A National Study of Health Care Service Utilization and Substance Use After the 2010 Chilean Earthquake

Dana Rose Garfin, Ph.D.
Vanessa Juth, Ph.D., M.P.H.
Roxane Cohen Silver, Ph.D.
Francisco Javier Ugalde, Ph.D.
Heiko Linn, M.S.
Manuel Inostroza, M.D., M.P.H.

Objective: A national epidemiological survey in Chile assessed adaptive (health care utilization) and maladaptive (substance use) postearthquake behaviors. *Methods:* Three months after the 8.8-magnitude 2010 Bio-Bio earthquake, face-to-face interviews were conducted with a representative sample of 2,108 adults. Logistic regression analyses examined predictors of health care service utilization and substance use. *Results:* Few participants utilized available government- and community-based psychosocial resources (16.6%). A minority reported increased substance use (13.2%). Lower self-efficacy was correlated with increased health care utilization (odds ratio [OR]=.92, 95% confidence interval [CI]=.88–.96) and use of tranquilizers, illicit and psychotropic drugs, and alcohol (OR=.95, CI=.91–.99); this pattern was not limited to residents of areas with the heaviest impacts. *Conclusions:* Self-efficacy beliefs elucidate variability in survivors' behaviors postdisaster and may provide an avenue to encourage salubrious responses. Postdisaster interventions should broadly target the population; those less heavily affected may need, and be as likely to use, available resources. (*Psychiatric Services in Advance,* September 15, 2014; doi: 10.1176/appi.ps.201300500)

Dr. Garfin, Dr. Juth, and Dr. Silver are with the Department of Psychology and Social Behavior, University of California, Irvine. Dr. Ugalde, Mr. Linn, and Dr. Inostroza are with the Instituto de Salud Pública, Universidad Andrés Bello, Santiago, Chile. Send correspondence to Dr. Silver (e-mail: rsilver@uci.edu).

The February 27, 2010, 8.8-magnitude earthquake in Chile—the Bio-Bio earthquake—was the sixth largest ever recorded (1). Over 1.8 million Chileans were affected; 523 died, 12,000 were injured, and over 800,000 were displaced from their homes. To mitigate potential deleterious psychosocial consequences, the Chilean government offered a variety of outreach efforts, including community-based health care services (such as helplines and clinics) and workshops for families. Use of these services is largely unexplored.

After community disasters, some individuals may need or desire health care services, yet available resources are infrequently utilized (2). Residents may instead turn to maladaptive behaviors, including substance use, which is often comorbid with psychopathology (3) and which may exacerbate existing health problems or precipitate new ones (such as addiction) and thus impair community reconstruction efforts. Furthermore, after a disaster, general medical and mental health problems may extend beyond the regions with the heaviest impacts (4,5). Individuals living in more distant regions may also engage in maladaptive behaviors and may need health care services. However, many postdisaster studies focus only on directly affected areas (5,6). Identifying predictors of postdisaster adaptive and maladaptive behaviors throughout an affected population may bolster the efficacy of postdisaster interventions.

Examining the presence of psychological resources, such as self-efficacy, may help clarify variability in adaptive and maladaptive postdisaster behaviors (7,8). Self-efficacy involves a person's self-perceived ability to cope effectively with stressful events and the belief that actions produce tangible results, even in threatening situations (9,10). Individuals with low self-efficacy may feel unable to handle stressful circumstances that may occur after a disaster and may seek external resources, both salubrious and maladaptive, to facilitate coping. Indeed, self-efficacy has been associated with psychological adjustment and recovery from substance abuse after traumatic events, including natural disasters (7,8). Yet few studies have used population-based samples to examine the association between self-efficacy and adaptive and maladaptive behaviors after large-scale disasters. Such research may benefit relief efforts and postdisaster outreach.

We examined rates of health care service utilization and substance use in a representative sample shortly after the 2010 Bio-Bio earthquake. Self-efficacy was examined as a predictor of these behaviors. We hypothesized that individuals with lower self-efficacy, who may feel unable to independently cope

with the disaster, would be more likely to rely on health care services and substance use and would thus report greater adaptive and maladaptive behaviors.

