THE NATIONAL CENTER
FOR PTSD
VAM&ROC 116D
WHITE RIVER JUNCTION
VERMONT 05009 USA
802-296-5132
FTS 834-1132

PTSD Research Quarterly (ISSN 1050-1835) is published by the National Center for PTSD. Subscriptions are available free of charge to researchers and clinicians concerned with post-traumatic stress disorder.

In this issue:

National Center Sites

Executive Division
White River Junction
VT 05009

Clinical Laboratory
and Education Division
Menlo Park CA 94304

Clinical Neuroscience
Division
West Haven CT 06516

Behavioral Science
Division
Boston MA 02130

Northeast Program
Evaluation Center
West Haven CT 06516

The National Center for Post-Traumatic Stress Disorder

PTSD Research Quarterly

VOLUME 3, NUMBER 1 WINTER 1992

MENTAL HEALTH EFFECTS OF NATURAL AND HUMAN-MADE DISASTERS

Susan D. Solomon, PhD
National Institute of Mental Health
Bonnie L. Green, PhD
Georgetown University

All research reviewed in this issue relates to mental health studies of adult and child survivors of natural and human-made disasters. To avoid overlap with previous issues of the *PTSD Research Quarterly* (Weisæth & Eitinger, Volume 2, Numbers 2 & 3) we have restricted our focus to studies conducted in the United States. We also have excluded studies that focus on emergency workers, and on victims of torture, terrorism, and other interpersonal violence, since we regard these as topics worthy of separate attention in the *Quarterly*. And while our abstracts are limited to studies published since 1978, we have included a few citations of classic early work in the field of disaster research.

Mental health studies of disasters typically have been designed to answer three basic questions: What kinds of mental health problems, if any, result from exposure to disaster? Which groups of people are at highest risk for negative effects? And, what factors modify the impact of exposure to disaster (i.e., *why* are some people at particularly high risk)? In this review we include abstracts and citations of studies that address one or more of these questions.

What psychological problems result from disaster exposure? One early but continuing controversy in the field is whether disasters do in fact cause psychological problems. Some of the studies we have included in this review show little or no negative effect of disaster on mental health, relative to comparison groups or pre-disaster levels (Bromet et al., 1984; Robins et al., 1986), whereas the majority suggest that disasters *can* cause behavioral and emotional adjustment problems in both children and adults (Baum, Gatchel et al., 1983; Bravo et al., 1990; Bromet et al., 1982; Burke et al., 1986; Green et al., 1990; Norris & Murrell, 1988; Shore et al., 1986; Smith et al., 1986; Steinglass & Gerrity, 1990).

Those studies finding negative psychological consequences (with or without comparison groups) have reported a wide range of problems, from PTSD symptoms (Bravo et al., 1990; Green et al., 1990; Green et al., 1991; Shore et al., 1986; Smith et al., 1986) and symptoms of related non-PTSD disorders such as depression, alcohol abuse, anxiety, and somatization (Baum, Gatchel et al., 1983; Bravo et al., 1990; Bromet et al., 1982; Green et al., 1990; Norris & Murrell, 1988; Shore et al., 1986; Smith et al., 1986; Wilkinson, 1983), to physical illness (Adams & Adams, 1984; Leopold & Dillon, 1963), behavioral problems such as domestic violence (Adams & Adams, 1984), and more general symptoms of distress, performance, and/or physiological reactivity (Baum, Gatchel et al., 1983; Madakasira & O'Brien, 1987; Murphy, 1986). These effects have been reported for both natural disasters such as volcanos, fires, tornados, floods, and mudslides (Bravo et al., 1990; Krause, 1987; Shore et al., 1986; Smith et al., 1986; Steinglass & Gerrity, 1990), and human-made disasters such as Three Mile Island (TMI), dam collapses, fire, and a skywalk collapse (Baum, Gatchel et al., 1983; Bromet et al., 1982; Green et al., 1990, Green et al., 1991; Wilkinson, 1983).

Though this literature on the whole seems to suggest that disasters do result in, at the very least, stress reactions, if not full-blown psychiatric disorder, a question still outstanding is whether these effects are transient or lasting (i.e., persisting longer than several weeks post-event). Only recently has research been undertaken to examine the longer-term effects of disaster exposure. This research suggests that for natural disasters such as volcanos, tornados, and floods, psychological consequences may persist as long as 3 years, though most symptoms seem to abate by about 16 months (Bravo et al., 1990; Krause, 1987; Shore et al., 1986; Steinglass & Gerrity, 1990). Consequences of human-caused disasters may persist even longer. Baum's work (1990) continued to show negative psychological effects for residents near the TMI reactor 6 years after the initial leak, while follow-up studies of Buffalo Creek (Green et al., 1990) showed continued effects for some survivors at 14 years. Clearly more research over longer periods of time is needed to address the longevity of impact for human-made events.

Which groups of people are at highest risk for negative effects? The above discussion highlights how groups as a whole respond to disaster. However, group averages tend to disguise the fact that while many individuals may recover quickly from their disaster experiences, others may take much longer to recover, if indeed they recover at all. Several studies of disaster are designed to determine which populations are at greatest psychological risk. Some of these studies examine aspects of the disaster experience (the stressor) that cause the most negative consequences. Other studies examine qualities of the people (individual vulnerability) that put them at potentially higher risk.

Disaster studies that focus on aspects of the stressor have found that certain kinds of experiences put disaster victims at particularly high risk

for psychological problems. The experiences which have received the most systematic study are bereavement, property loss, and threat to life. With respect to bereavement, two studies of human-caused disasters have shown increased psychological risk for survivors who have lost a loved one: Gleser et al. (1981) showed a significant relationship between degree of loss (from possessions to immediate family) and overall level of psychological impairment 2 years after a dam collapse, for both adults and children; and Green et al. (1985) showed increased ratings of effective distress, self-rated symptoms, and hostility, 1 and 2 years following a supper club fire, in survivors who had lost a friend or loved one. Bereavement following natural disaster has shown a similar pattern. Interestingly, Shore et al. (1986) found that disaster-related bereavement (Mount St. Helens volcano) was significantly more likely to cause psychiatric morbidity than bereavement from other causes.

