, $SD = 11.9$), $t(657) = 3.22$, $p < .001$. The mobilization was confined to help from outsiders ($M = 53.7$, $SD = 12.8$), $t(657) = 7.32$, $p < .001$, as neither help from family ($M = 50.3$, $SD = 11.1$) nor help from friends ($M = 50.4$, $SD = 11.2$) exceeded normative levels, $ts < 1$. In Villahermosa, total received support again exceeded the Mexican norm ($M = 51.8$, $SD = 12.2$), $t(453) = 3.06$, $p < .01$. The effect was significant only with regard to help from outsiders ($M = 52.8$, $SD = 13.0$), $t(453) = 4.67$, $p < .001$. In Teziutlán, total received support did not exceed the Mexican norm ($M = 50.9$, $SD = 11.2$), $t(203) = 1.10$, ns. There was a substantial mobilization of help from outsiders ($M = 55.5$, $SD = 12.3$), $t(203) = 6.36$, $p < .001$, but no mobilization of help from family ($M = 48.8$, $SD = 10.5$), $t(203) = -1.57$, ns, or friends ($M = 49.4$, $SD = 10.8$), $t(203) = -0.79$, ns.

Predicting Social Support Mobilization at Wave 1

A series of multiple regression analyses were conducted to test the independent and interactive effects of exposure/context and sex on received social support. Predictors included in the equation were age, education, predisaster MDD, sex (*male* = 0, *female* = 1), city (*Villahermosa* = 0, *Teziutlán* = 1), severity of exposure, and two interaction terms: City × Sex and Severity of exposure × Sex. Because they were scored as products of mean deviations, these interaction terms were approximately independent of the component measures.

These results can be summarized succinctly: Education was positively associated with help received from family, $\beta = .21$, $p < .001$, friends, $\beta = .19$, $p < .001$, and all sources combined, $\beta = .20$, $p < .001$. It was not predictive of help from outsiders, $\beta = .07$, ns. Severity of exposure was positively associated with help from family, $\beta = .09$, $p < .05$. With education and severity of exposure controlled, residence in Teziutlán predicted help from outsiders, $\beta = .10$, $p < .05$. There were no main effects of sex. One interaction term (severity × sex) approached significance in the prediction of help from outsiders, $\beta = -.07$, $p < .06$. Plotting this interaction showed that severe exposure predicted mobilization of help for men but not for women. Thus, overall, education was a stronger and more consistent predictor of *network* mobilization than was either severity of exposure or city, whereas the reverse was true for outsider support. Sex differences in received support were minimal.

Social Support Deterioration: Comparison of Wave 1 Sample Means to Mexican Norms

Table II shows sample means on perceived social support and social embeddedness. When postdisaster help has not been adequately or equitably mobilized, theory predicts that perceived social support should decline. Although predisaster measures of perceived support and social

embeddedness were unavailable, the same logic implies that, under such conditions, disaster-stricken communities should score lower than other communities on measures of perceived support and social embeddedness. Consistent with this, the sample as a whole scored below norms for Mexico on Wave 1 measures of total perceived support, Perceived Friend Support, Perceived Family Support, total social embeddedness, Friend Embeddedness, and Family Embeddedness. Villahermosa scored below Mexican norms on total perceived support, Perceived Friend Support, total social embeddedness, Friend Embeddedness, and Family Embeddedness. Teziutlán scored below the norms on all measures, often substantially.

Table II. Perceived Support and Social Embeddedness by City and Time

Variable	Wave 1 (*n* = 658)			Wave 4 (*n* = 556)		
	All	**Villahermosa**	**Teziutlán**	**All**	**Villahermosa**	**Teziutlán**
Perceived support all						
M	46.9[a]	48.6[b]	43.0[a]	48.3[a]	50.7	43.1[a]
SD	11.7	11.6	11.1	11.6	10.7	11.8
Friend						
M	46.6[a]	48.1[a]	43.4[a]	47.4[a]	49.5	42.8[a]
SD	11.1	11.1	10.2	11.1	10.7	10.4
Family						
M	48.4[a]	49.5	45.9[a]	50.0	51.2[c]	47.4
SD	12.1	11.5	13.1	10.6	9.9	11.6
Partner						
M	49.3	50.3	46.9[b]	50.2	51.5[c]	47.4[b]
SD	44.6	11.1	12.2	9.8	9.1	10.8
Social embeddedness all						
M	47.5[a]	48.8[b]	44.6[a]	48.6[b]	50.2	45.2[a]
SD	10.2	10.2	9.6	10.8	10.3	10.9
Friend						
M	47.8[a]	48.9[d]	45.2[a]	48.8[b]	50.3	45.5[a]
SD	10.1	10.0	10.0	10.1	9.9	9.9
Family						
M	47.8[a]	48.7[b]	45.7[a]	48.4[a]	49.3[d]	46.6[a]
SD	10.6	10.2	10.7	10.3	10.5	10.6
Household						
M	49.6	50.3	48.1[d]	50.9	51.3	50.0
SD	9.8	9.9	9.4	10.3	10.5	9.9

