



Natural Hazards Research and Applications Information Center
University of Colorado
482 UCB
Boulder, CO 80309-0482

Quick Response Report #160

El Salvador Earthquakes: Resource Loss, Traumatic Event Exposure, and Psychological Functioning

David N. Sattler

Department of Psychology
Center for Cross-Cultural Research
Western Washington University
Bellingham, WA 98225-9089

E-mail: David.Sattler@wwu.edu

2002

 **[Return to the Hazards Center Home Page](#)**

 **[Return to the Quick Response Report Index](#)**

This material is based upon work supported by the National Science Foundation under Grant No. CMS-0080977. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation or the Natural Hazards Research and Applications Information Center.

Citation: David N. Sattler. 2002. El Salvador Earthquakes: Resource Loss, Traumatic Event Exposure, and Psychological Functioning. Quick Response Research Report #160. Boulder, Colorado: Natural Hazards Research and Applications Information Center, University of Colorado. URL:
<http://www.colorado.edu/hazards/qr/qr160/qr160.html>

INTRODUCTION

During the first two months of 2001, El Salvador was struck by a series of powerful earthquakes. On January 13, at 11:33 a.m., an earthquake with a magnitude of 7.6 on the Richter scale struck the Central American country. As a result of the earthquake, 844 persons were killed, 4,723 persons were injured, 108,226 homes were destroyed, and 169,632 homes were damaged (USAID, 2002). The shaking created numerous landslides, including the collapse of a 1,500 foot wall of dirt that poured down over homes in the Las Colinas neighborhood of Santa Tecla, a town approximately 15 miles from the country's capital, San Salvador. Thousands of aftershocks-several registering more than 5.0 in magnitude-continued daily for weeks.

Exactly one month later, on February 13, at 8:22 a.m., a 6.6 magnitude earthquake struck. At that time, recovery efforts after the first earthquake were underway and some persons lost in that earthquake remained unaccounted for. Buildings that had been weakened as a result of the previous earthquake either collapsed or experienced additional damage. Many communities suffered severe damage, including the town of San Vicente. As a result of this second earthquake, 315 persons were killed, 3,399 persons were injured, 41,302 homes were destroyed, and 15,706 homes were damaged (USAID, 2002). Aftershocks continued daily for several weeks. Four weeks later, a 5.9 magnitude earthquake struck.

El Salvador's National Emergency Committee reports that the earthquakes affected 1,582,428 of the six million persons in El Salvador (whose size is comparable to Massachusetts, United States), left more than one hundred thousand persons homeless, and left tens of thousands without jobs. Thousands of landslides damaged roads and utilities (USGS National Earthquake Information Center, 2001). Damage estimates were close to \$3 billion (USAID, 2002).

Unfortunately, these devastating earthquakes follow in the wake of other disasters and catastrophic stressors. For example, between 1981 and 1992, El Salvador endured a grueling civil war. In 1986, a devastating earthquake struck. In 1998, Hurricane Mitch created devastating floods and landslides in the northeast portion of El Salvador, as well as in Nicaragua and Honduras. Because of its proximity to fault lines, volcanoes, and hurricanes, the country is at risk of continued natural disasters. Following the recent earthquakes, one survivor is quoted as saying, "First we had the war. Then Mitch. Then the earthquakes. What is going to happen next...the end of the world?" (Gonzalez, 2001).

There is a limited amount of research examining psychological responses to disasters in countries other than the United States (Green, 1996; Sattler et al., 2002). This is due, in part, to a number of substantial hurdles in conducting this type of research. Often times it can be difficult to gain access to and travel within the disaster site, and to locate and recruit survivors to participate. For researchers who do not speak the language of the country and/or who are unfamiliar with the country, additional challenges include communicating in a foreign language and translating questionnaire materials into the primary language of the country.

