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TRAUMA, PTSD, AND PHYSICAL HEALTH

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This issue of the *PTSD Research Quarterly* reviews the growing literature on the health outcomes associated with trauma and PTSD. It is based in part on a chapter I recently published with Matt Friedman (Friedman & Schnurr, 1995) in which we propose that PTSD is a primary mediator of the relationship between trauma and poor physical health.

Methodological issues. There are a number of methodological issues to consider when attempting to understand the complex literature on trauma, PTSD, and physical health. Because all of the data are correlational, caution must be used in ascribing a causal role to either trauma or PTSD. This caution is no different than that which must be used in making causal interpretations for the effects of trauma and of PTSD more generally. One methodological issue that is different, though, is that most of the outcome data are based on self-reports of physical health. Self-reports can, and do, reflect actual health status, but the two are not synonymous. Another methodological issue centers on the nature of the control group that is used to ascertain differences in traumatized or PTSD groups. It is critically important that the controls be as similar as possible to the target group in age, gender, race, and other variables known to affect health, especially in studies of veterans. Because veterans are screened for health conditions prior to entering the military, they are typically healthier than the general population (Seltzer & Jablon, 1974). One last issue is mortality due to external causes (accidents and suicides), which is elevated in traumatized and PTSD populations (e.g., Bullman & Kang, 1994; Centers for Disease Control, 1987; Thomas et al., 1991). This excess of mortality may obscure the effect of trauma and PTSD on disease outcomes.

Physical health outcomes associated with trauma. There are numerous studies showing that individuals who are exposed to a traumatic event have an increased likelihood of poor self-reported health, morbidity (as indicated by physical exam or laboratory tests), utilization of medical services, and mortality. Most existing studies have used self-reported health as an outcome, but there are exceptions that considerably strengthen the interpretation of the self-report data as indicative of actual health status.

One line of investigation has focused on health outcomes among crime victims. Koss and colleagues (1991) studied a sample of women drawn from a health maintenance organization. Victims, compared to nonvictims, reported poorer physical health and more physical health symptoms. Victims also showed increases in physician visits after victimization, relative to before victimization. Specifically focusing on sexual assault, Golding (1994) found that assaulted women were more likely than nonassaulted women to report a wide range of physical symptoms, both those that could be explained by drug use, illness, or injury, as well as those that could not. Assaulted and nonassaulted women did not differ in the likelihood of reporting at least one chronic disease, although reports of several diseases were higher among assaulted women. Leserman and colleagues (1996) studied female patients in a gastroenterology practice and found that sexual and physical abuse each were associated with poor outcomes (e.g., somatic symptoms, bed disability days, and lifetime surgeries). Rape and life-threatening physical abuse had more significant effects than less serious forms of sexual and physical assault.

Another line of inquiry has focused on military veterans. The effects of trauma and PTSD are difficult to interpret in studies of former prisoners of war because of the injury and illness directly related to imprisonment. (This is also true in studies of concentration camp survivors, such as the classic work by Eitinger, 1973.) However, any review of the health outcomes following trauma would be incomplete without mention of an important series of studies on men who were POWs in World War II or the Korean conflict (Beebe, 1975; Keehn, 1980; Nefzger, 1970). An interesting aspect of these studies is that accidental death is an important influence on mortality, a finding that is also true in studies of both male (Centers for Disease Control, 1987) and female (Thomas et al., 1991) Vietnam veterans. In general, the mortality studies of Vietnam veterans have not found increased mortality due to disease; an exception is increased risk of death due to pancreatic and to uterine cancers among female veterans (Thomas et al., 1991). Both the Centers for Disease Control (1988) and the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1990) found that Vietnam veterans had increased reports of poor health, relative to era veterans. Kulka et al. also found that Vietnam veterans had increased

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utilization of medical services. The Centers for Disease Control (1988) study, however, found few objective health differences between Vietnam and Vietnam-era veterans.

Sibai and colleagues (1989) did find objective health differences associated with traumatic exposure. They studied civilians exposed to the civil war in Lebanon and found that patients with severe coronary artery disease had more war-related stress than did either patients with normal arteriographic findings or hospital visitors. Another study that found objective health differences focused on individuals with chronic fatigue syndrome who were exposed to Hurricane Andrew (Lutgendorf et al., 1995). Compared to chronic fatigue patients who were not exposed to the hurricane, the exposed patients showed significant increases in physician-diagnosed relapse, as well as increases in self-reported symptoms and illness burden.