[a] Below norm, *p* < .001.
[b] Below norm, *p* < .01.
[c] Above norm, *p* < .05.
[d] Below norm, *p* < .05.

Predicting Social Support Deterioration at Wave 1

A series of multiple regression analyses were conducted to test the independent and interactive effects of exposure/context and sex on perceived social support and social embeddedness. Predictors were the same as described for predicting received support. The results of this analysis are summarized in Table III. Of the background variables (age, education, and predisaster MDD), only education was consistently related to social support. Higher education was associated with significantly higher social support on all measures except Perceived Partner Support where the effect was not significant (*p* = .06).

Effects of sex were significant and in the predicted direction for the total scale of perceived support, that is, on average women perceived less support than did men across sources. Effects were in the predicted direction but not significant for subscales of Perceived Friend Support ($p = .07$) and Perceived Partner Support ($p = .06$). Significant effects were also observed for total social embeddedness, and the strongest effect was observed for Friend Embeddedness.

Table III. Multiple Regressions Testing Effects of Exposure and Sex on Social Support at Wave 1 (Final Standardized Betas)

	Set							
	Perceived support				Social embeddedness			
Variable	All	Friend	Family	Partner	All	Friend	Family	Partner
Age	.01	.06	.06	.01	−.04	−.06	.01	−.10*
Education	.28***	.24***	.21***	.10	.37***	.25***	.21***	.24***
Predisaster MDD	−.04	−.01	.02	−.08	.00	.00	.01	.03
Female sex	−.09*	−.07	−.06	−.09	−.11**	−.24***	.04	−.03
Severity of exposure	−.04	−.03	.00	−.08	−.02	−.05	.04	.00
Severity by female sex	−.02	−.01	−.01	−.05	−.01	.00	−.05	−.07
City (Teziutlán)	−.14***	−.13***	−.08*	−.13**	−.08	−.10**	−.08*	−.07
Teziutlán by female sex	−.12***	−.08*	−.08*	−.12**	−.07*	−.06	−.09*	−.14**
Adjusted R^2	.15***	.11***	.05***	.06***	.19***	.17***	.06***	.12***
df	(8,648)	(8,648)	(8,648)	(8,437)	(8,648)	(8,648)	(8,648)	(8,437)

*$p < .05$ (two-tailed test).
**$p < .01$ (two-tailed test).
***$p < .001$ (two-tailed test).
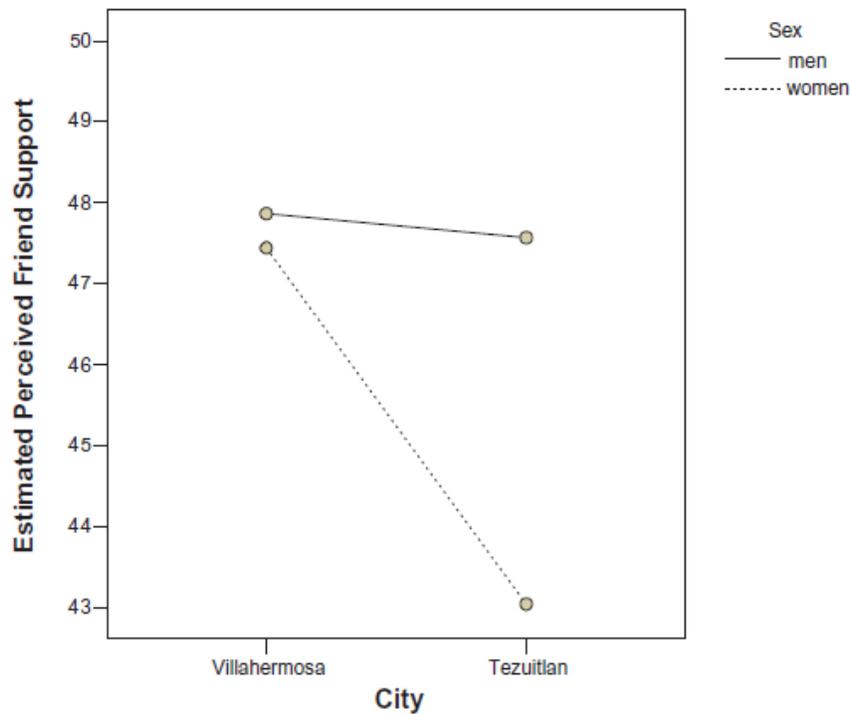
Fig. 1. Perceived friend support at Wave 1 by sex and city with education controlled. The scale is standardized to a population norm of 50 with an *SD* of 10.