Methods

Ipsos Public Affairs compiled a representative sample of Chilean individuals ages 15 to 90, oversampled near the earthquake's epicenter. Data were collected from May 13 to June 7, 2010, via 2,108 face-to-face interviews conducted in Spanish and each lasting 35 to 40 minutes. Sampling maps were designed by using military topographic maps and census data from the Chilean National Statistics Institute. Quota sampling methodology determined household and participant eligibility (one participant per household). Random Map Selection Software was implemented in Santiago to account for the large number of apartment dwellers. Region of residence was recorded as the epicenter region (Concepción, Talcahuano, Tomé, Lota, and Talca) or outside the epicenter (Santiago metropolitan area, North, Central, and South).

Professionally trained Ipsos staff obtained oral consent and then conducted the interviews. Demographic information included age, gender, and marital status. Economic disadvantage was assessed via the Chilean E&E Socioeconomic Classification, a composite of employment status and education level of household head. Pre-earthquake physician-diagnosed anxiety or depressive disorder was ascertained. Methods were approved by the institutional review boards at the University of California, Irvine and the Universidad Andrés Bello, Santiago, Chile. [Full details of the methodology are available in an online supplement to this report.]

Participants reported on service utilization after the earthquake: reading pamphlets or articles; calling helplines; attending community-based workshops; visiting a psychiatrist, psychologist, or health care professional; or participating in a government-funded psychoeducational group. Responses were dichotomized: 0, no health care service use, and 1, used at least one type of service.

Participants reported whether they had used alcohol, tranquilizers, or other drugs (illicit or psychotropic) more than usual since the earthquake (yes or no

for each). Responses were dichotomized: 0, did not use substances; and 1, used drugs, alcohol, or tranquilizers more than usual. Self-efficacy was assessed via the Generalized Self-Efficacy Scale (10), a continuous measure assessing beliefs about one's ability to perform novel or difficult tasks and to cope with adversity. Distance of residence from the epicenter was calculated, and severity of earthquake destruction was assessed.

Data analyses were conducted with Stata, version 11.0. Poststratification weights were constructed according to gender, age, and region as indicated by 2010 National Statistics Institute census estimates. Because of oversampling in the epicenter region, separate weights were constructed for participants at the epicenter on the basis of age, gender, and province (a subcategory of region).

Incidence of health care service utilization and substance use were calculated. Next, two multivariate logistic regression analyses examined predictors of health care utilization and substance use. Self-efficacy, demographic factors, and prior mental health conditions were included as potential indicators. To explore impact of severity of exposure to the earthquake, analyses were conducted separately with region of residence, distance from the epicenter (both categorical and continuous), and reported destruction as predictors. The pattern of results did not change, and results are presented using region of residence for ease of interpretation.

Results

A total of 2,108 interviews were conducted. Among participants, 52% (N=1,096) were female, 48% (N=1,012) were male. The mean age of the sample was 40±17.2 years. Married individuals accounted for 44% (N=921) of the sample; 13% (N=282) were widowed, divorced, or separated; and 43% (N=900) were single. Forty-eight percent (N=1,004) of the sample were from the epicenter region, 14% (N=299) from the Northern region, 17% (N=351) from the Central region, 9% (N=199) from the South, and 12% (N=255) from Santiago. In terms of mental disorders, 11% (N=231) reported a history of either depression or anxiety, 6% (N=126) reported prior diagnoses of both anxiety and depression, and 83% (N=1,751) had

no history of a physician-diagnosed mental disorder. The mean self-efficacy score was 33.7±5.8 (possible scores range from 10 to 40, with higher scores indicating the individual's stronger belief in self-efficacy).