A number of other studies have examined the health consequences of exposure to natural or technological disaster. Two groups of investigators have capitalized on investigations that were ongoing for another purpose to prospectively study changes in physical health among individuals who were exposed to a natural disaster (Escobar et al., 1992; Phifer, 1990). Both studies found increased reports of poor health. Hovanitz (1993) provides an excellent summary of findings on the health effects of disaster exposure and discusses likely causal mechanisms.

Physical health outcomes associated with PTSD. The above-mentioned studies are but a small sample of the existing literature. Reviewing this literature, Matt Friedman and I (1995) concluded that there is good evidence for increases in self-reported health, morbidity, service utilization, and mortality following exposure to trauma. We feel that PTSD is the likely cause for a substantial part of the observed association between trauma and adverse health outcomes.

A study by Wolfe and colleagues (1994) of female Vietnam veterans illustrates the point. War-zone exposure and PTSD, by themselves, were associated with self-reports of poor health and numerous physical problems. But when both exposure and PTSD were simultaneously treated as predictors, the effects associated with exposure substantially diminished, whereas the effects associated with PTSD remained virtually unchanged. Path analysis of two of the primary outcomes (self-reported health and number of health problems) found that 50-75% of the effects of exposure were mediated by PTSD (Friedman & Schnurr, 1995).

The NVVRS found that both male and female Vietnam veterans with PTSD had increased reports of poor health and utilization of medical services, relative to Vietnam veterans without PTSD. Litz and colleagues found that PTSD in male Vietnam veterans was associated with increased reports of a variety of physical symptoms, although not with more physician-diagnosed disorders. The specific problems associated with PTSD implicate a variety of organ systems, e.g., cardiovascular, neurological, and gastrointestinal (Breslau & Davis, 1992; McFarlane et al., 1994; Shalev et al., 1990; Wolfe et al., 1994).

Among individuals with PTSD, chronicity, symptom severity, and comorbidity with other psychiatric disorders confer increase risk of poor health. Breslau and Davis (1992) found that young adults whose PTSD lasted at least a year reported more medical conditions than those whose PTSD lasted less than a year. McFarlane and colleagues (1994) divided a sample of Australian firefighters who had experienced a major natural disaster into those who had physical problems and those who did not. The group with physical problems had higher PTSD symptom levels and was more likely to have Major Depression.

There have been only a few published studies of physical morbidity in PTSD. Falger and colleagues (1992) compared World War II Dutch Resistance fighters who currently had PTSD with men of similar age who had recently had either surgery or a myocardial infarction (MI). The PTSD group was comparable to the MI group in prevalence of angina (31% vs. 26%, respectively), and higher than the surgery group (7%). Shalev and colleagues (1990) studied Israeli combat veterans with PTSD, who did not differ from non-PTSD controls on physical exam and laboratory test findings. Effort tolerance was poorer in veterans who had PTSD, regardless of whether they smoked. Even though smoking did not provide a sufficient explanation for the difference between PTSD and no PTSD groups, smoking and other health behaviors are important factors to consider when attempting to understand how PTSD might promote poor health. I consider this issue in the section below on mechanisms.

Despite the data showing that PTSD is associated with increased physical morbidity, the one existing study of mortality and PTSD failed to find that mortality due to physical causes is increased in PTSD (Bullman & Kang, 1994). This study, which was based on male Vietnam veterans in the Agent Orange Registry, found an excess of death due to external causes among the veterans with PTSD, relative to both veterans without PTSD and to the general population.

Mechanisms. Rosen and Fields (1988) were among the first to attempt to explain how PTSD could adversely affect physical health. Their explanation centered around neurochemical changes in the brain. In our review chapter, Matt Friedman and I (1995) discussed biological, psychological, and behavioral correlates of PTSD that could substantiate a causal role for PTSD. The biological correlates include cardiovascular reactivity, autonomic hyperarousal, disturbed sleep physiology, adrenergic dysregulation, enhanced thyroid function, and altered HPA activity. The psychological correlates include depression, hostility, and poor coping, and the behavioral include poor health habits such as smoking and drinking.