This project was guided by the conservation of resources stress theory (Hobfoll, 1989; 1998). The theory suggests that people build and retain resources to enhance the self and maximize positive reinforcement. The theory predicts that psychological stress occurs when there is a *threat* of resource loss, *loss* of resources, or *lack of resource* gain following investment of resources (Hobfoll, 1989). Four resource types are identified: condition (e.g., marriage, employment, or other social roles), personal characteristic (e.g., age, knowledge, locus of control, self-esteem, skills), energy (e.g., money, insurance), and object (e.g., house, car, or other physical possessions). The theory also predicts that, in time, people may experience resource gains or positive outcomes. For example, survivors may learn about the value of preparation, learn new coping skills, and develop an enhanced sense of self-efficacy (Hobfoll, Dunahoo, & Monnier, 1995; Kaiser, Sattler, Bellack, & Dersin, 1996; Sattler, Kaiser, & Hittner, 2000). This study examined the role of each of these resource types in contributing to psychological distress.

Sattler, Preston, Kaiser, Olivera, Valdez, and Schlueter (2002) examined the conservation of resources stress theory four weeks after Hurricane Georges struck the U. S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States. They found that persons in locations that experienced the strongest wind (viz., Puerto Rico, Dominican Republic) experienced higher levels of distress but also reported more damage. Further, resource loss (especially personal characteristic resources) and low social support made significant contributions to psychological distress in each location. In another study, Lima, Hernan, Lozano, Chavez, Samaniego, Pompei, and Pai (1990) examined

psychological distress following the eruption of a volcano in Colombia and an earthquake in Ecuador. They found that the types of distress symptoms experienced by survivors, including anxiety and depression, were similar regardless of disaster.

The present project examined psychological functioning four weeks after the second earthquake. Of special interest was the prevalence of symptoms associated with acute stress disorder—a psychological reaction that may develop during the acute period following a life-threatening event in which the person responds with intense fear, helplessness, or horror (American Psychiatric Association, 1994)—and variables associated with these distress symptoms. The situation in El Salvador was especially unique in that serious life threats due to multiple earthquakes were prolonged for over two months. Reports in the San Salvador media suggested the reoccurring earthquakes were creating extreme concern and distress.

METHOD

Participants

The participants were 253 (89 men, 164 women) students at the University of El Salvador in San Salvador. The average age was 23.31 years ($SD = 5.22$), and most participants were single (89%) and lived with about five other persons ($M = 4.98$, $SD = 1.80$). Participants lived in their city for an average of 19 years ($SD = 6.83$). Most participants had been through another natural disaster (66%) and indicated that they were moderately to very religious (74%).

Materials

A cover letter attached to the anonymous and confidential questionnaire described the purposes of the study. The first section of the questionnaire asked about demographic characteristics (9 items), number of days without services such as electricity, water, and telephone (3 items), injury to self and relatives during the earthquake and clean-up (2 items), property damage (2 items), number of days before returning to school or work (1 item), and religiosity (1 item). Participants checked one of several possible choices that best reflected their experience or wrote in a number to indicate their answers.

The second section measured resource losses as a result of the earthquake. The 24 items were adapted from Freedy et al. (1994) and Sattler et al. (2002) and asked about loss of object resources (e.g., food, money for living expenses, sentimental possessions), condition resources (e.g., family stability, stable employment, companionship), personal characteristic resources (e.g., sense of optimism, sense of humor, feeling that you have control over your life, feeling that your life has purpose), and energy resources (e.g., time for adequate sleep, free time, motivation to get things done; see Table 4). Participants used a 4-point scale (1 = no loss to 4 = extensive loss) to indicate their answers.

The third section assessed symptoms associated with acute stress disorder and depression. The acute stress disorder symptoms measure was developed by David Sattler and Charles Kaiser, and has been successfully used in Spanish and English speaking countries (Sattler et al., 2002; see Table 2). The depression measure included 15 items from the short-form of the Multiscore Depression Inventory (Berndt, 1986). Examples include, "I usually feel lively and full of energy," "My thoughts are often mixed up," "I often feel guilty," and "My future for the most part looks good." Participants used a 4-point scale (1 = not at all to 4 = quite a bit) to indicate their answers.