Table 1 presents data on postearthquake health care service utilization and substance use for the entire sample and by region. In adjusted models, health care service utilization was associated with lower self-efficacy (odds ratio [OR]= .92, 95% confidence interval [CI]= .88–.96, p<.001). No demographic factors or prior mental disorders were significant predictors of health care utilization. In adjusted models, a greater likelihood of substance use was associated with having a prior mental disorder (OR=2.77, CI=1.91–4.02, p<.001), being economically disadvantaged (OR=1.33, CI=1.02–1.73, p=.034), having no spouse present (OR=1.97, CI=1.08–3.58, p=.026), and having lower self-efficacy (OR=.95, CI=.91–.99, p=.029). Participants who reported any postdisaster health care utilization were almost three times as likely to report use of at least one type of substance (OR=2.70, CI=1.47–4.98, p=.001). Some regional differences were associated with utilization and substance use. For example, individuals in the South (a rural area a mean distance of 520±81 km from the epicenter) were significantly less likely than those in the epicenter to use health care services (OR=.46, CI=.26–.81, p=.007) and substances (OR=.31, CI=.15–.68, p=.003). However, compared with those in the epicenter, residents of Santiago were just as likely to report health care service utilization and substance use. [A table presenting results of these analyses is available in the online supplement.]

Discussion

Although a variety of health care services were available after the Chilean earthquake, utilization was infrequent. Because individuals may show persistent disaster-related negative general medical and mental health consequences years after a disaster (5), public service efforts should offer and encourage use of services over time. The media may also help promote awareness of services and methods to increase resiliency (11). Outreach efforts should account for psychological variability in the population:

Table 1

Health care utilization and increased substance use by 2,108 adults in the three months after the 2010 Bio-Bio earthquake in Chile, by region

Variable	Epicenter region (N=1,004)			Nonepicenter region (N=1,104)			All regions (N=2,108)		
	N	Weighted %	Unweighted %	N	Weighted %	Unweighted %	N	Weighted %	Unweighted %
Health care utilization									
Primary health care visits	93	9.5	9	56	7.6	5	149	7.8	7
Community mental health care visit	32	3.2	3	34	4.2	3	66	4.1	3
Hospital psychiatric service[a]	8	.6	<1	22	2.8	2	30	2.6	1
Read articles or pamphlets	55	5.7	5	57	6.6	5	112	6.6	5
Called helpline	8	.1	<1	2	.3	<1	10	.3	<1
Attended adult community workshop	11	1.1	1	23	.9	2	34	.9	2
Used any of the above health care services	157	15.9	16	132	16.6	12	289	16.6	14
School-age household member attended JUNAEB workshop[b]	43	4	4	71	5.6	6	114	5.4	5
Substance use									
Increased drinking	42	4.3	4	41	4.7	4	83	4.7	4
Increased drug use	6	.6	<1	4	1	<1	10	1	<1
Took tranquilizers	86	8.5	9	59	8.3	5	145	8.5	7
Any increased substance use	120	12.0	12	97	13.1	9	217	13.2	10

[a] Utilization differed significantly (p<.001) between the epicenter and nonepicenter regions.
[b] JUNAEB, Chilean National Board of Assistance and Scholarship. Utilization differed significantly (p<.05) between the epicenter and nonepicenter regions.

efforts targeted toward people with low self-efficacy could promote the use of adaptive behaviors (health care service use) as an alternative to maladaptive ones (substance use). Appeals to people with higher self-efficacy could frame use of health care services as a type of self-directed behavior that can help alleviate disaster-related distress.

These results support research suggesting that a small percentage of people may increase use of substances after natural disasters (12). Health care professionals should be cognizant of this possible increase and the potential comorbidity between substance use and other psychopathology and treat them concurrently (3). Community-level interventions to curtail substance use after disasters may also help speed community recovery (13).