Most recently, my research has focused on these psychological and behavioral factors, in particular, smoking and alcohol consumption. A follow-up study of Israeli combat veterans found that PTSD was associated with increases in alcohol consumption and smoking (Solomon & Mikulincer, 1987). Shalev et al.'s (1990) study of Israeli combat veterans also found that veterans with PTSD were more likely than veterans without PTSD to smoke, drink alcohol, and have dysregulated eating habits. More recently, Beckham and

colleagues (1995) have reported an association between smoking and PTSD in American combat veterans. How much variance in health outcomes can be explained by behavioral, as opposed to psychological and biological processes, remains to be determined. It is noteworthy that smoking failed to explain the poor effort tolerance in PTSD that was observed by Shalev and colleagues. Future research needs to comprehensively evaluate all potential mechanisms because it is unlikely that any single one will prove to be sufficiently explanatory.

Conclusions. The literature on trauma and health consistently shows that exposure to trauma is related to poor health outcomes. The much smaller literature on PTSD and health also shows consistent associations between PTSD and poor health. Given the prevalence of trauma in the general population—roughly 5% in men and 10% in women (Kessler et al., 1995)—the existing data can be used to argue that exposure to trauma is a significant public health problem that has real social and economic costs. Perhaps the most important direction for future research will be to assess morbidity and mortality along with self-reports of health status and service utilization. It will be through such efforts that the true costs of trauma can be estimated.

REFERENCES

KESSLER, R.C., SONNEGA, A., BROMET, E.J., HUGHES, M., & NELSON, C.B. (1995). **Posttraumatic stress disorder in the National Comorbidity Survey.** *Archives of General Psychiatry, 52,* 1048-1060.

SELTZER, C.C. & JABLON, S. (1974). **Effects of selection on mortality.** *American Journal of Epidemiology, 100,* 367-372.

SELECTED ABSTRACTS

BECKHAM, J.C., ROODMAN, A.A., SHIPLEY, R.H., HERTZBERG, M.A., CUNHA, G.H., KUDLER, H.S., LEVIN, E.D., ROSE, J.E., & FAIRBANK, J.A. (1995). **Smoking in Vietnam combat veterans with post-traumatic stress disorder.** *Journal of Traumatic Stress, 8,* 461-472. The present study investigated smoking prevalence, smoking motives, demographic variables and psychological symptoms in 124 help-seeking, male Vietnam combat veterans with PTSD. A high percentage of these veterans smoked (60%). Vietnam veterans with PTSD who smoked were more likely than those who did not smoke to report higher levels of PTSD symptoms, depression and trait anxiety. Increased depression was associated with increased automatic smoking. Smokers reported a high frequency of smoking in response to military memories. Implications for smoking interventions, cessation, and relapse prevention efforts are discussed.

BULLMAN, T.A. & KANG, H.K. (1994). **Posttraumatic stress disorder and the risk of traumatic deaths among Vietnam veterans.** *Journal of Nervous and Mental Disease, 182,* 604-610. Vietnam veterans have been reported to be at increased risk for PTSD and deaths due to traumatic causes after service in the Vietnam War. This study evaluated whether an association exists between PTSD and traumatic deaths among Vietnam veterans. Mortality risk of 4,247 Vietnam veterans from the Agent Orange Registry (AOR) with a diagnosis of PTSD relative to that of 12,010 Vietnam veterans from the AOR with no diagnosis of PTSD was calculated using the Cox proportional hazards model. Mortality experience of both groups was also compared with U.S. males. The PTSD veterans were more likely than the non-PTSD veterans to die from suicide (relative risk = 3.97, 95% confidence interval [CI] = 2.20-7.03) and from accidental poisoning (relative risk = 2.89, CI = 1.03-8.12). The standardized mortality ratio for suicides was 6.74 (CI = 4.4-9.87) among PTSD veterans and 1.67 (CI = 1.05-2.53) among non-PTSD veterans. Among Vietnam veterans on the AOR, PTSD is associated with a significant increased risk for suicide and accidental poisoning.