Contrary to hypothesis, individual differences in severity of exposure were unrelated to social support. Nor were any interactions between severity of exposure and sex observed. In contrast, community-level differences in social support were quite evident. Even with education controlled, residence in Teziutlán was associated with lower social support on all measures except Household Embeddedness. The additive effects of city and sex predict that Teziutlán women would score lower than all others on social support. Nonetheless, the effects of the interaction between city and sex were statistically significant and in the predicted direction for all measures except Friend Embeddedness, on which a particularly strong main effect of sex had been observed. Thus, in general, Teziutlán women scored even lower than predicted by the additive effects of city and sex.

The form of this relationship is illustrated for Perceived Friend Support in Fig. 1. With other predictors (education) controlled, all groups scored below the population norm of 50. Whereas Villahermosa men and women and Teziutlán men scored in the range of 0.2–0.3 SDs below the norm, Teziutlán women score 0.7 SDs below the norm.

Social Support Recovery: Comparison of Wave 4 Sample Means to Mexican Norms

Of the 658 adults in the Wave 1 analyses, 556 (85%) participated in all four waves of data collection. Wave 4 occurred 2 years post-event. The retention rate did not differ between men (82%) and women (86%) or between Villahermosa (84%) and Teziutlán (86%). In a MANOVA of Wave 1 perceived support and social embeddedness, retention status had neither main effects nor interactive effects with sex, city, or both. In other words, the Wave 4 sample appears to be relatively free of attrition bias, although its smaller size affords less power.

Wave 4 means (Table II) suggest that the two cities differed markedly in their social recovery. In Villahermosa, only Family Embeddedness remained below normative levels, and this effect was small. Moreover, Villahermosa actually exceeded the norms on Perceived Family and Perceived Partner Support. Teziutlán, on the other hand, continued to score below population norms on all measures except Household Embeddedness.

Predicting Social Support Recovery at Wave 4

A series of regression analyses were conducted that predicted social support at Wave 4. The predictors were the same as previously described except for the addition of the Wave 1 measure. Degrees of freedom for these equations were 9,545 (total scales and friend and family subscales) or 9,347 (partner and household subscales). The Wave 1 measure had statistically significant effects in each equation, with βs ranging from .13, $p < .01$, for Household Embeddness (the shortest and least reliable of the measures) to .39, $p < .001$, for Perceived Partner Support. With Wave 1 support or embeddedness controlled, education was associated with later support and embeddedness, with βs ranging from .19 to .28, $p < .001$. Thus not only was lower education initially related to lower social support, it predicted less recovery, meaning that education-related disparities grew larger rather than smaller as time passed.

With Wave 1 support/embeddedness and education controlled, sex was related to Wave 4 Perceived Partner Support, $\beta = -.11$, $p < .05$, total social embeddedness, $\beta = -.08$, $p < .05$, and

Friend Embeddedness, $\beta = -.15$, $p < .001$. In each case, women recovered less completely than did men. The effect for Friend Embeddedness is particularly noteworthy because women had scored substantially below men on this measure at Wave 1 ($\beta = -.24$, $p < .05$; see Table III). Thus, across cities, sex differences worsened rather than lessened over time. Sex did not interact with severity of exposure in any analysis.

Individual differences in severity of exposure were related only to recovery of Perceived Family Support; the more severe the exposure, the less recovery, $\beta = -.10$, $p < .05$. City of residence (Teziutlán), however, continued to exert an effect on total perceived support, $\beta = -.14$, $p < .001$, Perceived Friend Support, $\beta = -.15$, $p < .001$, Perceived Partner Support, $\beta = -.12$, $p < .05$, total social embeddedness, $\beta = -.08$, $p < .05$, and Friend Embeddedness, $\beta = -.11$, $p < .01$.

