

An Empirical Study of Employment and Disability Over Three Years Among Survivors of Major Disasters

Sarah S. Rasco, MD, and Carol S. North, MD

This study was designed to clarify the relationship between exposure to disaster and future employment. Survivors of seven disasters and their employment histories were prospectively followed over three years. At the time of the disasters, 86 percent were working, and at follow-up, 84 percent were working. All of the 261 individuals employed on the day of the disaster described themselves as not disabled at follow-up, although one individual who dropped out of the workforce to become a self-described housewife shortly after the disaster and who developed PTSD may have left the workforce because of lasting emotional effects of the disaster. The reasons she provided for changing job status were not disaster related, however. Long-standing employment disability was virtually nonexistent in this highly exposed sample of trauma survivors, but it is possible that some cases of PTSD-related disability were lost to follow-up. Further work is needed to explore psychological disability in other trauma survivor populations.

J Am Acad Psychiatry Law 38:80–6, 2010

Psychiatric illness is well recognized as a leading cause of disability worldwide.^{1,2} Most research examining occupational disability in which an individual obtains competitive employment but then is unable to maintain employment due to psychiatric illness has focused on depressive disorders.^{3–9} Studies of traumatized populations such as refugees, veterans, and motor vehicle accident victims have suggested that significant occupational disability may also accompany PTSD.^{10–15} Analysis of data from the European Study of the Epidemiology of Mental Disorders Project found PTSD to be one of the top 10 mental and physical disorders with the highest independent

impact on work days lost.¹⁶ In military veterans, PTSD has been found to be associated with significantly reduced likelihood of employment.^{17,18} Zatick *et al.* found that surgical patients with PTSD suffered significant functional impairments and were less likely to return to work than those without PTSD.¹⁹ PTSD is not an uncommon problem in the general population, with a lifetime prevalence estimated to be around eight percent.²⁰ The prevalence of significant trauma in the population is even higher.²¹ Thus, the question of whether individuals directly exposed to major disasters return to work is pertinent.

Whether individuals exposed to trauma with or without consequent PTSD return to work is an especially important question for mental health professionals who serve as experts regarding determinations of disability for PTSD. For example, a plaintiff may sue an employer whom he holds responsible for trauma exposure and the subsequent development of PTSD, may claim that he will never be able to work again, and may demand lifetime financial compensation for the permanent loss of employability. In such cases, consulting psychiatric and psychological experts may be asked to predict whether the former employee with psychological wounds from exposure to trauma should ever be able to return to work. This

Dr. Rasco is Assistant Medical Director at the Special Needs Offender Program of Metrocare Services, Dallas, TX. Dr. North is Director of the Program in Trauma and Disaster at the VA North Texas Health Care System, Dallas, TX. Dr. North is also Professor of Psychiatry and the Nancy and Ray L. Hunt Professor of Crisis Psychiatry at the University of Texas Southwestern Medical Center, and Adjunct Professor in the Department of Surgery/Division of Emergency Medicine at UT Southwestern Medical Center, Dallas, TX. This research was supported by National Institute of Mental Health Grants MH40025 and MH68853 to Dr. North. The contents of this article do not represent the views of the Department of Veterans Affairs or the United States Government. This paper was presented at the 39th Annual Meeting of the American Academy of Psychiatry and the Law, October 23–26, 2008, Seattle, WA. Address correspondence to: Sarah S. Rasco, MD, 3330 S. Lancaster, Annex Building, Dallas, TX 75216. E-mail: sarahrasco@yahoo.com.

Disclosures of financial or other potential conflicts of interest: None.

Table 1 Description of the Seven Disasters and Research Participants from Each Site