CENTERS FOR DISEASE CONTROL VIETNAM EXPERIENCE STUDY. (1988). **Health status of Vietnam veterans: II. Physical health.** *Journal of the American Medical Association, 259,* 2708-2714. The Vietnam Experience Study was a multidimensional assessment of the health of Vietnam veterans. From a random sample of enlisted men who entered the US Army from 1965 through 1971, 7,924 Vietnam and 7,364 non-Vietnam veterans participated in a telephone interview; a random subsample of 2,490 Vietnam and 1972 non-Vietnam veterans also underwent a comprehensive medical examination. During the telephone interview, Vietnam veterans reported current and past health problems more frequently than non-Vietnam veterans, although results of medical examinations showed few current objective differences in physical health between the two groups. The Vietnam veterans had more hearing loss. Also, among a subsample of 571 participants who had semen samples evaluated, Vietnam veterans had lower sperm concentrations and lower mean proportions of morphologically "normal" sperm cells. Despite differences in sperm characteristics, Vietnam and non-Vietnam veterans have fathered similar numbers of children.

FALGER, P.R.J., OP DEN VELDE, W., HOVENS, J.E.J.M., SCHOUTEN, E.G.W., DE GROEN, J.H.M., & VAN DUIJN, H. (1992). **Current posttraumatic stress disorder and cardiovascular disease risk factors in Dutch Resistance veterans from World War II.** *Psychotherapy and Psychosomatics, 57,* 164-171. The extraordinary trauma experienced by Resistance veterans from World War II (WWII) and other veterans may be associated with an increased incidence of PTSD and somatic morbidity, including cardiovascular disease (CVD). This study explored some relationships between current PTSD and CVD risk factors in 147 male Dutch WWII Resistance veterans. They were compared to 65 same-aged male patients with a recent myocardial infarction and 79 surgical patients. Of these subjects, WWII Resistance veterans scored highest on CVD risk factors (i.e., angina pectoris, type A behavior, lifestressors, and vital exhaustion), except smoking. 56% of these veterans were currently suffering from PTSD. They reported CVD risk factors, in particular, type A behavior and vital exhaustion, more often than veterans without PTSD; they also reported more premorbid adverse living conditions. These data suggest that early sensitization to environmental stressors may be associated with a high prevalence of current PTSD and excess CVD risk factors in subjects exposed to extraordinary wartime trauma and that this may lead to vital exhaustion.

FRIEDMAN, M.J. & SCHNURR, P.P. (1995). **The relationship between trauma, post-traumatic stress disorder, and physical health.** In M.J. Friedman, D.S. Charney, & A.Y. Deutch (Eds.), *Neurobiological and clinical consequences of stress: From normal adaptation to post-traumatic stress disorder* (pp. 507-524). Philadelphia: Lippincott-Raven. Abstracted in *PTSD Research Quarterly, 6(4),* 1995.

GOLDING, J.M. (1994). **Sexual assault history and physical health in randomly selected Los Angeles women.** *Health Psychology, 13,* 130-138. Associations of sexual assault history with multiple measures of physical health were examined among randomly selected women living in Los Angeles (N = 1,610). Sexually assaulted women were more likely than nonassaulted women to report poor health perceptions, functional limitation, several chronic diseases, medically explained somatic symptoms, and medically unexplained somatic symptoms. Sexual assault was associated with increased risk of symptoms in a variety of organ systems rather than solely reproductive or sexual symptoms. The data are from the Los Angeles Epidemiologic Catchment Area (LA-ECA) project, one of five sites of the National Institute of Mental Health (NIMH)-initiated, collaborative ECA programs.

HOVANITZ, C.A. (1993). **Physical health risks associated with aftermath of disaster: Basic paths of influence and their implications for preventative intervention.** *Journal of Social Behavior and Personality, 8,* 213-254. This article reviews empirical evidence supporting stress as a cause of the link between disaster and impaired physical health. Victims of natural disasters report longer illnesses and poorer health. Physician or hospital records also suggest greater physical morbidity and mortality. Increased life stress is observed to follow disaster, and is also prospectively related to an increased likelihood of the initiation or exacerbation of physical impairment. Alterations in immune functioning and psychophysiological reactivity that result from stress are likely causes of these health risks. Many studies suggest that immune functioning and psychophysiological reactivity may be improved by interventions such as relaxation and physical exercise. These techniques may serve as useful preventative interventions in the wake of a disaster. Other strategies that should reduce the risk of physical impairment involve alterations in the cognitive and emotional processing of the trauma.