DISCUSSION

Previous research has established that various facets of social support (received support, perceived support, and social embeddedness) function in various ways to protect disaster victims from various threats to their health and mental health (Norris et al., 2002). In this case, however, comparisons between sample data and population norms suggested there was minimal mobilization of help from family and friends (received support) and substantial deterioration of perceived support and social embeddedness. Six months postevent, this sample, as a whole, scored below norms for Mexico on both perceived support and social embeddedness. Although cause and effect cannot be established by using a nonexperimental design, the hypotheses were drawn from, and results consistent with, the *social support deterioration model* that was proposed and tested by Kaniasty and Norris (1993). The results provide less support for the subsequent *social support deterioration deterrence model* that was proposed and tested by Norris and Kaniasty (1996). In that study, the deterioration effect was found, but it was less severe than it might have been because it was partially offset by the initial mobilization of help. That is, severity of exposure was also related to an initial increase in received support, which served to protect perceived support. It is possible, however, that the overall low level of received support experienced by the victims of the 1999 flood was one contextual factor that contributed to the present sample's unusually low levels of perceived support.

Our study examined the effects of several different potential predictors of postdisaster social support. The lack of effects of predisaster MDD on postdisaster support was interesting in light of prior work suggesting that depression harms an individual's ability to develop and maintain social support networks as well as his or her propensity to perceive these networks as supportive (e.g., Coyne, 1976; Johnson, 1991). Education was the only background variable to show consistent effects: the higher the education, the higher the received support, perceived support, and social embeddedness. The measurement of education as a marker of socioeconomic status has a long history in sociological research in the United States (see Grzywacz, Almeida, Neupert, & Ethner, 2004) and the same is true in Mexico (Murphy & Stepick, 1991). In their study of social support after Hurricane Hugo, Kaniasty, and Norris (1995) found that ethnic minority and less educated persons received less help than did their comparably affected counterparts. Socially and economically disadvantaged groups are frequently too overburdened to provide ample help to other members in time of additional need. "In a sense, the poor in disaster are double victims: they are first of all victims of poverty and that, in turn, adds to the degree of 'victimization' in

disasters" (Bolin, 1982, p. 247). In general, it might be surmised that distribution of help according to the *rule of relative need* (severity of exposure) is an indicator of good community functioning, whereas distribution of help according to the *rule of relative advantage* (status factors) is an indicator of poor community functioning. The latter may help to set the stage for subsequent deterioration of perceived support and social embeddedness.

Gender had both main and interactive effects on postdisaster social support, with women perceiving less social support and embeddedness than men, especially in Teziutlán and especially with regard to friend support. The primary explanation for these findings may be many female victims' displacement and isolation. In Mexico, women's networks tend to be localized within the neighborhood (Gonzalez de la Rocha, 1994). Mexican women are more oriented to the interior, domestic space, whereas Mexican men are more oriented to the exterior, outside the family environment (Vinas, 1998). Thus it is possible that men were better situated to retain sources of support associated with employment outside the immediate *colonia.* Bolin and Stanford (1999) suggested that women are particularly vulnerable to the effects of disaster because of their caregiving roles and relative lack of power and status, and Hoffman (1999) argued that women tend to lose conflicts over scarce resources. These factors may have also contributed to women's lower levels of perceived social support (see also Peacock, Morrow, & Gladwin, 1997).

This study also demonstrated that the same event may have very different consequences when communities experience the event in different ways. Deteroration of support was far more evident in Teziutlán than in Villahermosa. The differences between contexts grew more rather than less pronounced over time, especially as they related to friend connections. A number of factors probably contributed to this, especially the mass casualties and displacement experienced by survivors in Teziutlán. It is noteworthy that the effect of context (Teziutlán v. Villahermosa) showed stronger effects on social support than individual variations in severity of exposure. From an ecological perspective, individuals' social functioning would depend not only on their own losses and resources but on the losses and resources of the community-at-large. Certainly, past research has focused on personal loss, which is the extent to which a given individual has experienced trauma or loss. Most definitions of disaster, however, recognize the broader context in which these losses occur (e.g., Bolin, 1985). Progress in understanding the collective aspects of disaster exposure may rest on making advancements in ecological assessment and analytic strategies that allow us to explore the transactions of individual, family, and community recovery.