Place/Date	Description of Incident	Index Study Sample	Follow-up n (% of Index)
Indianapolis, IN, plane crash into hotel, 10/20/87	Military jet crashed into the lobby of a Ramada Inn. The hotel was destroyed, resulting in loss of employment for most; 10 fatalities (9 employees, 1 patron).	74% of all hotel employees; <i>n</i> = 17	14 (82%)
Russellville, AR, mass shooting at local businesses, 12/28/87	After murdering 14 people in his rural mobile home, a man went on a 35-minute shooting rampage through four local businesses; 2 fatalities, 4 injuries.	72% of the employees of two affected businesses; <i>n</i> = 11	10 (91%)
Madison, FL, tornado, 4/19/88	Without warning at 4:55 a.m., an F-4 tornado cut a mile-wide path through the town; 4 fatalities, 17 injuries.	89% of affected households (one representative member of each); <i>n</i> = 40	38 (95%)
Killeen, TX, mass shooting at a cafeteria, 10/16/91	A gunman drove his pickup truck through the front window of Luby's cafeteria and held 150 patrons and employees captive while shooting people at close range for 15 minutes; 24 fatalities (including gunman), 20 injuries.	82% of individuals present during the shooting; <i>n</i> = 123	105 (85%)
Oakland/Berkeley, CA, firestorm, 10/20/91	A massive firestorm fueled by a five-year drought and strong Santa Ana winds destroyed nearly 3,000 homes in largely upscale neighborhoods in the Oakland Hills over 3 days, causing \$1.5 billion in damages; 25 fatalities, 150 injuries.	Volunteer sample of respondents invited by random mailing to burned area households (one representative member each); <i>n</i> = 62	54 (87%)
Iowa City, IA, university campus mass shooting, 11/2/91	After being passed over for an award, a disgruntled graduate student in physics went on a shooting rampage on the campus of the University of Iowa; six fatalities (gunman and university professors, students, and staff), one serious injury.	75% of all individuals who encountered the gunman in the physics building where most of the shooting occurred; <i>n</i> = 9	6 (67%)
Clayton, MO, mass shooting in courthouse, 6/5/92	In court on divorce proceedings, a man shot at wife, lawyers, and judge and then stalked hallways with guns for 10 minutes; one fatality (gunman's wife), five injuries (including both parties' lawyers).	Volunteer sample of courthouse employees, lawyers, and judges, and law enforcement personnel in courthouse during shooting; <i>n</i> = 79	76 (96%)
Total		<i>N</i> = 341	303 (89%)

study seeks to aid experts in making predictions of the future employability of trauma survivors by clarifying prospectively the relationships observed between trauma exposure and subsequent employment among survivors of unexpected mass casualties.

Survivors of seven different disasters and their subsequent histories of employment and disability were prospectively queried on the day of the disaster and at three-year follow-up. Most disasters tend to strike randomly, without regard to preexisting characteristics that may confound risk of trauma exposure with risk of psychological sequelae in other populations such as accident victims and survivors of child abuse. The advantage of reviewing disaster studies is the relative unbundling of predisposing personal characteristics for risk of trauma from trauma mental health outcomes.²²

Methods

Disaster-Exposed Samples

The seven disasters (five manmade, two natural) constituting the source of the study population for this report occurred between 1987 and 1992. Details of research methods and basic findings from these incidents have been presented in greater detail in previous publications.^{23–31} Table 1 summarizes characteristics of each incident and the number of study participants at each site.

All known surviving individuals who were directly exposed to five disasters: a plane crash into an Indianapolis Ramada Inn; a tornado in Madison, Florida; and mass shooting episodes in Russellville, Arkansas; a Killeen, Texas, cafeteria; and the University of Iowa, Iowa City, were sought out and invited to

Postdisaster Course of Employment

Table 2 Employment Status on the Day of Disaster and at Three-Year Follow-Up

Employment Status	Day of Disaster <i>n</i> (%)	3-y Follow-up <i>n</i> (%)
Working	261 (86%)	254 (84%)
Not working	42 (14%)	49 (16%)
Retired	30 (10%)	29 (10%)
Housewife*	11 (4%)	15 (5%)
Unemployed	0 (0%)	4 (1%)
Disabled	1 (<1%)	1 (<1%)
Total	303 (100%)	303 (100%)

* Self-described.

participate in the research, with a combined participation rate of 82 percent.^{23–29} In the two remaining disasters: a firestorm in the Oakland/Berkeley, California, area and a mass shooting episode in a Clayton County, Missouri, courthouse, volunteers were invited to participate in the research by directed mailings and other recruitment measures. In the Oakland/Berkeley disaster, mailings were sent to known affected households.³⁰ In the Clayton County disaster, a volunteer sample was recruited from groups known to be present in the courthouse at the time.³¹ Thus, five of the samples were collected systematically, and two were volunteer samples.

Index interviews were conducted at approximately one (Indianapolis, Russellville, Madison, and Iowa City samples), two (Killeen and Clayton samples), or four (Oakland/Berkeley sample) months after the disaster. Follow-up interviews at approximately three years were conducted at 37 (Killeen, Iowa City, and Clayton samples), 39 (Oakland/Berkeley sample), 41 (Madison sample), or 45 (Indianapolis and Russellville samples) months after the disaster. The majority (89%, 303/341) of index participants responded for the follow-up interviews; the remaining 11 percent were lost to follow-up. The 303 individuals who completed both index and follow-up interviews provide the research sample on which these analyses are conducted. There were no significant differences between those interviewed at follow-up and those not reinterviewed in terms of index demographic (sex, age, ethnicity, marital status, and level of education) or diagnostic (predisaster or postdisaster PTSD or any diagnosis) variables.