Results indicate that individuals with lower self-efficacy were more likely to engage in both adaptive and maladaptive behaviors; this pattern was not limited to residents of areas with the heaviest impacts. Of note, residents of some rural areas reported less service utilization, congruent with research indicating access and transportation as a barrier (4). However, economic disadvantage was not associated with outcomes—perhaps because of the Chilean government's

attempts to distribute postdisaster resources to all communities regardless of socioeconomic status. Nonetheless, targeting self-efficacy may help curtail deleterious choices and promote adaptive choices (7). Brief self-efficacy assessments could be incorporated into postdisaster intake screenings, and the results could inform psychological first-aid activities, such as individual and group interventions (14). Service providers could work to increase feelings of self-efficacy, building survivors' psychological capital (such as social support) and capacity to manage disaster-related stressors positively (such as cognitive reframing). This could be achieved by facilitating mastery experiences (such as filling out insurance forms) or by enhancing feelings of control (such as goal setting). Providers could also screen for substance use among treatment seekers and offer appropriate resources.

Individuals obtaining treatment for their own or their family members' disaster-related physical injuries may also be a good population to assess for potential substance use or other problems. Physician referrals tend to increase the likelihood of additional, malady-specific, health care service use (15). Although having a prior mental disor-

der did not predict postdisaster service use, people without an official diagnosis of a mental disorder may be symptomatic but may not seek formal assistance (2). Furthermore, preexisting mental health problems may be exacerbated after a disaster, leading to increased substance use or substance use disorders and to disorders that are difficult to treat (such as posttraumatic stress disorder) (5). Use of mental health services may mitigate such risks.

Although we obtained useful information shortly after a devastating natural disaster, the study had several limitations. We used self-report measures for health care service use, substance use, and prior physician-diagnosed mental disorders. Corroborating reports from doctors and agencies would strengthen findings. Our study was cross-sectional and cannot support causal inferences or document behaviors over time. Availability of and motivation for seeking services was not assessed, and we did not assess domain-specific self-efficacy (9), such as individuals' beliefs about their abilities to overcome specific trauma-related obstacles (such as relocation and material loss). Finally, our participation rate was lower than ideal, although higher than the 20% that is

typical in face-to-face survey assessments in South America (personal communication, Vásquez J, 2013).

Conclusions

This study is unique in that it assessed a representative sample of individuals in Latin America after a devastating natural disaster. Designs that include postdisaster representative samples are essential for making evidence-based recommendations for postdisaster resource allocation, yet they are rarely implemented. Postdisaster studies in Latin America are exceedingly rare. Findings highlight the potential to capitalize on psychological resources such as self-efficacy to promote positive adjustment. Lack of a dose-response relationship between geographic proximity and outcomes suggests that communities should prepare to distribute postdisaster resources widely; individuals in areas that are affected less heavily may also need resources and may be as likely to use them. These findings may help inform preparation efforts and postdisaster interventions to facilitate a quicker return to predisaster functioning.

References

1. Largest Earthquakes in the World Since 1900. Washington, DC, US Department of the Interior, US Geological Survey, 2014. Available at earthquake.usgs.gov/earthquakes/world/10_largest_world.php

2. Brackbill RM, Stellman SD, Perlman SE, et al: Mental health of those directly exposed to the World Trade Center disaster: unmet mental health care need, mental health treatment service use, and quality of life. Social Science and Medicine 81:110–114, 2013

3. Chen L-Y, Crum RM, Martins SS, et al: Service use and barriers to mental health care among adults with major depression and comorbid substance dependence. Psychiatric Services 64:863–870, 2013

4. Silver RC, Holman EA, McIntosh DN, et al: Nationwide longitudinal study of psychological responses to September 11. JAMA 288:1235–1244, 2002

5. Norris FH, Friedman MJ, Watson PJ, et al: 60,000 disaster victims speak: part I. an empirical review of the empirical literature, 1981–2001. Psychiatry 65:207–239, 2002

6. Sumer N, Karanci AN, Berument SK, et al: Personal resources, coping self-efficacy, and quake exposure as predictors of psychological distress following the 1999 earthquake in Turkey. Journal of Traumatic Stress 18:331–342, 2005

7. Luszczynska A, Benight CC, Cieslak R: Self-efficacy and health-related outcomes of collective trauma. European Psychologist 14:51–62, 2009