Other studies have examined not only bereavement but also property loss. For example, another study of the Mount St. Helens volcano found both bereavement and property loss to be risk factors for mental illness, and that bereavement (death of loved ones) was more likely to cause mental health problems than property loss (Murphy, 1986). And in their study of floods, Phifer and Norris (1989) found the psychological consequences associated with personal property loss to be relatively short-term (less than 1 year), whereas exposure to widespread community destruction had a longer-term impact (up to 2 years), regardless of individual loss.

Degree of exposure to toxic or life-threatening aspects of a disaster also show clear-cut relationships with outcomes, across a variety of human-made events. For example, Bromet et al. (1982) showed that mothers living within 5 miles of the TMI plant had significantly higher self-reported symptoms on selected scales of the SCL-90 than those living outside the 5-mile radius. Dohrenwend et al. (1981) showed higher demoralization in TMI residents living within 5 miles of the plant compared to those further away, within 3 months of the leak. Adler (1943) and Green et al. (1985) showed that more intensive exposure to smoke, fire, and pushing/shoving in 2 night club fires contributed to higher risk for psychological problems 3 months (Adler, 1943) and 1 to 2 years (Green et al., 1985) post-fire. The latter finding applied to both interviewer-rated and self-reported symptoms. Gleser et al. (1981) found that increased exposure to flood waters and the elements following the dam collapse predicted higher overall severity ratings in both adults and children 2 years following the Buffalo Creek disaster. More exposed children also showed higher levels of PTSD symptoms in particular (Green et al., 1991). Other studies focus on qualities of the victims that may make them vulnerable to negative psychological effects following disaster exposure. For example, some studies suggest that women or girls may be at greater risk than men or boys for PTSD and other mental health problems following exposure to disaster (Bromet et al., 1982; Burke et al., 1986; Dohrenwend et al., 1981; Gleser et al., 1981; Green et al., 1991; Krause, 1987; Shore et al., 1986; Steinglass & Gerrity,

REVIEW ARTICLES

BAUM, A. (1990). **Stress, intrusive imagery, and chronic distress.** *Health Psychology, 9,* 653-675.

BERREN, M.R., BEIGEL, A. & GHERTNER, S. (1980). **A typology for the classification of disasters.** *Community Mental Health Journal, 16,* 103-111.

BOLIN, R. (1988). **Response to natural disasters.** In M. Lystad (Ed.), *Mental health response to mass emergencies: Theory and practice* (pp. 22-51). New York: Brunner/Mazel.

GIBBS, M.S. (1989). **Factors in the victim that mediate between disaster and psychopathology: A review.** *Journal of Traumatic Stress, 2,* 489-514.

GREEN, B.L. (1982). **Assessing levels of psychological impairment following disaster.** *Journal of Nervous and Mental Disease, 170,* 544-552.

HARTSOUGH, D.M. (1985). **Measurement of the psychological effects of disaster.** In J. Laube & S. Murphy (Eds.), *Perspectives on disaster recovery* (pp. 22-51). Norwalk, CT: Appleton-Century-Crofts.

KOHN, R. & LEVAV, I. (1990). **Bereavement in disaster: An overview of the research.** *International Journal of Mental Health, 19,* 61-76.

LOGUE, J.N., MELICK, M.E. & HANSEN, H. (1981). **Research issues and directions in the epidemiology of health effects of disasters.** *Epidemiologic Reviews, 3,* 140-162.

RUBONIS, A.V. & BICKMAN, L. (1991). **Psychological impairment in the wake of disaster: The disaster-psychopathology relationship.** *Psychological Bulletin, 109,* 384-399.

SMITH, E.M., NORTH, C.S. & PRICE, P.C. (1988). **Response to technological accidents.** In M. Lystad (Ed.), *Mental health response to mass emergencies: Theory and practice* (pp. 52-95). New York: Brunner/Mazel.

SOLOMON, S.D. (1989). **Research issues in assessing disaster's effects.** In R. Gist & B. Lubin (Eds.), *Psychosocial aspects of disaster* (pp. 308-340). New York: Wiley.

BOOKS

BARTON, A.H. (1969). **Communities in disaster: A sociological analysis of collective stress situations.** Garden City, NY: Doubleday.

DRABEK, T.E. (1986), **Human system responses to disaster: An inventory of sociological findings.** New York: Springer-Verlag.

ERIKSON, K.T. (1976). **Everything in its path: Destruction of community in the Buffalo Creek flood.** New York: Simon & Schuster.

GLESER, G.C., GREEN, B.L. & WINGET, C. (1981). **Prolonged psychosocial effects of disaster: A study of Buffalo Creek.** New York: Academic Press.

LEVINE, A.G. (1982). **Love canal: Science, politics and people.** Lexington, MA: Lexington Books.

1990), and that elderly victims are less vulnerable to such problems than are younger victims (Gleser et al., 1981; Huerta & Horton, 1978; Kilijanek & Drabek, 1979). Older children, however, may be at more risk for PTSD symptoms than younger children (Green et al., 1991).

What factors modify the impact of exposure to disaster (i.e., why are some people at particularly high risk)? Several studies focus on mechanisms or processes which put individuals at high risk. These studies examine factors that mediate response to disaster exposure, such as social support, control attributions, and perceptions of threat.