The study sample was 59 percent (123/303) female, 87.8 percent (266/303) Caucasian, 8 percent (25/303) African-American, and 4 percent (12/303) other ethnicities; 70 percent (211/303) were married. Mean (SD) age was 42.8 (14.3) years and median was 41. More than one-third (37.2%, 109/293)

of the sample had completed a college education, with the median years of education being two years past high school.

Procedures

Prior to the inception of this research, approval for the study was obtained from the Institutional Review Board of Washington University School of Medicine, the institutional affiliation of the principal investigator at the time. All research participants provided written informed consent before being interviewed, and they were offered \$20 for each interview in appreciation of their participation.

Instruments

Index and follow-up interviews utilized the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R) Diagnostic Interview Schedule³² and Disaster Supplement³³ (DIS/DS). These instruments provided full diagnostic assessment of lifetime, predisaster, and postdisaster psychiatric diagnoses and information on variables of relevance to disaster experience, as well as demographic data and information about employment history and current employment status. Interviews were administered by members of the disaster research team who received formal training to administer the DIS. Interviews were monitored to ensure interviewer fidelity and reliability.

Results

Table 2 shows employment status categories among study participants on the day of the disaster and at the three-year follow-up. At the time of the disaster, 86 percent were working, and at follow-up, 84 percent were working. Of 261 individuals who were working at the time of the disaster, 249 (95%) were still working at follow-up. Most individuals who were not working were retired. No individuals who were employed on the day of the disaster described themselves as disabled at follow-up.

Figure 1 shows the course of individual employment trajectories over the three-year follow-up period. Of the 42 individuals who were not working on the day of the disaster, most had not changed employment status at three years, including 1 individual classified as disabled at the time of the disaster who was still classified as disabled at three years, 26 retirees, and 10 individuals who elected to describe their current work status as housewife. The few people not