The fourth section assessed experiences during the community's recovery, coping, perceptions of aid, social support, and culturally specific responses and symptoms. Items were based on Sattler et al.'s (1995) 22-item measure assessing coping and perceptions of recovery efforts (see Table 3) and Kaniasty and Norris's (1993) social support measure (8 items). Participants used a 4-point scale (1 = not at all to 4 = quite a bit) to indicate their answers.

The fifth section asked participants if they were exposed to any of five traumatic events during their lifetime, and if they had experienced any of three stressful life events in the year prior to completing the questionnaire (see Table 1). Participants used a 2-point no/yes scale to indicate their answers.

Participants completed the questionnaire in Spanish. A version of the committee approach was used to translate the items (van de Vijver & Leung, 1997). First, a Department of Hispanic Studies professor of Spanish at the College of Charleston, South Carolina, translated the questionnaire. To evaluate the translation, another College of Charleston Department of Hispanic Studies professor of Spanish, an advanced student of Spanish from Puerto Rico, and a professor from the Dominican Republic reviewed and edited the questionnaire. Finally, we asked all participants and several professors at universities in Puerto Rico, the Dominican Republic, and El Salvador to assess the readability of the questionnaire. They indicated that the questionnaire was easy to read and understandable. A similar questionnaire in Spanish was successfully used in Puerto Rico and Dominican Republic following Hurricane Georges (Sattler et al., 2002).

Procedure

Four weeks after the second earthquake, the author and a psychology graduate student at Western Washington University traveled to San Salvador, El Salvador. With the assistance of faculty members at the University of El Salvador, the author and the graduate student administered the questionnaires to participants in their classrooms. The questionnaires took about 30 minutes to complete. The response rate was 99%.

RESULTS

Preparation, Property Damage, and Resource Loss

Participants returned to school an average of 24 days ($SD = 20.29$) after the earthquake struck. They were without services for the following number of days: water ($M = 2.61$, $SD = 7.46$), phone: ($M = 1.13$, $SD = 2.86$), electricity: ($M = 1.13$, $SD = 2.50$). Four percent were physically injured and 12% had a relative or friend who was physically injured during the earthquake or clean up. Participants reported minor home damage (42%), followed by no damage (22%), moderate damage, (20%), major damage (7%), total loss (2%), and not sure (7%).

Psychological Distress and Psychosocial Responses

Table 1 shows that more than one-third of the participants reported being exposed to at least one traumatic event during their lifetime, and having a life stressors during the previous year. Table 2 presents descriptive information concerning symptoms associated with acute stress disorder. The most common symptoms reported were difficulty sleeping, getting upset and/or angry easily, and feeling anxious.

Table 3 presents psychosocial responses related to the impact of the earthquake. Participants reported being angry at people who were breaking laws to get aid and supplies and believing that the earthquake was due to God's will. They also believed that their friends, military personnel, neighbors, strangers, and social workers had been helpful, and they had taken on more responsibilities.

Predicting Psychological Distress

Items on each scale were summed to create measures of symptoms associated with acute stress disorder, social support, and depression. The median reliability coefficients indicated that each scale had marginally adequate to good reliability: acute stress disorder symptoms, $\alpha = .90$; social support, $\alpha = .85$; and depression, $\alpha = .64$. Table 4 presents the resource loss scales, which were created following Sattler et al. (2002).

A hierarchical multiple regression analysis was conducted to examine the importance of gender, age, number of children living in the home, religiosity, disaster experience, prior exposure to traumatic events, stresses within the past year, social support, damage to home, resource loss, depression, and guilt in predicting acute stress disorder symptoms. The predictor variables were entered in six blocks, based on the COR stress theory and previous research (Freedy et al., 1994; Sattler et al., 2002).

Table 5 shows that the predictor blocks accounted for 68% of acute stress disorder symptom variance, $F(16, 235) = 31.59, p < .001$. Each block accounted for a significant portion of the variance. For blocks that had more than one variable, the beta coefficients indicate that acute stress disorder symptoms were significantly associated with being female, religiosity, prior exposure to traumatic events, stresses within the past year, condition resource loss, energy resource loss, personal characteristic resource loss, depression, and feeling guilty about the situation.