KOSS, M.P., KOSS, P.G., & WOODRUFF, W.J. (1991). **Deleterious effects of criminal victimization on women's health and medical utilization.** *Archives of Internal Medicine, 151,* 342-347. The long-term consequences of criminal victimization on physical health were examined among 390 adult women (74 nonvictims and 316 victims of crime). Data included health status self-ratings and objective service utilization. Findings indicated that severely victimized women, compared with nonvictims, reported more distress and less well-being, made physician visits twice as frequently in the index year, and had outpatient costs that were 2.5 times greater. Criminal victimization severity was the most powerful predictor of physician visits and outpatient costs. Utilization data across 5 years preceding and following crime were obtained from 15 rape victims, 26 physical assault victims, and 27 noncontact crime victims and were compared with five continuous years of utilization among 26 nonvictims. Victims' physician visits increased 15% to 24% during the year of the crime compared with less than 2% change among nonvictims. We conclude that these long-term deleterious effects suggest that criminally victimized women's needs for medical treatment transcend the traditional focus on emergency care and forensic evaluation.

KULKA, R.A., SCHLENGER, W.E., FAIRBANK, J.A., HOUGH, R.L., JORDAN, B.K., MARMAR, C.R., WEISS, D.S., & WEIR, J. (1990). **Use of physical and mental health services.** In R.A. Kulka, W.E. Schlenger, J.A. Fairbank, R.L. Hough, B.K. Jordan, C.R. Marmar, & D.S. Weiss, *Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study* (pp. 200-235). New York: Brunner/Mazel. Chapter IX presents findings on the patterns of use of services for physical and mental health problems. Separate analyses are provided for a number of subtypes of mental and physical health services. First, because the mental health status of Vietnam veterans was a particular focus of the NVVRS, findings for the use of mental and physical health services are presented separately. Because Public Law 98-160, which mandated the Readjustment Study, expressly stipulated that data be presented on use of services provided by the Veterans Administration (VA), data on VA services (VA medical centers, VA outpatient clinics, and Vet Centers) are presented separately from those for other services, although the total use of services, VA and non-VA combined, is also examined. To determine whether Vietnam theater veterans have sought more care overall than comparison groups—and whether they have sought more or less care recently—lifetime use of services is also distinguished from more recent use. Finally, because use of inpatient care often reflects the presence of more serious problems than outpatient care, but yet typically represents only a small proportion of total care, separate information is also provided for the use of inpatient and outpatient physical health care. However, because inpatient mental health care is a particularly rare event, use of inpatient mental health care is not separated for either analysis or discussion.

LESERMAN, J., DROSSMAN, D.A., LI, Z., TOOMEY, T.C., NACHMAN, G., & GLOGAU, L. (1996). **Sexual and physical abuse history in gastroenterology practice: How types of abuse impact health status.** *Psychosomatic Medicine, 58,* 4-15. There is an increasing amount of literature pointing to a relationship between sexual and/or physical abuse history and poor health status, although few studies provide evidence concerning which aspects of abuse may impact on health. In female patients with gastrointestinal (GI) disorders, the present study examined the effects on health status of: 1) history of sexual abuse and physical abuse, 2) invasiveness or seriousness of sexual abuse and physical abuse, and 3) age at first sexual and physical abuse. The sample included 239 female patients from a referral gastroenterology clinic who were interviewed to assess sexual and physical abuse history. We found the following: 1) 66.5% of patients experienced some type of sexual and/or physical abuse; 2) women with sexual abuse history had more pain, non-GI somatic symptoms, bed disability days, lifetime surgeries, psychological distress, and functional disability compared to those without sexual abuse; 3) women with physical abuse also had worse health outcome on most health status indicators; 4) rape (intercourse) and life-threatening physical abuse seem to have worse health effects than less serious physical violence, and sexual abuse involving attempts and touch; and 5) those with first abuse in childhood did not appear to differ on health from those whose first abuse was as adults. The authors conclude that asking about abuse should be integrated into history taking within referral-based gastroenterology practices.