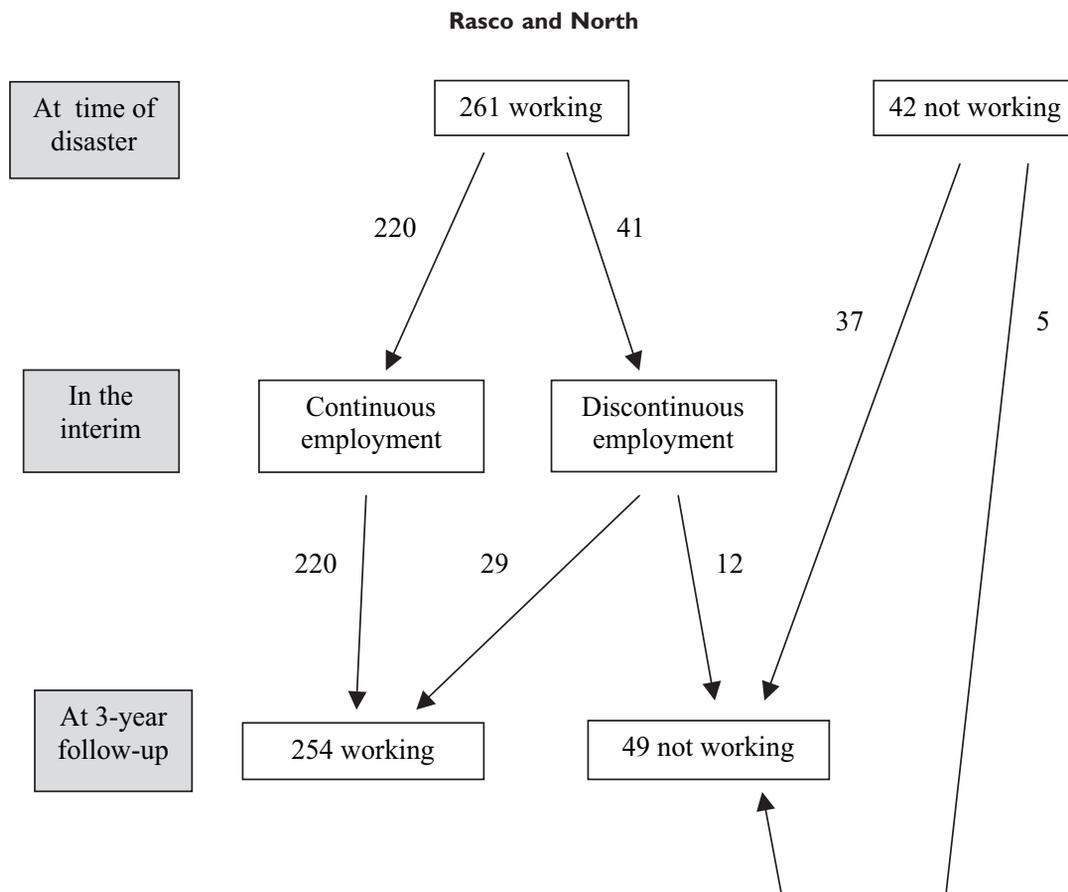


Figure 1. Employment status over three-year follow-up.

working on the day of the disaster who changed employment status by three years did so as follows: four people who were retired at the time of the disaster started working (three part time and one full time), and one housewife began working part time outside the home. Of 29 individuals employed at baseline with postdisaster disruptions in employment who were again working at three years, 8 in Indianapolis obtained other employment after loss of their jobs because the hotel was destroyed, 2 in Oakland resumed work following a hiatus related to effects of the disaster on their businesses, and the remaining individuals stated that they had experienced disruption in employment for various reasons that were unrelated to the disaster (e.g., sought and obtained a higher level job; returned to school; or had medical problems unrelated to the disaster). None cited psychiatric reasons for interruptions in employment. Only 2 of the 29 individuals employed at baseline who had postdisaster employment disruptions were unemployed for more than one year during the three-year follow-up period.

Figure 2 illustrates the follow-up employment status and relevant personal circumstances of the 12

individuals who were working on the day of the disaster but not working three years later, 3 of whom suffered from PTSD related to the disaster. Three individuals had retired, all between the ages of 65 and 76. Five individuals had left work to become housewives (three shortly after the disaster including one with disaster-associated PTSD, and two just two to four months before the three-year follow-up including one with disaster-associated PTSD). Four people described themselves as unemployed (three from the destroyed Indianapolis hotel who obtained intermittent employment elsewhere in the interim, including one with disaster-related PTSD who worked until just six months before follow-up and one Killeen mass-shooting survivor who quickly obtained other employment that ended just a month before the three-year follow-up). Therefore, of the 12 individuals who were working on the day of the disaster but not 3 years later, 3 retired (at appropriate ages) and 6 worked at least part of the time in the interim. Of the three remaining individuals, only one had disaster-associated PTSD. It is possible that she was unable to return to long-term work as a result of suffering from

Postdisaster Course of Employment

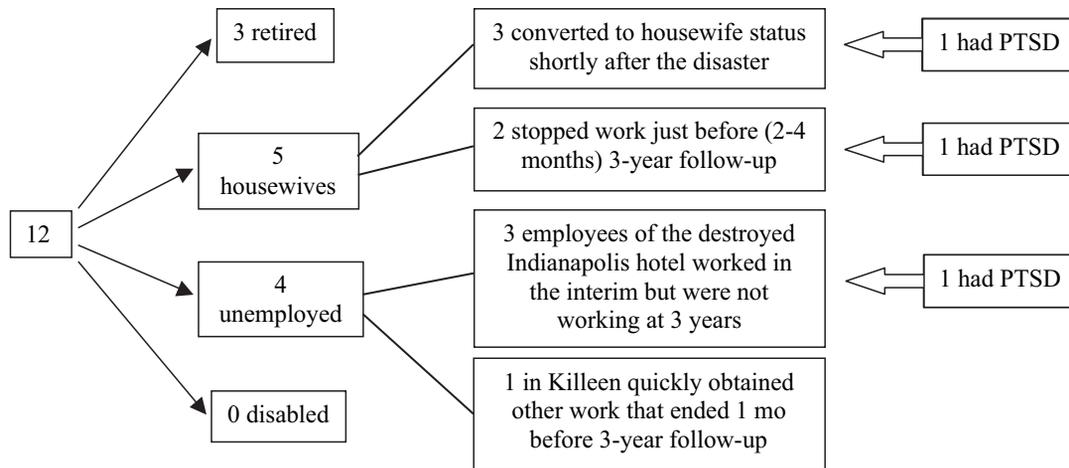


Figure 2. Working on day of disaster, not working at three-year follow-up.

PTSD, although she did not indicate this to be the case. She therefore represents the single possible case of long-term occupational disability related to PTSD in this study of 303 trauma survivors.