Quite relevant to this discussion is the notion of "community resilience" that is emerging as a key concept in the field of public health (Hall, Norwood, Ursano, & Fullerton, 2003; Reissman, Spencer, Tanielian, & Stein, 2005). The concept of resilience — literally meaning to "bounce back" — is not new, but its application to larger systems, such as families, occupational groups, and entire communities, is of relatively recent origin. Community resilience refers to the capacity of a collective to overcome shared trauma or adversity as manifest in social cohesion, mutual support, hope, and the presence of communal narratives that give the experience meaning and purpose (Landau & Saul, 2005). People who have attempted to build community resilience have observed that in times of massive trauma, community resilience is challenged because primary connections are disrupted and resources are strained (Landau & Saul, 2005). A related concept is

communal mastery, defined as the sense that individuals can overcome life challenges and obstacles *through and because of* their being interwoven in a close social network (Hobfoll, Jackson, Hobfoll, Pierce, & Young, 2002). There is clearly more to these notions than social support. Nonetheless, social connectedness is perhaps their most fundamental component.

Before closing, some strengths and shortcomings of our study should be reviewed. Our study had four primary strengths. First, probability sampling strategies coupled with high response and retention rates yielded samples that were representative of two cities that experienced Mexico's 1999 flood in two distinct ways. Second, a longitudinal panel design allowed a rare examination of mobilization, deterioration, and recovery of social resources over time. Third, multiple, reliable measures of social support enabled consideration of its various facets. Finally, the availability of normative data collected from a cross-section of Mexicans facilitated the interpretation of the postdisaster data. Yet the present study's highly quantitative examination is also its greatest shortcoming because it did not capture well the research team's observations of the challenges posed by the decision to relocate Teziutlán survivors to a new settlement that appeared isolated from the city as a whole and lacking in community identity other than residents' shared traumatic loss. Future research needs to capture these community-level experiences and challenges more richly and completely.

Within the limits of its methodology, our results provide compelling evidence that the international health community must be mindful of social as well as psychological consequences when disasters strike developing countries, especially when the events are associated with mass casualties and displacement. Certainly, these findings point to a need to develop both early and ongoing interventions that provide support to disaster victims in a way that is culturally appropriate and feasible for places, like Teziutlán that have few mental health professionals to draw upon. Norris and Alegria (2005) similarly concluded that postdisaster interventions conducted in the context of collectivist cultures should emphasize social, as opposed to psychological, functioning. However, our results make it quite clear that it is not sufficient for *outsiders* to come in and provide this support. Landau and Saul (in press), Harvey (1996), van den Eynde and Veno (1999) and Somasundaram, Norris, Asukai, and Murthy (2003) similarly advocated for postdisaster interventions that foster community competence and ownership of problems and solutions. Solomon (2003, p. 12) summarized this viewpoint well, "Although professionals working in the mental health arena are seldom trained or prepared to work at a broader community level, the scale of these emergences may require abandoning dyadic interventions for those that can be implemented via community action using a public health approach." These initiatives can claim a basis in theory, whether centered specifically on the social support deterioration deterrence model (Norris & Kaniasty, 1996) or more broadly on Hobfoll's (1988) conservation of resources theory. With regard to the conservation of resources, the primary goal of postdisaster interventions is to help people replace valued resources as quickly as possible (Hobfoll & Lilly, 1993). Providing indigenous networks with the resources they need to help one another is (or should be) the primary objective of disaster mental health policy (Somasundaram et al., 2003).

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REFERENCES

Andrews, B., Brewin, C., & Rose, S. (2003). Gender, social support, and PTSD in victims of violent crime. *Journal of Traumatic Stress*, *16,* 421–427.

Arata, C., Picou, J., Johnson, G., & McNally, T. (2000). Coping with technological disaster: An application of the conservation of resources model to Exxon Valdez oil spill. *Jounal of Traumatic Stress*, *13,* 23–29.

Barrera, M. (1986) Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology*, *14,* 413–445.

Bellman, S., Forster, N., Still, L., & Cooper, C. (2003). Gender differences in the use of social support as a moderator of occupational stress. *Stress and Health*, *19,* 45–58.

Bland, S., O'Leary, E., Farinaro, E., Jossa, F., Krogh, V., Violanti, J., et al. (1997). Social network disturbances and psychological distress following earthquake evacuation. *Journal of Nervous and Mental Disease*, *185,* 188–194.

Bolin, R. (1985).Disaster characteristics and psychosocial impacts. In B. Sowder (Ed.), *Disasters and mental health: Selected contemporary perspectives* (pp. 3–28). Rockville, MD: National Institute of Mental Health.