8. Benight CC, Harper ML: Coping self-efficacy perceptions as a mediator between acute stress response and long-term distress following natural disasters. Journal of Traumatic Stress 15:177–186, 2002

9. Bandura A: Self-efficacy: toward a unifying theory of behavioral change. Psychological Review 84:191–215, 1977

10. Schwarzer R, Jerusalem M: Generalized Self-Efficacy Scale; in Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs. Edited by Weinman J, Wright S, Johnston M. Windsor, United Kingdom, NFER-Nelson, 1995

11. Gard BA, Ruzek JI: Community mental health response to crisis. Journal of Clinical Psychology 62:1029–1041, 2006

12. Vetter S, Rossegger A, Rossler W, et al: Exposure to the tsunami disaster, PTSD symptoms and increased substance use: an Internet based survey of male and female residents of Switzerland. BMC Public Health 8:92, 2008

13. DiMaggio C, Galea S, Li G: Substance use and misuse in the aftermath of terrorism. A Bayesian meta-analysis. Addiction 104:894–904, 2009

14. Hobfoll SE, Watson P, Bell CC, et al: Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. Psychiatry 70:283–315, 2007

15. Wong EC, Schell TL, Marshall GN, et al: Mental health service utilization after physical trauma: the importance of physician referral. Medical Care 47:1077–1083, 2009

ONLINE APPENDIX

Sampling

Ipsos Public Affairs, an international policy and market research company, obtained a representative sample of Chilean adults aged 15-90 who lived in provinces across Chile. Regions in the far north and south were not surveyed. Demographic quota sampling cells, used to determine participation eligibility, were constructed from Chilean National Statistics Institute (NSI) census population estimates of region, gender, and age. These estimates, along with topographic data derived from the Military Geographic Institute, were used to construct geographic sampling maps. Due to higher population density and the presence of large apartment buildings, Random Map Selection Software (Ipsos, Santiago) was implemented to generate sampling maps in the Santiago Metropolitan Region. Interviewers approached 11,095 homes and contacted a total of 4,327 eligible individuals; 2,108 participated in the interviews, divided between the epicenter (n=1004) and representative samples from four other major regions in Chile (Santiago metropolitan area, North, Central, and South, n=1104) (a 49% participation rate overall).

Each home was approached at least twice at different times to account for variability in work and activity schedules. If a household was unattended, the interviewer would gather information from neighbors to ensure vacancies were not systematic (e.g., loss of property during the earthquake, tsunami or looting, or lower SES). Information from neighbor reports of work schedule, vacation plans, or relocation of the household to another property was used to locate these individuals. Given that most people who lost their homes from the earthquake subsequently resided in tents on their own property, earthquake-related vacancies were not a predominant issue in interview solicitation (Vásquez J, personal communication, 2013).

Two bilingual psychologists (FJU and HL) translated and back-translated all measures originally written in English and then checked for linguistic and cultural accuracy.

Data from the interviews were entered manually into a database; 5% of all responses were re-entered to check for data entry errors.

Measures

Self-efficacy. Respondents completed the General Self-Efficacy Scale (GSE),[1] a 10-item scale with endpoints 1 (totally disagree) to 4 (totally agree), which assesses beliefs about abilities to perform novel or difficult tasks and cope with adversity. Items were summed to create a continuous scale ranging from 10 to 40; lower scores indicate lower perceived self-efficacy. (Row mean substitution was implemented for 6 participants missing a single item.) This scale has shown adequate reliability across cultures (Cronbach's α's range: 0.75-0.91), including some in South America (e.g., Peru).[2] Reliability was excellent in the present study: Cronbach's α=0.93.