Discussion

In this empirical study of disaster survivors, we prospectively chronicled their subsequent course of employment over three years. The study was designed to clarify the relationship between exposure to disaster and future employment and to aid the mental health expert who is asked to predict whether an individual exposed to a disaster can be expected to return to work. Overall employment rates were relatively unchanged after the disaster, although individual stories contained variations over time that are not described in the summary rates at baseline and follow-up. Those employed on the day of the disaster reported themselves to be not disabled at follow-up. Of those employed at the time of the disasters who were followed up at three years, only five percent were no longer working, and 8 of the 12 had transitioned to retired or housewife status. It is possible that one or more made these transitions because of lasting emotional effects of the disaster, although the reasons that they provided for changing their job status were largely unrelated to the disaster, and none of the reasons included psychological difficulties. All those who transitioned to retirement did so at appropriate ages (all were aged 65 years or older), and all the individuals who described themselves as unemployed at the time of the follow-up interview had worked for at least part (and in the majority, most) of

the three-year interim. Only one person with PTSD permanently dropped out of the workforce shortly after the disaster. Therefore, we found, at most, one possible case of long-term occupational disability due to PTSD in 303 trauma survivors. Long-standing employment disability was virtually nonexistent in this sample of highly exposed disaster survivors. Based on these findings, a psychiatric or psychological expert can provide an evidence-based recommendation to the court that inability to return to work is not to be expected.

These results are discrepant with those in studies of refugees, veterans, and motor accident victims, which suggests that significant occupational disability may accompany PTSD. The apparent discrepancy may be related to whether an individual suffers a single and severe trauma versus multiple traumatic events or even chronic trauma. It is also possible that whether an individual is exposed to trauma in isolation versus as a part of a group affects his or her occupational outcome. These disasters struck communities of various sorts (e.g., towns, an academic department, a group of coworkers). Perhaps recovering from trauma as a part of a community versus as a solitary victim influences an individual's ability to return to work. Finally, it is possible that other trauma survivors have selection biases that disaster survivors do not have. For example, motor vehicle accident survivors may have more pre-existing substance abuse, risk-taking behavior patterns, and novelty-seeking traits than would a cohort struck by random disaster. Future research should seek to address

this apparent incongruity in the literature regarding trauma exposure and occupational disability. It is not known whether these results generalize to survivors of other types of trauma.

The major methodologic strengths of this study are its prospective design, representative sampling methods in five of the seven disaster samples, analysis of individual employment trajectories, as opposed to presentation of summary data at index and follow-up, and consistent use of the same diagnostic instrument by the same research team in all disaster survivors included in this analysis. Limitations include lack of ethnic diversity, the follow-up period being restricted to only three years, and the fact that data were collected from interviews conducted by multiple interviewers without corroborative information. Although the sample in our study had a high follow-up rate, it is possible that individuals who were lost to follow-up after the index interview suffered occupational disability due to PTSD. It is also possible that individuals who were employed after the disaster performed poorly at work and were functionally disabled, although they maintained their jobs for whatever reason. The interview used did not query details about work performance, number of days missed at work, conflict with coworkers, or other indicators of trouble functioning at work. Further research is needed to examine the long-term course of employment after trauma in greater detail, for longer periods, and among diverse populations and should include more detailed measurement of work performance and other indicators of functional impairment.