Summary and Discussion

1. Most participants experienced some degree of damage to their homes: minor damage (42%), followed by moderate (20%), major (7%), and total (2%). About one-fifth (22%) did not have damage.
2. Most participants experienced temporary short-term loss of utility service (mean number of days: 1.13 to 2.61).
3. The most common symptoms associated with acute stress disorder were difficulty sleeping, getting upset or angry easily, feeling anxious, trying not to talk about the earthquake, and avoiding things that bring back memories of the earthquake.
4. Participants reported being angry at people breaking the law to get aid and supplies, and believed that what happened was God's will.
5. Participants reported that friends, military personnel, neighbors, strangers, social workers, and police had been helpful.
6. Participants reported taking on more responsibilities, making new friends, and becoming more involved in community activities since the earthquakes.
7. In addition to property damage, the most common losses involved energy resources (e.g., time), followed by personal characteristic resources (e.g., motivation to get things done, sense of optimism, sense of humor).
8. Variables associated acute stress disorder symptoms included being female, prior exposure to traumatic events, stressful events the prior year, social support, damage to home, condition resource loss, energy resource loss, personal characteristic resource loss, depression, and feeling guilty about the situation.
9. The findings support the conservation of resources stress theory (Hobfoll, 1989; 1998) and extend previous research (e.g., Sattler et al., 2002; Smith & Freedy, 2000). Such studies are needed in order to examine whether theories and research findings from disasters in the United States are valid for persons in other countries.
10. The situation in El Salvador was particularly unique given that several large-magnitude earthquakes and aftershocks occurred within a few months, as well as the country's recent experience with Civil War, hurricanes, and other earthquakes. The importance of prior exposure to these and other traumatic events in relation to distress following the earthquake is supported by the current findings.
11. It is important to consider that secondary stressors continue to develop for many months after the earthquakes. Secondary stressors include stressful life events, strains, and hassles that develop in the wake of a disaster, and can include delays in obtaining resources, anxiety and concerns about personal safety due to new disaster threats, employment difficulties, and financial difficulties (Sattler, Freedy, Anderson, & Kaiser, 1997). Secondary stressors can tax personal characteristic, energy, and condition resources, exacerbate the influence of preexisting stressors, and contribute to psychological distress and relationship difficulties (Baum, 1991, Norris & Uhl, 1993). As such, it is possible that delayed mental health problems may develop many months after the event. Understanding the nature and

role of secondary stressors is critically important to intervention and recovery programs. Research should continue to examine the mental health and psychological implications of secondary stressors. Especially important issues concern identifying persons most at risk of adjustment difficulties and determining which interventions most effectively minimize or prevent adjustment problems. Such work should carefully consider the role of culture when considering the manifestation of symptoms, and in designing and evaluating intervention programs.

12. Future research also might examine factors associated with posttraumatic growth, including optimism, perceptions of control over life events, sense of self, preexisting vulnerabilities, and the characteristics of the situation (Calhoun & Tedeschi, 2001; Sattler, in press).

13. This correlational study has limitations that are common in most disaster studies. Because participants were college students in San Salvador, the findings may not generalize to all college students or to all persons in El Salvador. The findings offer detailed information about how persons within a specific demographic group responded to the tragic event. We do not know about preexisting psychopathology amongst the participants. It is possible that a small proportion of participants were experiencing distress or living with a mental health issue prior to the earthquakes. If so, these issues may have been reflected, to some degree, in the participants' answers.

Table 1. Exposure to Traumatic Events

Event	Percent
<i>Traumatic Event Exposure During Lifetime</i>	-
Attacked by someone intent on seriously injuring you	46
Fear of loss of live or involved with fighting during the civil war	29
Health threatening chemicals or radiation	25
Serious accident	23
Threat of physical force or contact	10
<i>Stressful Life Events in Past Year</i>	-
Death of a close family member	41
Serious injury or loss	34
Divorce or separation	9

Table 2. Symptoms Associated with Acute Stress Disorder

Symptom	Mean	Standard Deviation
I have difficulty sleeping	2.29	1.07
I get upset and/or angry easily	2.28	1.13