Research suggests that inadequate social support relates to severity of PTSD and related symptoms (Bromet et al., 1982, 1984; Green et al., 1985); however, the cause and effect of this relationship is unclear. A longitudinal study found that exposure to floods was associated with a subsequent decline in both perceptions of social support and social participation (Kaniasty et al., 1990). Other research suggests that strong marital ties can exacerbate the negative psychological consequences of disaster for female victims (Gleser et al., 1981; Solomon et al., 1987).

Research also suggests that perceptions of control may reduce distress in chronic stress situations. For example, emotion-focused coping styles, compared to problem-focused strategies, were associated with low levels of stress following the radioactive leak at TMI (Baum, Fleming et al., 1983). Further, TMI residents who assumed at least some blame for problems they experienced post-TMI exhibited less stress than residents who did not.

In studies of children, parental behavior or distress, parental psychological history, and psychosocial atmosphere in the home have been shown to be important determinants of the child's functioning following a disaster experience (Bromet et al., 1984; Dollinger et al., 1984; Green et al., 1991). Some studies also have found that parents under-identify symptoms (particularly anxiety) in their children (Earls et al., 1988; Handford et al., 1986), suggesting the importance of assessing the child directly.

Conclusions. We have identified research that has looked at risk factors for negative outcomes following disaster. However, yet to be conducted are systematic studies of interventions: prevention, treatment, and service provision for disaster victims. We hope that what we have learned in these early studies will provide the groundwork for the future design and testing of mental health interventions for victims of disaster.

SELECTED ABSTRACTS

BAUM, A., GATCHEL, R.J. & SCHAEFFER, M.A. (1983). **Emotional, behavioral, and physiological effects of chronic stress at Three Mile Island.** *Journal of Consulting and Clinical Psychology, 51,* 565-572. The present study evaluated the psychophysiological impact of a powerful environmental stressor — the uncertainty and threat during the aftermath of the nuclear accident at Three Mile Island (TMI). TMI residents were compared with samples of people living near an undamaged nuclear power plant, people living near a traditional coal-fired power plant, and people living in an area more than 20 miles from any power plant. A number of self-report measures of psychological stress were evaluated by administering the Symptom Checklist-90 and the Beck Depression Inventory more than 1 year after the nuclear accident. In addition, two behavioral measures of stress were obtained (performances on a proofreading task and an embedded figures task). Finally, urinary catecholamine levels were assayed in order to examine chronic stress-related sympathetic arousal. Results indicated that residents of the TMI area exhibited more symptoms of stress (self-report, performance, and catecholamine levels) more than 1 year after the nuclear accident than did people living under different circumstances. Although the intensity of these problems appears to be subclinical, the persistence of stress may be cause for some concern.

BRAVO, M., RUBIO-STIPEC, M., CANINO, G.J., WOODBURY, M.A. & RIBERA, J.C. (1990). **The psychological sequelae of disaster stress prospectively and retrospectively evaluated.** *American Journal of Community Psychology, 18,* 661-680. This study was designed to document the psychological sequelae of flooding/mudslides in the adult (17-68) population on the Caribbean island of Puerto Rico, by surveying 912 persons (including 375 previously interviewed) with a Spanish version of the Diagnostic Interview Schedule. A rigorous methodology, which included both retrospective and prospective designs, was used, enabled by the occurrence of a catastrophic disaster only a year after a comprehensive survey was completed. Framed in a stress theoretical perspective, disaster effects for new depressive, somatic, and posttraumatic stress symptoms were identified, even after adjusting for demographic and methodologic factors. All the effects, however, were relatively small, suggesting that most disaster victims were rather resilient to the development of new psychological symptoms. Comparison of results with previous findings and its implications for both disaster and stress research are discussed, as well as the role of community psychologists in disaster action.

BROMET, E.J., HOUGH, L. & CONNELL, M. (1984). **Mental health of children near the Three Mile Island reactor.** *Journal of Preventive Psychiatry, 2,* 275-301. The mental health of children living near the TMI nuclear reactor was assessed. The sample was composed of 150 children from the TMI area and 99 children from a comparison site where a similar nuclear plant is located. Mental health status was determined 3 1/2 years after the accident using measures of social competence, behavior problems, fearfulness and self-esteem. No significant differences were found between the TMI group and comparison group children. Children whose fathers worked at TMI were also not significantly different from children drawn from a sample which was not associated with the plant. Perceptions of distress occurring after the accident were associated with poorer current mental health. These effects were buffered in part by the family milieu. Under poor support conditions, children who had adverse experiences from the TMI accident were considerably more symptomatic or had lower self-esteem at follow-up. The paper critically reviews prior research on mental health effects of disaster on children.

BROMET, E.J., PARKINSON, D.K., SCHULBERG, H.C., DUNN, L.O. & GONDEK, P.C. (1982). **Mental health of residents near the Three Mile Island reactor: A comparative study of selected groups.** *Journal of Preventive Psychiatry, 1,* 225-274. The purpose of the present study was to assess the mental health effects of the accident at the Three Mile Island (TMI) nuclear plant. Three groups thought to have been particularly affected by the accident were studied, namely, mothers of preschool children living within 10 miles of the plant; workers at the power plant; and psychiatric patients. Their peers in and around another nuclear plant in Pennsylvania served as controls. Interviews were conducted nine months and twelve months after the accident. Both clinical diagnostic information (current and lifetime) and subclinical symptomatology were assessed. The results showed that mothers had an excess risk of experiencing clinical episodes of anxiety and depression during the year after the accident. TMI mothers also reported more symptoms of anxiety and depression at subclinical levels at both interviews compared with controls. TMI mothers who were most symptomatic were those who had a psychiatric history before the accident, those who lived within five miles of the plant, and those with less adequate social support. No differences were observed between the TMI nuclear workers and controls, although TMI workers reported feeling more rewarded by their jobs. In both areas, workers with greater social support were less symptomatic. With respect to the psychiatric patients, there were no differences between exposed and nonexposed patients. Although for mothers and workers perceptions of TMI as dangerous or living near a nuclear plant as unsafe were unrelated to symptomatology, these perceptions bore an important relationship to symptom level among the patients.