References

- Murray CJ, Lopez AD: The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability From Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020. Cambridge, MA: Harvard University Press, 1996
- Ormel J, VonKorff M, Ustun TB, *et al*: Common mental disorders and disability across cultures: results from the WHO Collaborative Study on Psychological Problems in General Health Care. *JAMA* 272:1741–8, 1994
- Kessler RC, Barber C, Birnbaum HG, *et al*: Depression in the workplace: effects on short-term disability. *Health Aff (Millwood)* 18:163–71, 1999
- Dewa CS, Goering P, Lin E, *et al*: Depression-related short-term disability in an employed population. *J Occup Environ Med* 44: 628–33, 2002
- Mojtabai R: Residual symptoms and impairment in major depression in the community. *Am J Psychiatry* 158:1645–51, 2001
- Von Korff M, Ormel J, Katon W, *et al*: Disability and depression among high utilizers of health care: a longitudinal analysis. *Arch Gen Psychiatry* 49:91–100, 1992
- Ormel J, Von Korff M, van den BW, *et al*: Depression, anxiety, and social disability show synchrony of change in primary care patients. *Am J Public Health* 83:385–90, 1993
- Simon GE, Revicki D, Heiligenstein J, *et al*: Recovery from depression, work productivity, and health care costs among primary care patients. *Gen Hosp Psychiatry* 22:153–62, 2000
- Mintz J, Mintz LI, Arruda MJ, *et al*: Treatments of depression and the functional capacity to work. *Arch Gen Psychiatry* 49:761–8, 1992
- Mollica RF, McInnes K, Sarajlic N, *et al*: Disability associated with psychiatric comorbidity and health status in Bosnian refugees living in Croatia. *JAMA* 282:433–9, 1999
- Mollica RF, Sarajlic N, Chernoff M, *et al*: Longitudinal study of psychiatric symptoms, disability, mortality, and emigration among Bosnian refugees. *JAMA* 286:546–54, 2001
- Thapa SB, Van Ommeren M, Sharma B, *et al*: Psychiatric disability among tortured Bhutanese refugees in Nepal. *Am J Psychiatry* 160:2032–7, 2003
- Bleich A, Solomon Z: Evaluation of psychiatric disability in PTSD of military origin. *Isr J Psychiatry Relat Sci* 41:268–76, 2004
- Dekel R, Solomon Z, Bleich A: The contribution of social disability to the evaluation of mental disability among PTSD veterans. *Isr J Psychiatry Relat Sci* 41:237–47, 2004
- Matthews LR: Work potential of road accident survivors with post-traumatic stress disorder. *Behav Res Ther* 43:475–83, 2005
- Alonso J, Angermeyer MC, Bernert S, *et al*: Disability and quality of life impact of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand Suppl* 420: 38–46, 2004
- Savoca E, Rosenheck R: The civilian labor market experiences of Vietnam-era veterans: the influence of psychiatric disorders. *J Ment Health Policy Econ* 3:199–207, 2000
- Zatzick DF, Marmar CR, Weiss DS, *et al*: Posttraumatic stress disorder and functioning and quality of life outcomes in a nationally representative sample of male Vietnam veterans. *Am J Psychiatry* 154:1690–5, 1997
- Zatich D, Jurkovich G, Tivara F, *et al*: A national US study of posttraumatic stress disorder, depression, and work and functional outcomes after hospitalization for traumatic injury. *Ann Surg* 248:429–37, 2008
- Kessler RC, Sonnega A, Bromet E, *et al*: Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry* 52:1048–60, 1995
- Breslau N, Davis GC, Andreski P, *et al*: Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Arch Gen Psychiatry* 48:216–22, 1991
- North CS: Human response to violent trauma. *Baillieres Clin Psychiatry* 1:225–45, 1995
- North CS, Smith EM, McCool RE, *et al*: Short-term psychopathology in eyewitnesses to mass murder. *Hosp Community Psychiatry* 40:1293–5, 1989
- North CS, Smith EM, Spitznagel EL: Posttraumatic stress disorder in survivors of a mass shooting. *Am J Psychiatry* 151:82–8, 1994
- North CS, Smith EM, Spitznagel EL: One-year follow-up of survivors of a mass shooting. *Am J Psychiatry* 154:1696–702, 1997
- North CS, Spitznagel EL, Smith EM: A prospective study of coping after exposure to a mass murder episode. *Ann Clin Psychiatry* 13:81–7, 2001
- North CS, McCutcheon V, Spitznagel EL, *et al*: Three-year follow-up of survivors of a mass shooting episode. *J Urban Health* 79:383–91, 2002

Postdisaster Course of Employment

28. Smith EM, North CS, McCool RE, *et al*: Acute postdisaster psychiatric disorders: identification of persons at risk. *Am J Psychiatry* 147:202–6, 1990
29. North CS, Smith EM, McCool RE, *et al*: Acute postdisaster coping and adjustment. *J Trauma Stress* 2:353–60, 1989
30. North CS, Hong BA, Suris A, *et al*: Distinguishing distress and psychopathology among survivors of the Oakland/Berkeley firestorm. *Psychiatry* 71:36–46, 2008
31. Johnson SD, North CS, Smith EM: Psychiatric disorders among victims of a courthouse shooting spree: a three-year follow-up study. *Community Ment Health J* 38:181–94, 2002
32. Robins LN, Helzer JE, Cottler L, *et al*: NIMH Diagnostic Interview Schedule, Version III-Revised. St. Louis: Washington University, 1989
33. Robins LN, Smith EM: The Diagnostic Interview Schedule/Disaster Supplement. St. Louis: Washington University, 1983