I feel anxious	2.13	1.05
Time seems to stand still	2.00	.96
I try not to talk about the earthquake	1.95	1.08
I get upset when events remind me of the earthquake	1.93	1.11
I avoid things that remind me of the earthquake	1.92	1.08
I have difficulty doing work or other things	1.90	.97
I feel mixed up or disoriented	1.89	.94
I am slow to react to people around me	1.83	.96
I have trouble feeling my emotions	1.80	.95
I think about the earthquake when I do not want to	1.80	1.02
I have nightmares about the earthquake	1.75	1.04
I feel emotionally numb	1.70	.86
I have difficulty remembering important things about the earthquake	1.60	.88
I feel like someone else	1.52	.89

Note: Rating scale: 1 = not at all, to 4 = quite a bit.

Table 3. Psychosocial Responses and Responses Related to the Impact of the Earthquake

Item	Mean	Standard Deviation
<i>Blame and Anger</i>	-	-
I am angry at people breaking the law to get aid and supplies	2.91	1.13
What happened was God's will	2.82	1.34
This happened because our nation has done something wrong	1.71	1.11
Done things don't like to get aid	1.39	.79
It is my fault that there is not enough aid	1.31	.66
<i>Assistance Provided</i>	-	-
Friends have been helpful	3.17	.98

Military personnel have been helpful	2.79	1.08
Neighbors have been helpful	2.77	1.06
Strangers have been helpful	2.73	1.09
Social workers have been helpful	2.68	1.09
Police have been helpful	2.49	1.10
Insurance adjusters have been helpful	1.86	.98
<i>Miscellaneous</i>	-	-
I have taken on more responsibilities	3.00	.93
I have made more friends	2.65	1.08
I have become more involved in community activities	2.29	.99
I have been busy rebuilding my life	2.40	1.08
I have been getting my fair share of aid and supplies	1.68	1.06
I am hurting more than other people	1.38	.67

Note: Rating scale: 1 = not at all, to 4 = quite a bit.

Table 4. Resource Loss Items

Item	Mean	Standard Deviation
<i>Personal Characteristic Resources</i>	-	-
Feeling that you have control over your life	1.77	.85
Motivation to get things done	1.94	.98
Feeling that your life has purpose	1.47	.82
Sense of humor	1.87	1.01
Sense of optimism	1.92	1.03
Feeling independent	1.72	.92
<i>Condition Resources</i>	-	-
Closeness with one or more family members	1.57	.96

Companionship	1.52	.77
Feeling valuable to others	1.75	.97
Support from coworkers	1.52	.82
Closeness with at least one friend	1.57	.89
<i>Object Resources</i>	-	-
Sentimental possessions (photos, etc.)	1.39	.81
Personal transportation	1.17	.58
Furniture, appliances and household contents	1.77	.95
<i>Energy Resources</i>	-	-
Time for adequate sleep	2.98	1.07
Free time	2.18	1.15
<i>Basic Object Resources</i>	-	-
Food, water	1.49	.76
Money for living expenses	1.88	.94

Note: Rating scale: 1 = not at all, to 4 = quite a bit.

References

- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Baum, A. (1991). Toxins, technology, and natural disasters. In A. Monat & R. S. Lazarus (Eds.), *Stress and coping: An anthology* (3rd ed.; pp. 97-139). New York: Columbia University Press.
- Berndt, D. J. (1986). *Multiscore depression inventory manual*. Los Angeles: Western Psychological Services.
- Calhoun, L. G., & Tedeschi, R. G. (2001). *Posttraumatic growth: The positive lessons of loss*. Washington, DC: American Psychological Association.
- Freedly, J. R., Saladin, M. E., Kilpatrick, D. G., Resnick, H. S., & Saunders, B. E. (1994). Understanding acute psychological distress following natural disaster. *Journal of Traumatic Stress, 7*, 257-273.
- Gonzalez, D. (2001, February 26). El Salvador says earthquake aid from foreign nations is lagging. *New York Times*, Section A, pp. 1
- Green, B. L. (1996). Cross-national and ethnocultural issues in disaster research. In A. J. Marsella, M. J. Friedman, E. T. Gerrity, & R. M. Scurfield (Eds.), *Ethnocultural aspects of posttraumatic stress disorder: Issues, research, and clinical applications* (pp. 341-361). Washington, D.C.: American Psychological Association.