BURKE, J.D., MOCCIA, P., BORUS, J.F. & BURNS, B.J. (1986). **Emotional distress in fifth-grade children ten months after a natural disaster.** *Journal of the American Academy of Child Psychiatry, 25,* 536-541. Ten months after a blizzard and flood disaster struck Revere, Massachusetts, fifth-grade children in two churches wrote stories about "this coming winter." These were assessed blindly by six mental health clinicians for signs of distress, including fear, depression, and anxiety. Children from the flooded area demonstrated more distress than those from the non-flooded area. Only girls showed this effect; for boys, there was no difference between flooded and non-flooded groups. These results, which suggest that distress can persist as long as 10 months after a natural disaster, corroborate and extend the findings of an earlier study of younger children in this community. Future studies may be able to incorporate standardized instruments using revised criteria for clinical disorders in this age group.

DOLLINGER, S.J., O'DONNELL, J.P. & STALEY, A.A. (1984). **Lightning-strike disaster: Effects on children's fears and worries.** *Journal of Consulting and Clinical Psychology, 52,* 1028-1038. As part of a larger study of a lightning disaster, this article compares the fears of victims of a lightning strike with matched control children drawn from a normative study of the Louisville Fear Survey for Children (LFSC). Fear reports were obtained from both the children and their mothers. Additionally, measures of children's sleep disturbance and somatic complaints were obtained from their mothers, and the interviewer rated each child in the lightning sample for extent of emotional upset caused by the disaster. Differences between the lightning and control samples were most pronounced for child-reported fears, and the generalization gradient was fairly consistent with expectations from classical conditioning theory. The correspondence between the mother's and children's reports of intense storm-related fears was markedly larger in the lightning sample than in the control sample. Finally, child-reported fears showed a number of substantial relations with mother-reported sleep and somatic problems and with interviewer-rated emotional upset. Results are discussed in terms of the mental health effects of disasters and the ethical issues inherent in such research.

GREEN, B.L., GRACE, M.C., LINDY, J.D., GLESER, G.C., LEONARD, A.C. & KRAMER, T.L. (1990). **Buffalo Creek survivors in the second decade: Comparison with unexposed and nonlitigant groups.** *Journal of Applied Social Psychology, 20,* 1033-1050. This study investigated the second-decade effects of the Buffalo Creek dam collapse and flood that occurred in West Virginia in 1972. One hundred twenty-one survivors who had participated in an earlier lawsuit against the coal company that built the collapse dam were compared to 78 nonlitigant survivors on self-reported symptoms, clinical ratings, and diagnoses. A nonexposed sample from a geographically and culturally similar neighborhood was investigated as well. Findings showed no differences between the litigant and nonlitigant survivor groups. The survivor groups together showed higher rates of anxiety, depression, and hostility symptoms and diagnoses than the nonexposed sample. The findings were discussed in the context of the nature of the traumatic event, social and cultural influences on recovery, and the constellation of symptoms which differentiated the groups.

GREEN, B.L., KOROL, M., GRACE, M.C., VARY, M.G., LEONARD, A.C., GLESER, G.C. & SMITSON-COHEN, S. (1991). **Children and disaster: Age, gender, and parental effects on PTSD symptoms.** *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 945-951. Psychiatric reports of 179 children aged 2 to 15 who were exposed to the Buffalo Creek dam collapse in 1972 were rated for post-traumatic stress disorder (PTSD) symptoms 2 years after the disaster. Age and gender effects and the impact of the level of exposure and parental functioning were examined according to a conceptual model addressing factors contributing to adaptation to a traumatic event. Results showed fewer PTSD symptoms in the youngest age group and higher symptom levels for girls than boys. Approximately 37 percent of the children were given a "probably" diagnosis of PTSD. Multiple regression analysis showed that life threat, gender, parental psychopathology, and an irritable and/or depressed family atmosphere all contributed to the prediction of PTSD symptomatology in the children.

HUERTA, F. & HORTON, R. (1978). **Coping behavior of elderly flood victims.** *The Gerontologist, 18,* 541-546. A study of the effects of the Teton Dam Disaster in 1976 upon the elderly provides a test of the assertion in the literature that the elderly are more likely to overreport their losses and express feelings of relative deprivation than younger cohorts. The findings suggest that elderly persons cope quite well with disaster situations and tend to report fewer adverse emotional effects and feelings of relative deprivation than younger victims. High agreement was found between subjective comparative estimations of loss and actual loss. Recommendation for disaster assistance planning is included.

KRAUSE, N. (1987). **Exploring the impact of a natural disaster on the health and well-being of older adults.** *Journal of Human Stress, Summer,* 61-69. The failure of researchers to consider the temporal dimensions of the stress process may be at least partially responsible for the disappointing empirical findings from research on stress and health. These researchers argue that careful consideration must be given to the time lag between the occur-

rence of a stressor and initial symptom development, as well as the length of time that is required for symptoms to abate. Using a synthetic cohort design, and measures of depression (CES-D) and health, they examine the length of time needed for symptoms to dissipate following a natural disaster (Hurricane Alicia). Findings from a random community survey of 351 older adults suggested that the major effects of the storm diminished in about 16 months. Significant gender differences were found in this adjustment process. The implications of these findings for stress research are discussed.