Bolin, R. C. (1982). *Long-term family recovery from disaster*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Bolin, R., & Stanford, L. (1999). Constructing vulnerability in the first world: The Northridge earthquake in southern California, 1994. In A. Oliver-Smith & S. Hoffman (Eds.), *The angry earth: Disaster in anthropological perspective* (pp. 89–112). New York: Routledge.

Brewin, C., Andrews, B., & Valentine, J. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68,* 748–766.

Caldera, T., Palma, L., Penayo, U., & Kullgren, G. (2001). Psychological impact of the Hurricane Mitch in Nicaragua in a one-year perspective. *Social Psychiatry and Psychiatric Epidemiology*, *36,* 108–114.

Cohan, C., & Cole, S. (2002). Life course transitions and natural disaster: Marriage, birth, and divorce following Hurricane Hugo. *Journal of Family Psychology*, *16,* 14–25.

Coyne, J. (1976). Toward an interactional description of depression. *Psychiatry*, *39,* 28–40.

de Girolamo, G., & McFarlane, A. C. (1996). The epidemiology of PTSD: A comprehensive review of the international literature. In A. Marsella, M. Friedman, E. Gerrity, & R. Scurfield (Eds.), *Ethnocultural aspects of posttraumatic stress disorder: Issues, research, and clinical applications* (pp. 33–86). Washington, DC: American Psychological Association.

de la Fuente, R. (1990). The mental health consequences of the 1985 earthquakes in Mexico. *International Journal of Mental Health*, *19,* 21–29.

Durkin, M. (1993). Major depression and posttraumatic stress disorder following the Coalinga (California) and Chile earthquakes: A cross-cultural comparison. In R. Allen (Ed.), *Handbook of disaster interventions* (pp. 405–420). Corte Madera, CA: Select Press.

Erikson, K (1976). Loss of communality at Buffalo Creek. *American Journal of Psychiatry*, *133,* 302–305.

Gleser, G., Green, B., & Winget, C. (1981). *Prolonged psychosocial effects of disaster: A study of Buffalo Creek*. New York: Academic Press.

Goenjian, A., Molina, L., Steinberg, A., Fairbanks, L., Alverez, M., Goenjian, H., et al. (2001). Posttraumatic stress and depressive reactions among Nicaraguan adolescents after Hurricane Mitch. *American Journal of Psychiatry*, *158,* 788–794.

Gonzalez de la Rocha, M. (1991). Family well-being, food consumption, and survival strategies during Mexico's economic crisis. In M. Gonzalez de la Rocha & A. Escobar Latapí, (Eds.), *Social responses to Mexico's economic crisis* (pp. 115– 127). San Diego, CA: Center for U.S.–Mexican Studies.

Gonzalez de la Rocha, M. (1994). *The resources of poverty: Women and survival in a Mexican city.* Cambridge, MA: Blackwell.

Greenberg, J. (1989). *Blood ties: Life and violence in rural Mexico.* Tucson, AZ: University of Arizona Press.

Grzywacz, J.,Almeida,D., Neupert, S.,&Ethner, S. (2004). Socioeconomic status and health: A micro-level analysis of exposure and vulnerability to daily stressors. *Journal of Health and Social Behavior*, *45,* 1–16.

Hall, M., Norwood, A., Ursano, R., & Fullerton, C. (2003). The psychological impacts of bioterrorism. *Biosecurity and Bioterrorism*, *1,* 139–144.

Harvey, J., Stein, S., Olsen, N., Roberts, R., Lutgendorf, S., & Ho, J. (1995). Narratives of loss and recovery from a natural disaster. *Journal of Social Behavior and Personality*, *10,* 313–330.

Harvey, M. (1996). An ecological view of psychological trauma and trauma recovery. *Journal of Traumatic Stress*, *9,* 3–23.

Hobfoll, S., Jackson, A.,Hobfoll, I., Pierce, C., & Young, S. (2002). The impact of communal-mastery versus self-mastery on emotional outcomes during stressful conditions: A prospective study of Native American women. *American Journal of Community Psychology*, *30,* 853-871.

Hobfoll, S. (1988). *The ecology of stress*. Washington, DC: Hemisphere.

Hobfoll, S., & Lilly, R. (1993). Resource conservation as a strategy for community psychology. *American Journal of Community Psychology*, *21,* 128–148.