Hobfoll, S. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44, 513-524.

Hobfoll, S. E. (1998). *Stress, culture, and community: The psychology and philosophy of stress*. New York: Plenum Press.

Hobfoll, S., Dunahoo, C., & Monnier, J. (1995). Conservation of resources and traumatic stress (pp. 29-47). In J. R. Freedy & S. E. Hobfoll (Eds.), *Traumatic Stress: From Theory to Practice*. New York: Plenum.

Kaiser, C. F., Sattler, D. N., Bellack, D. R., & Dersin, J. (1996). A conservation of resources approach to a natural disaster: Sense of coherence and psychological distress. *Journal of Social Behavior and Personality*, 11, 459-476.

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

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

Norris, F. H., & Uhl, G. A. (1993). Chronic stress as a mediator of acute stress: The case of Hurricane Hugo. *Journal of Applied Social Psychology*, 23, 1263-1284.

Sattler, D. N. (in press). Resiliency, posttraumatic growth, and psychological distress following the attacks on America. In D. Mileti (Ed.), *Impacts of and human response to the September 11, 2001 disasters: What research tells us*. Special publication #39. Boulder, CO: Natural Hazards Research and Applications Center.

Sattler, D. N., Freedy, J. F., Anderson, K., & Kaiser, C. F. (1997). Natural disasters and psychological adjustment: Implications of research for intervention efforts. *Journal of Psychological Practice*, 3, 113-127.

Sattler, D. N., Kaiser, C. F., & Hittner, J. (2000). Disaster preparedness: Relationship between prior experience, personal characteristics, and psychological distress. *Journal of Applied Social Psychology*, 30, 1398-1420.

Sattler, D. N., Preston, A., Kaiser, C. F., Olivera, V. E., Valdez, J., & Schlueter, S. (2002). Hurricane Georges: A cross-national study examining preparedness, resource loss, and psychological distress in the U. S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States. *Journal of Traumatic Stress*, 15, 339-350.

Sattler, D. N., Sattler, J. M., Kaiser, C., Hamby, B. A., Adams, M., Love, L., Winkler, J. M., Abu-Ukkaz, C., Watts, B., & Beatty, A. (1995). Hurricane Andrew: Psychological distress among shelter victims. *International Journal of Stress Management*, 2, 133-143.

Smith, B. W., & Freedy, J. R. (2000). Psychosocial resource loss as a mediator of the effects of flood exposure on psychological distress and physical symptoms. *Journal of Traumatic Stress*, 13, 349-357.

USAID (2002). El Salvador earthquakes: Final fact sheet (FY 2001). September 7.
http://www.usaid.gov/hum_response/ofda/elsalveq_finalfs_fy01.html

USGS National Earthquake Information Center (2001). Earthquake bulletin.
http://neic.usgs.gov/neis/bulletin/01_EVENTS/010113173329/010113173329.HTML

van de Vijver, F. J. R., & Leung, K. (1997). *Methods and data analysis for cross-cultural research*. Thousand Oaks, CA: Sage.

Author Note

This project was supported by a grant to David N. Sattler from the Natural Hazards Center, University of Colorado, Boulder, and the Bureau for Faculty Research, Western Washington University.

I would like to express my appreciation to the participants and faculty at the University of El Salvador; Mary Fran Myers, Natural Hazards Center; Geri Walker, Bureau for Faculty Research; Robert Van Male, Robert Thorndike, Steve Somers, Tiffany Boyle, Michael Frison, Michelle Beggerly, Department of Psychology, Western Washington University; and Shannon Schlueter, College of Charleston.

Address correspondence to David N. Sattler, Ph.D., Department of Psychology, Center for Cross-Cultural Research, Western Washington University, 516 High Street, Bellingham, Washington 98225-9089.

 [Return to Top](#)

 [Return to the Hazards Center Home Page](#)

 [Return to the Quick Response Report Index](#)

March 5, 2002

hazctr@spot.colorado.edu