NORRIS, F.H. & MURRELL, S.A. (1988). **Prior experience as a moderator of disaster impact on anxiety symptoms in older adults.** *American Journal of Community Psychology, 16,* 665-683. As participants in a panel study, 234 older adults were interviewed before, as well as after, serious flooding occurred in southeastern Kentucky. Floods are not uncommon in this area, but these were more widespread than most, and resulted in both previously exposed and newly exposed subsamples of disaster victims. Flood impact was measured at both personal and community levels, including the measures of State-Trait Anxiety, and Center for Epidemiologic Studies Depression Scale (CES-D). With preflood symptoms controlled, there were modest flood effects on both trait anxiety and weather-specific distress in older adults without prior flood experience, but no flood effects in older adults who had been in floods before. Thus, the study provides support for the "inoculation hypothesis" and other conceptualizations that emphasize the advantage of being familiar or experienced with a stressor that is at hand. An implication is that "experienced" victims could be a valuable resource in prevention efforts.

PHIFER, J.F. & NORRIS, F.H. (1989). **Psychological symptoms in older adults following natural disaster: Nature, timing, duration, and course.** *Journal of Gerontology: Social Sciences, 44,* S206-S217. Using a prospective design with five follow-up intervals, the study addressed questions regarding the timing of onset, duration, course, and nature of psychological reactions to natural disaster. As participants in a statewide panel study, more than 200 older adults were interviewed both before and after two distinct floods occurred in southeastern Kentucky in 1981 and 1984. Exposure to these incidents, which differed in overall intensity, was assessed at both the individual and community levels. Personal loss was associated with short-term increases in negative affect, limited to one year postflood. Longer-term effects were more dependent on the level of community destruction. Exposure to high levels of community destruction and personal loss was predictive of increased negative affect for two years.

SHORE, J.H., TATUM, E.L. & VOLLMER, W.M. (1986). **Psychiatric reactions to disaster: The Mount St. Helens experience.** *American Journal of Psychiatry, 143,* 590-595. Following the 1980 Mount St. Helens volcanic eruption, psychiatric reactions were studied in the disaster area and in a control community. Using the criterion-based diagnostic method for psychiatric epidemiologic research, the Diagnostic Interview Schedule, the authors found a significant prevalence of disaster-related psychiatric disorders. These Mount St. Helens disorders included depression, generalized anxiety, and posttraumatic stress reaction. There was a progressive "dose-response" relationship in the comparison of control, low-exposure, and high-exposure groups. The dose-response pattern occurred among both the bereaved and the property-loss victims.

SMITH, E.M., ROBINS, L.N., PRYZBECK, T.R., GOLDRING, E. & SOLOMON, S.D. (1986). **Psychosocial consequences of a disaster.** In J. Shore (Ed.), *Disaster stress studies: New methods and findings* (pp. 49-76). Washington, DC: American Psychiatric Press. This study examined the extent to which exposure to dioxin and/or flooding affected the mental health of adult residents in the St. Louis area. Findings indicated that individuals directly exposed to disaster had more physical and psychiatric problems than unexposed individuals. Although the respondents were assessed for a range of psychiatric disorders (using the Diagnostic Interview Schedule/Disaster Supplement), most striking were the findings for post-traumatic stress disorder. Post-traumatic stress symptoms were experienced by almost 25% of directly exposed respondents, and significantly more new cases of full-blown disorder were found among victims than among the unexposed respondents. Although post-traumatic symptoms were associated with both flood and dioxin exposure, exposure to the technological hazard (dioxin) appeared to have a somewhat greater negative effect.

SOLOMON, S.D., SMITH, E.M., ROBINS, L.N. & FISCHBACH, R.L. (1987). **Social involvement as a mediator of disaster-induced stress.** *Journal of Applied Social Psychology, 17,* 1092-1112. This study examined individuals either personally or indirectly exposed to disaster and hypothesized that social involvement would differentially mediate the effect of exposure on the mental health of male and female victims. The study reinterviewed individuals previously interviewed just prior to disastrous floods and the discovery of unsafe levels of dioxin. Results indicated that males and females differ in their response to disaster exposure. Assessed with the Diagnostic Interview Schedule/Disaster Supplement, males showed increased symptoms of alcohol abuse and depression as a result of either personal, or both personal and indirect, exposure to disaster. In contrast, female symptomatology was not directly elevated by personal disaster exposure. Both sexes were sensitive to demands for support as a mediator of disaster effects. That is, victims both personally exposed to disaster and heavily relied upon by network members were far more likely to somatize (females) or abuse alcohol (males) than personally exposed individuals subject to more moderate network demands. Although excellent spouse support attenuated male symptomatology, its presence was associated with an exacerbation of symptoms in personally exposed females. Results suggest the importance of considering both the positive and negative consequences of social involvement because, for women in particular, very strong social ties may be more burdensome than supportive in times of extreme stress.

STEINGLASS, P. & GERRITY, E. (1990). **Natural disasters and post-traumatic stress disorder: Short-term versus long-term recovery in two disaster-affected communities.** *Journal of Applied Social Psychology, 20,* 1746-1765. Post-traumatic stress disorder (PTSD) in adults following disaster-precipitated family relocation was investigated in a longitudinal study of family and individual response to natural disasters. Adult participants included 78 women and 77 men in two communities. Psychosocial adjustment was measured at two points in time: at 4 months and 16 months after the disaster. Instruments used for assessing stress-related symptomatology included the Horowitz Impact of Event Scale (HIES) and the Diagnostic Interview Schedule (DIS). Major findings included: (a) levels of short-term stress symptomatology and diagnosable PTSD were substantial in both communities; (b) significant decrements in these levels occurred by 16-months postdisaster; (c) substantial gender differences (greater levels for women) were apparent in both short- and long-

term PTSD response rates; and (d) patterns and levels of PTSD symptoms were different in the two communities. Findings have implications for the interpretation of PTSD within the context of family- and community-level variables.