Hoffman, S. (1999). The regenesis of traditional gender patterns in the wake of disaster. In A. Oliver-Smith & S. Hoffman (Eds.), *The angry earth: Disaster in anthropological perspective* (pp. 173–191). New York: Routledge.

Ibañez, G., Khatchikian, N., Buck, C., Weisshaar, D., Abush-Kirsh, T., Lavizzo, E., et al. (2003). A qualitative analysis of social support and conflict among Mexican and Mexican-American disaster survivors. *Journal of Community Psychology*, *31,* 1–24.

International Federation of Red Cross and Red Crescent Societies. (1999). *World disaster report*. Dordrecht: Martinus Nijhoff.

Johnson, T. (1991). Mental health, social relations, and social selection: A longitudinal analysis. *Journal of Health and Social Behavior*, *32,* 408–423.

Kaniasty, K., & Norris, F. (1993). A test of the support deterioration model in the context of natural disaster. *Journal of Personality and Social Psychology*, *64,* 395–408.

Kaniasty, K., & Norris, F. (1995). In search of altruistic community: Patterns of social support mobilization following Hurricane Hugo. *American Journal of Community Psychology*, *23,* 447–477.

Kaniasty, K., & Norris, F. (2000). Help-seeking comfort and the receipt of help: The roles of context and ethnicity. *American Journal of Community Psychology*, *28,* 545–582.

Kaniasty, K., & Norris, F. (2004). Social support in the aftermath of disasters, catastrophes, and acts of terrorism: Altruistic, overwhelmed, uncertain, antagonistic, and patriotic communities. In R. Ursano, A. Norwood, & C. Fullerton (Eds.), *Bioterrorism: Psychological and public health interventions*. Cambridge: Cambridge University Press.

Landau, J., & Saul, J. (2005). Facilitating family and community resilience in response to major disaster. In F. Walsh & M. McGoldrick (Eds.), *Living beyond loss* (pp. 287–309). New York: Norton.

Lewis, O. (1952). Urbanization without breakdown: A case study. *Scientific Monthly*, *75,* 31–41.

Lewis, O. (1958). The culture of the vecindad in Mexico City: Two case studies. *Actas del XXXIII Congreso Internacional de Americanistas, San Jose*, 387–402.

Lima, B., Santacruz, H., Lozano, J., Chavez, H., Samaniego, N., Pompei, M., et al. (1990). Disasters and mental health: Experience in Columbia and Ecuador and its relevance for primary care in mental health in Latin America. *International Journal of Mental Health*, *19,* 3–20.

Lima, B., Pai, S., Santacruz, H., & Lozano, J. (1991). Psychiatric disorders among poor victims following a major disaster: Armero, Columbia. *Journal of Nervous and Mental Disease*, *179,* 420–427.

Lloyd, P. (1980). *The "young towns" of Lima*. New York: Cambridge University Press.

Lomnitz, L. (1977). *Networks and marginality: Life in a Mexican shantytown*. New York: Academic Press.

McFarlane, A. C., Policansky, S., & Irwin, C. (1987). A longitudinal study of the psychological morbidity in children due to a natural disaster. *Psychological Medicine*, *17,* 727–738.

Morris, E. (1991).Household, kin and nonkin sources of assistance in home building: The case of the city of Oaxaca. *Urban Anthropology*, *20,* 49–65.

Murphy, A., & Stepick, A. (1991). *Social inequality in Oaxaca: A history of resistance and change*. Philadelphia: Temple University Press.

Norris, F., & Alegria, M. (2005). Mental healthcare for ethnic minority individuals and communities in the after math of disasters and mass violence. *CNS Spectrums*, *10,* 132–140.

Norris, F., Friedman, M., Watson, P., Byrne, C., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak. Part I: An empirical review of the empirical literature, 1981–2001. *Psychiatry, 65,* 207–239.

Norris, F., & Kaniasty, K. (1996). Perceived and received social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71,* 499–511.

Norris, F., Murphy, A., Baker, C., & Perilla, J. (2004). Postdisaster PTSD over four waves of a panel study of Mexico's 1999 flood. *Journal of Traumatic Stress*, *17,* 283-292.

Norris, F., Murphy, A., Baker, C., Perilla, J., Gutierrez-Rodriguez, F., & Gutierrez-Rodriguez, J. (2003). Epidemiology of trauma and posttraumatic stress disorder in Mexico. *Journal of Abnormal Psychology*, *112,* 646–656.