Economic disadvantage. The E&E Socioeconomic Classification is commonly used in Chilean epidemiological and market research to classify people into socioeconomic categories. It is calculated using type of employment and education level of head of household. This measure

correlates strongly with household income.[3,4] The E&E is computed by asking respondents the education level (seven possible choices range from "less than primary school" to "graduate degree obtained") and type of work (six possible choices range from "occasional work/unemployed" to "organization director") of the head of household. Households are then categorized via a matrix of possible responses and grouped into the greater than 90th, 70th, 45th, 10th, and lower than 10th percentiles.[3,4] This measure was used as a continuous measure of economic disadvantage in analyses ($M=3.3\pm1.00$, range=1-5).

Distance from the epicenter. Interviewers recorded the participant's municipality during the earthquake; 62 different municipalities were reported. Latitude and longitude were used to estimate participants' approximate kilometers from the earthquake's epicenter; distances ranged from 38.4-1991.6 kilometers. A continuous and a five-level categorical variable (0-74 km, 75-199 km, 200-449 km, 450-999, and 1000+ from the epicenter) was calculated.

Severity of earthquake destruction. Degree of destruction experienced during the earthquake was assessed using a version of the Modified Mercalli Intensity Scale,[5] commonly implemented to assess earthquake intensity for the non-scientist population. Participants reported their experience of the earthquake the night it occurred, from 1 (not perceptible, hardly felt) to 8 (destructive, forcibly thrown to the ground, many objects were broken, walls collapsed, home was uninhabitable).

References

1. Schwarzer R, Jerusalem M: Generalized Self-Efficacy Scale; in Measures in Health Psychology: A user's portfolio. Causal and control beliefs. Edited by Weinman J, Wright S, Johnston M. Windsor, UK, NFER-NELSON, 1995

2. Scholz U, Gutiérrez Doña B, Sud S, Schwarzer R: Is general self-efficacy a universal construct? European Journal of Psychological Assessment 18:242–251, 2002

3. AIM: *Grupos socioeconómicos*. Santiago de Chile: Asociación Chilena de Empresas de Investigación de Mercado, 2008

4. Ipsos: *Clasificacion de GSE*. Santiago, Chile, 2010

5. Wood HO, Neumann F: Modified Mercalli Intensity Scale of 1931. Bulletin of the Sesmological Society of America 21:277–283, 1931

Table
Self-efficacy and Other Predictors of Post-earthquake Substance Use (N=2103)[a] and Healthcare Service Utilization (N=2101)[a]

| | Substance Use | | | | | | Healthcare Service Utilization | | | | | |
| | Model 1 | | | Model 2 | | | Model 1 | | | Model 2 | | |
Variable	OR	95% CI	p	OR	95% CI	p	OR	CI	p	OR	CI	P
Self-efficacy	.92	.88-.96	<.001	.95	.91-.99	.029	.92	.88-.95	<.001	.92	.88-.96	<.001
MD-dx mental health ailments[b]				2.77	1.91-4.02	<.001				.97	.65-1.44	.874
Female gender				.97	.52-1.82	.930				1.42	.82-2.44	.209
Age				1.01	.99-1.02	.499				1.00	.98-1.02	.910
No spouse present (single, widowed, divorced, or separated)[c]				1.97	1.08-3.58	.026				.97	.57-1.63	.895
Economic disadvantage				1.33	1.02-1.73	.034				.96	.74-1.25	.768
Region												
Epicenter (reference group)												
North				.38	.20-.76	.006				.64	.40-1.03	.067
Central				.45	.27-.76	.003				.43	.27-.69	<.001
South				.31	.15-.68	.003				.46	.26-.81	.007
Santiago metropolitan region				1.06	.65-1.73	.812				1.15	.76-1.74	.514
	$X^2(1)=9.16, p=.003,$ Pseudo $R^2=.027$			$X^2(10)=78.39, p<.001,$ Pseudo $R^2=.144$			$X^2(1)=17.45, p<.001,$ Pseudo $R^2=.036$			$X^2(10)=41.84, p<.001,$ Pseudo $R^2=.055$		

[a]N differs due to listwise deletion of missing data

[b]0=no history of anxiety or depressive disorder, 1=anxiety or depressive disorder, 2=both anxiety and depressive disorder

[c]Spouse present (married) comprises the reference group