WILKINSON, C.B. (1983). **Aftermath of a disaster: The collapse of the Hyatt Regency Hotel skywalks.** *American Journal of Psychiatry, 140,* 1134-1139. The author provides data regarding psychiatric symptoms reported by 102 persons who had experienced the collapse of two skywalks in the lobby of the Hyatt Regency Hotel in Kansas City, MO. Those interviewed were injured victims, guests of the hotel who were not injured, and rescue workers. They were interviewed within 5 months of the disaster. Virtually all of the subjects had psychiatric symptoms; only slight differences were found among those who were victims, observers, or rescuers.

ADDITIONAL CITATIONS
Annotated by the Editors

ADAMS, P.R. & ADAMS, G.R. (1984). **Mount Saint Helens's ashfall: Evidence for a disaster stress reaction.** *American Psychologist, 39,* 252-260.
Examined community-based statistical information to study the effects of the Mount St. Helens disaster on a small town in Washington state. After adjusting for seasonal variations, the authors found pre- to postdisaster increases in indicators of illness, family problems, alcohol abuse, aggression, and general adjustment. Results are interpreted as evidence that natural disasters can lead to relatively nontransient stress reactions.

ADLER, A. (1943). **Neuropsychiatric complications in victims of Boston's Cocoanut Grove disaster.** *Journal of the American Medical Association, 123,* 1098-1101.
Performed psychiatric interviews with 54 survivors of the Cocoanut Grove fire, 46 of whom were available for interview up to 11 months later. Nervousness, anxiety, and nightmares were common outcomes, but remitted somewhat over the interval. Symptoms were more likely in victims who had not lost consciousness during the fire, and loss of friends or family was unrelated to symptom likelihood.

AGUIRRE, B.E. (1980). **The long term effects of major natural disasters on marriage and divorce: An ecological study.** *Victimology, 5,* 298-307.
Selected six natural disasters that occurred in the United States between 1962 and 1968 to study trends in the divorce and marriage rates of affected and control communities. There were no trends attributable to any of the disasters. The authors interpret their data as demonstrating resilience as a reaction to disaster.

BAUM, A., FLEMING, R. & SINGER, J.E. (1983). **Coping with victimization by technological disaster.** *Journal of Social Issues, 39,* 117-138.
Measured coping on the Ways of Coping Checklist and stress, via the Symptom Checklist-90 as well as urinary catecholamines and task performance, in 38 survivors of the Three Mile Island nuclear accident and 32 controls living near an undamaged nuclear plant. In survivors only, high use of emotion-focused coping and low use of problem-focused coping was associated with lower stress. The authors interpret these and other findings as suggesting that the perception of control can be effective in reducing the distress associated with technological disasters.

DOHRENWEND, B.P., DOHRENWEND, B.S., WARHEIT, G.J., BARTLETT, G.S., GOLDSTEEN, R.L., GOLDSTEEN, K. & MARTIN, J.L. (1981). **Stress in the community: A report to the President's Commission on the Accident at Three Mile Island.** *Annals of the New York Academy of Science, 365,* 159-174.
Combined results of several studies of child and adult survivors of the Three Mile Island accident to study the behavioral effects of the disaster. Demoralization and other psychological symptoms were most severe one month later but diminished by two months. Distrust in authorities with respect to nuclear power persisted five months later. The authors suggest that this distrust may interfere with the process of recovery.

EARLS, F., SMITH, E., REICH, W. & JUNG, K.G. (1988). **Investigating psychopathological consequences of a disaster in children: A pilot study incorporating a structured diagnostic interview.** *Journal of the American Academy of Child and Adolescent Psychiatry, 27,* 90-95.
Used parent and child versions of the Diagnostic Interview for Children and Adolescents along with other instruments to determine the effect of surviving a flood on the psychiatric status of 32 children one year later. Relative to data from parents, childrens' data led to more DSM-III diagnoses. PTSD was not fully diagnosed by data from either source. There was a strong positive association between number of child and number of parent symptoms, and between preexisting disorder and flood-related symptomatology.

GREEN, B.L., GRACE, M.C. & GLESER, G.C. (1985). **Identifying survivors at risk: Long-term impairment following the Beverly Hills Supper Club fire.** *Journal of Consulting and Clinical Psychology, 53,* 672-678.
Used the Psychiatric Evaluation Form (PEF), the Symptom Checklist (SCL)-90, and other measures to identify predictors of outcome in survivors of the Beverly Hills Supper Club one (N=117) and two (N=67) years after the fire. In multiple regression analyses of the primary outcome measures, affective distress on the PEF, and total SCL-90 symptoms, objective fire stress accounted for the largest proportion of variance at both times, although other individual difference variables also significantly predicted SCL-90 scores.

HANDFORD, H.A., MAYES, S.D., MATTISON, R.E., HUMPHREY, F.J., BAGNATO, S., BIXLER, E.O. & KALES, J.D. (1986). **Child and parent reaction to the Three Mile Island nuclear accident.** *Journal of the American Academy of Child Psychiatry, 25,* 346-356.
Administered questionnaires and interviews to assess parent and child reports of the behavioral and emotional effects of the Three Mile Island accident on 35 child survivors. Children reported more symptoms than their parents reported for them. Intensity of a child's reaction was greater in children whose parents differed from each other in intensity of reaction or in mood. The authors make recommendations for future disaster research involving children.

KANIASTY, K.Z., NORRIS, F.H. & MURRELL, S.A. (1990). **Received and perceived social support following natural disaster.** *Journal of Applied Social Psychology, 20,* 85-114.
Conducted followups of 222 older adult victims of two separate floods, all of whom initially had participated in another study in which they had been asked about their expectations of support in a hypothetical disaster. In the first flood, victims received much less support than they had expected, and neither actual support nor extent of loss predicted expectations of support in a future

disaster. These expectations, however, did predict support received in the second flood.