Norris, F., Murphy, A., Kaniasty, K., Coronel-Ortis, D., & Perilla, J. (2001). Postdisaster social support in the United States and Mexico: Conceptual and contextual considerations. *Hispanic Journal of Behavioral Science*, *23,* 469–497.

Norris, F., Perilla, J., Ibañez, G., & Murphy, A. (2001). Sex differences in symptoms of posttraumatic stress: Does culture play a role? *Journal of Traumatic Stress*, *14,* 7–28.

Nutini, H. (1968). *San Bernardino Contla: Marriage and family structure in a Tlazcalan municipio*. Pittsburgh: University of Pittsburgh Press.

Palinkas, L., Downs, M., Petterson, J., & Russell, J. (1993). Social, cultural, and psychological impacts of the Exxon Valdez oil spill. *Human Organization*, *52,* 1–13.

Peacock, W.,Morrow, B.,&Gladwin, H. (Eds.). (1997). *Hurricane Andrew: Ethnicity, gender, and the sociology of disasters*. New York: Routledge.

Pretorius, T. (1996). Gender and the health-sustaining and stress-reducing functions of social support: A South Africa study. *Journal of Social Behavior and Personality*, *11,* 193–208.

Prezza, M., & Pacilli, M. (2002). Perceived social support from significant others, family and friends and several sociodemographic characteristics. *Journal of Community and Applied Social Psychology*, *12,* 422–429.

Quarantelli, E. (1994). *Future disaster trends and policy implications for developing countries*. Newark, DE: Disaster Research Center.

Reissman, D., Spencer, S., Tanielian, T., & Stein, B. (in press). Integrating behavioral aspects into community preparedness and response systems. In Y. Danieli and D. Brom (Eds.), *The trauma of terror: Sharing knowledge and shared care* (pp. 707–720). New York: Haworth Press.

Reyes Morales, R. (1994). *Condicionantes del bienestar en los hogares pobres de Oaxaca*, Doctoral thesis. Oaxaca, MX: Instituto Tecnológico de Oaxaca.

Schmink, M. (1984). Household economic strategies: Review and research agenda. *Latin American Research Review*, *19,* 87–101.

Solomon, S. (2003). Introduction. In B. Green, M. Friedman, J. De Jong, S. Solomon, T. Keane, J. Fairbank, B. Donelan, & E. Frey-Wouters. (Eds.), *Trauma in war and peace: Prevention, practice, and policy* (pp. 3–16). New York: Kluwer Academic/Plenum Publishers.

Solomon, S., Bravo, M., Rubio-Stipec, M., & Canino, G. (1993). Effect of family role on response to disaster. *Journal of Traumatic Stress*, *6,* 255–269.

Somasundaram, D., Norris, F., Asukai, N, & Murthy, R. (2003). Natural and technological disasters. In B. L. Green, M. Friedman, J. de Jong, S. D. Solomon, T. Keane, J. Fairbank, B.

Donelan, & E. Frey-Wouters. (Eds.), *Trauma in war and Peace: Prevention, practice, and policy* (pp. 291–318). New York: Kluwer Academic/Plenum Publishers.

Turner, R., & Marino, F. (1994). Social support and social structure: A descriptive epidemiology. *Journal of Health and Social Behavior*, *35,* 193–212.

Van den Eynde, J., & Veno, A. (1999). Coping with disastrous events: An empowerment model of community healing. In R. Gist & B. Lubin (Eds.), *Response to disaster: Psychosocial, community, and ecological approaches*. Philadelphia, PA: Bruner/Mazel.

Vega, W., Kolody, B., Aguilar-Gaxiola, S., Alderette, E., Catalano, R., & Caraveo-Anduaga, J. (1998). Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. *Archives of General Psychiatry*, *55,* 771–778.

Velez-Ibañez, C. (1983). *Bonds of mutual trust: The cultural systems of rotating credit associations among urban Mexicans and Chicanos*. New Brunswick, NJ: Rutgers University Press.

Vinas, C. (1998). Women's disaster vulnerability and response to the Colima Earthquake. In E. Enarson & B. Morrow (Eds.), *The gendered terrain of disaster: Through women's eyes* (pp. 173–180).Westport, CT: Preaeger.

Weiss, R. (1974). The provisions of social relationship. In Z. Rubin (Ed.), *Doing unto others.* Englewood Cliff, NJ: Prentice Hall.

World Health Organization. (1997). *Composite International Diagnostic Interview (CIDI), Version 2.1*. Geneva, Switzerland: Author.