KILIJANEK, T.S. & DRABEK, T.E. (1979). **Assessing long-term impacts of a natural disaster: A focus on the elderly.** *The Gerontologist, 19,* 555-566.
Examined the effect of a tornado on the elderly by comparing pre- and postdisaster data from victims over 60 years old with data from younger victims. Older victims differed from younger victims in a number of ways, including their experience of the loss and strategies for recovery, but were not more adversely affected. In particular, older victims were no more likely than age-matched controls to report significant physical or mental health problems.

LEOPOLD, R.L. & DILLON, H. (1963). **Psycho-anatomy of a disaster: A long term study of post-traumatic neuroses in survivors of a marine explosion.** *American Journal of Psychiatry, 119,* 913-921.
Conducted clinical interviews with 27 survivors of a marine explosion immediately after the explosion and then, with 9 additional cases, at various times over the next several years. Affective disturbances, sleep disturbances, and somatic reactions were common immediately after the disaster and increased over time. Those over age 35 at the time of the explosion deteriorated more than younger survivors. Data on functional impairment also are presented.

MADAKASIRA, S. & O'BRIEN, K.F. (1987). **Acute post-traumatic stress disorder in victims of a natural disaster.** *Journal of Nervous and Mental Disease, 175,* 286-290.
Administered a structured interview to 279 adult victims of a tornado in a rural Southern community five months after the disaster. Of the 116 victims who also provided questionnaire data, 59% met criteria for a DSM-III diagnosis of PTSD. PTSD was associated with increased scores on the Hopkins Symptom Checklist (HSCL). The authors suggest that the HSCL may be a useful screen for PTSD in large populations.

MAIDA, C.A., GORDON, N.S., STEINBERG, A. & GORDON, G. (1989). **Psychosocial impact of disasters: Victims of the Baldwin Hills fire.** *Journal of Traumatic Stress, 2,* 37-48.
Used the Diagnostic Interview Schedule with a Disaster Supplement to interview residents of a middle-class black community that had been severely damaged in a fire. Two to four months after the disaster, PTSD symptoms were associated with having been in the area during the fire, and depressive symptoms were associated with having lost one's home.

MURPHY, S.A. (1986). **Status of natural disaster victims' health and recovery 1 and 3 years later.** *Research in Nursing & Health, 9,* 331-340.
Recontacted 155 participants in a 1-year followup of the Mount St. Helens disaster to determine physical and mental health status 3 years post-disaster. Scores on the Symptom Checklist-90 decreased over time but bereaved individuals were more symptomatic at both times than those with property loss only or controls. Survivors' physical health reports did not differ from controls' reports at either time.

OLLENDICK, D.G. & HOFFMANN, M. (1982). **Assessment of psychological reactions in disaster victims.** *Journal of Community Psychology, 10,* 157-167.
Interviewed survivors of a flood to assess depressive symptoms and stress reactions in adults, and emotional and behavioral problems in children. In the 73 adults, scores on both measures at 8 months were elevated relative to retrospective reports of preflood status, regardless of age. In the 54 children, more temporary and emotional behavioral problems occurred in those with mothers who experienced the greatest stress reactions than in children whose mothers experienced the least stress reactions.

ROBINS, L.N., FISCHBACH, R.L., SMITH, E.M., COTTLER, L.B., SOLOMON, S.D. & GOLDRING, E. (1986). **Impact of disaster on previously assessed mental health.** In J.H. Shore (Ed.), *Disaster stress studies: New methods and findings* (pp. 21-48). Washington, DC: American Psychiatric Press.
Used the Diagnostic Interview Schedule with a Disaster Supplement to reinterview a subset of individuals who originally had taken part in the Epidemiologic Catchment Area project and subsequently were exposed to a natural or technological disaster. There were few new cases of PTSD in either the exposed group or in socioeconomically-matched controls, but the number of individuals with three or more PTSD symptoms increased more in the exposed group. Data on other psychiatric diagnoses, mental health service utilization, physical health, and social and occupational functioning also are presented.

PILOTS Update

In November we conducted a survey of potential PILOTS users, with the aid of marketing students from the Tuck School of Business at Dartmouth College. We mailed 766 surveys to American members of the International Society for Traumatic Stress Studies, of which 135 were returned in time to be used. While a 17.6% response rate would not be regarded as scientifically authoritative, it is a respectable one for a detailed market survey. The results provided encouraging support for decisions that we had made regarding the production and distribution of the PILOTS database.

The overwhelming majority of respondents indicated that they expected to use PILOTS through their academic or medical libraries, having their searches performed by trained searchers. Accordingly, we shall continue to emphasize our participation in the Combined Health Information Database, which is available to librarians worldwide on the BRS databank. Toward this end, we have begun a publicity campaign both in the library literature and in the mental health newsmagazines, so that clinicians, researchers, and the information specialists who support them will be aware of PILOTS.

We hope to have the PILOTS database available on floppy disk at the end of April. Details will be announced in the next issue of the *PTSD Research Quarterly*. For the benefit of potential users who are familiar with the Internet, we have made the PILOTS files available for anonymous file transfer from a computer at Dartmouth College. For further information, please write to us.

To obtain the *PILOTS User's Guide*, order publication PB92-100252 from the National Technical Information Service, Springfield, Virginia 22161. Telephone orders are accepted at (703) 487-4650; the price in the United States is $19.00 plus a $3.00 handling fee per order. The second edition of the *User's Guide* will be delayed until the latter half of 1992.

PTSD RESEARCH ACTIVITIES AT THE SEATTLE VA MEDICAL CENTER

M. Michele Murburg, MD and Miles E. McFall, PhD

The Seattle VAMC, through its Diabetes Research Center and its Geriatric Research, Education, and Clinical Center, has a long-established program of research into regulation of human sympathetic nervous system (SNS) function. Our clinical observations of patients with PTSD suggested to us that SNS function might be abnormal in this disorder, and so in 1985 we began a collaboration with Dr. Richard C. Veith to study SNS function in Vietnam veterans with PTSD. First, we consolidated data from published research on the psychophysiology of PTSD, concluding that: (a) PTSD subjects show baseline heart rates and blood pressures that are considerably greater than those of normal controls, but not greater than those of psychiatric patients with mental disorders other than PTSD; and (b) PTSD subjects show a greater autonomic response to combat-related cues than do controls, despite the fact that they respond about equally to non-combat stressors. Consistent with these findings, neuroendocrine studies using our own clinical samples showed that PTSD patients exhibited greater SNS activation in response to trauma-related than to trauma-unrelated disturbing stimuli. PTSD subjects also manifested a greater SNS response, including increased levels of epinephrine in arterialized venous plasma, to trauma-related stimuli than did controls. We concluded that phasic SNS activation occurs in response to trauma-relevant stimuli in PTSD, and that this activation may represent conditioning of autonomic functioning, as postulated by a number of investigators.

We subsequently investigated whether Vietnam combat veterans with PTSD might also have higher basal levels of SNS activity than appropriately matched controls. First we measured basal levels of arterialized plasma norepinephrine and epinephrine in PTSD patients and controls, and found no differences. Because plasma levels might be normal in the presence of increased SNS activity if the rate of catecholamine clearance from plasma were also increased, we have recently been employing a radioisotope dilution technique to measure plasma norepinephrine kinetics in a new group of PTSD patients and controls. We will ultimately analyze the data using two-compartmental modeling, which will allow differential assessment of vascular and extravascular release and uptake of norepinephrine. So far our results indicate that basal SNS activity is not increased in the population of PTSD patients we have studied.

In the course of executing the above studies, we found ourselves asking questions about the reliability and validity of several widely used psychometric measures of PTSD. The different measures assessed related but somewhat separate phenomena, and they were positively correlated with degree of combat exposure. The Mississippi Scale was found to have the highest sensitivity and specificity of all measures used in identifying PTSD cases. The clinical utility of these measures was demonstrated in a study of 489 veterans presenting primarily for substance abuse treatment at our facility. We found that 46% of the combat-exposed Viet Nam veterans in this sample experienced clinically significant PTSD, and that our psychometric screening procedure was useful for case identification and recruitment of patients into our PTSD program.

More recently, we have begun a series of studies investigating hypothalamo-pituitary-adrenal axis function in PTSD. Drs. Charles Wilkinson and Murray Raskind, University of Washington colleagues, are collaborating with us on these projects. We also are investigating, in collaboration with Drs. Deborah Cowley and Peter Roy-Byrne at the University of Washington, whether central benzodiazepine receptor function may be altered in PTSD, and whether such alteration is related to changes in SNS function. We also are interested in studying whether, among substance abusers, there are subtypes of PTSD that respond differently to selected addictions treatment interventions.

Selected Bibliography

MCFALL, M.E., MACKAY, P.W. & DONOVAN, D.M. (1991). **Combat-related PTSD and psychosocial adjustment problems among substance abusing veterans.** *Journal of Nervous and Mental Disease, 149,* 33-38.

MCFALL, M.E., MURBURG, M.M., KO, G.N. & VEITH, R.C. (1990). **Autonomic responses to stress in Vietnam combat veterans with posttraumatic stress disorder.** *Biological Psychiatry, 27,* 1165-1175.

MCFALL, M.E., MURBURG, M.M., ROSZELL, D.K. & VEITH, R.C. (1989). **Psychophysiologic and neuroendocrine findings in posttraumatic stress disorder: A review of theory and research.** *Journal of Anxiety Disorders, 3,* 243-257.

MCFALL, M.E., SMITH, D.S., MACKAY, P. & TARVER, D.J. (1990). **Reliability and validity of the Mississippi Scale for combat-related posttraumatic stress disorder.** *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 2,* 114-121.

MCFALL, M.E., SMITH, D.S., ROSZELL, D.K., TARVER, D.J. & MALAS, K.L. (1990). **Convergent validity of measures of PTSD in Vietnam combat veterans.** *American Journal of Psychiatry, 147,* 645-648.

MCFALL, M.E., VEITH, R.C. & MURBURG, M.M. (in press). **Basal sympathoadrenal function in PTSD.** *Biological Psychiatry.*

MURBURG, M.M. (Ed.) (in press). **Catecholamine function in PTSD: Emerging concepts.** Washington, DC: American Psychiatric Press.

MURBURG, M.M., LEWIS, N., MCFALL, M.E. & VEITH, R.C. (1991, May). **Norepinephrine kinetics in PTSD and depression.** Paper presented at the American Psychiatric Association Meeting, New Orleans, LA.

MURBURG, M.M., MCFALL, M.E., KO, G.N. & VEITH, R.C. (1989). **Sympathoadrenal response to combat-related versus combat-unrelated stressors in combat veterans with post-traumatic stress disorder and controls.** *Biological Psychiatry, 25:*33A.

MURBURG, M.M., MCFALL, M.E., PETRIE, E. & VEITH, R.C. (1991, November). **Basal sympathoadrenal function in posttraumatic stress disorder.** Presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.

MURBURG, M.M., MCFALL, M.E. & VEITH, R.C. (1990). **Catecholamines, stress and posttraumatic stress disorder.** In E.L. Giller (Ed.), *Biological assessment and treatment of posttraumatic stress disorder* (pp. 27-64). Washington, DC: American Psychiatric Press.