LUTGENDORF, S.K., ANTONI, M.H., IRONSON, G., FLETCHER, M.A., PENEDO, F., BAUM, A., SCHNEIDERMAN, N., & KLIMAS, N. (1995). **Physical symptoms of chronic fatigue syndrome are exacerbated by the stress of Hurricane Andrew.** *Psychosomatic Medicine, 57,* 310-323. This study examined the effects of Hurricane Andrew on physical symptoms and functional impairments in a sample of chronic fatigue syndrome (CFS) patients residing in South Florida. In the months after Hurricane Andrew (September 15-December 31,1992), 49 CFS patients were assessed for psychosocial and physical functioning

with questionnaires, interviews, and physical examinations. This sample was made up of 25 CFS patients living in Dade county, a high impact area, and 24 patients in Broward and Palm Beach counties, areas less affected by the hurricane. Based on our model for stress-related effects on CFS, we tested the hypothesis that the patients who had the greatest exposure to this natural disaster would show the greatest exacerbation in CFS symptoms and related impairments in activities of daily living (illness burden). In support of this hypothesis, we found that the Dade county patients showed significant increases in physician-rated clinical relapses and exacerbations in frequency of several categories of self-reported CFS physical symptoms as compared to the Broward/Palm Beach county patients. Illness burden, as measured on the Sickness Impact Profile, also showed a significant increase in the Dade county patients. Although extent of disruption due to the storm was a significant factor in predicting relapse, the patient's posthurricane distress response was the single strongest predictor of the likelihood and severity of relapse and functional impairment. Additionally, optimism and social support were significantly associated with lower illness burden after the hurricane, above and beyond storm-related disruption and distress responses. These findings provide information on the impact of environmental stressors and psychosocial factors in the exacerbation of CFS symptoms.

MCFARLANE, A.C., ATCHISON, M., RAFALOWICZ, E., & PAPAY, P. (1994). **Physical symptoms in post-traumatic stress disorder.** *Journal of Psychosomatic Research, 38,* 715-726. Physical complaints are recognised accompaniments of PTSD. This study investigates the reporting of physical complaints in a treatment-naive sample of fire-fighters with and without PTSD. Statistically higher rates of cardiovascular, respiratory, musculoskeletal and neurological symptoms were reported in the PTSD group. Possible explanations are discussed, with an exploration of the contribution of arousal, disordered information processing, dissociation, comorbid diagnoses and premorbid personality. The role of the original stressor and sociocultural issues are explored.

NEFZGER, M.D. (1970). **Follow-up studies of World War II and Korean War prisoners: I. Study plan and mortality findings.** *American Journal of Epidemiology, 91,* 123-138. U.S. Army men taken captive during World War II and the war in Korea, and various other groups, were followed for mortality to 1965. Standard mortality ratios and death rates indicate a clear early excess of deaths among prisoners held by the Japanese in World War II. Relative to their controls, excess mortality in Pacific prisoners diminished with time, the two groups being indistinguishable by the mid-1950's. Prisoners from the European and Mediterranean areas of World War II have not had an adverse mortality experience to 1965. Mortality in Korean War prisoners has been more like that in Pacific than European prisoners: A substantial early excess of deaths has, relative to partially matched controls, all but disappeared. Korean War prisoners remained at about the same disadvantage throughout 12 years of follow-up in relation to mortality in U.S. white males, whereas Pacific prisoners did not. Accidents, tuberculosis, and cirrhosis of the liver appear to be the causes chiefly responsible for the excess deaths in Pacific prisoners. Trauma is the most common cause of death, and of excess death, in the younger Korean prisoners.

SHALEV, A.Y., BLEICH, A., & URSANO, R.J. (1990). **Posttraumatic stress disorder: Somatic comorbidity and effort tolerance.** *Psychosomatics, 31,* 197-203. Abstracted in *PTSD Research Quarterly, 1(2),* 1990.

SIBAI, A.M., ARMENIAN, H.K., & ALAM, S. (1989). **Wartime determinants of arteriographically confirmed coronary artery disease in Beirut.** *American Journal of Epidemiology, 130,* 623-631. This study investigates the association of wartime stress variables and coronary artery disease as determined by coronary angiography in Lebanon in 1986, a country with an ongoing civil war for over a decade. A total of 127 patients who underwent coronary angiography at the American University of Beirut Medical Center were individually matched on age and sex with visitor controls free from any evidence of clinical coronary artery disease. Arteriographic cases (greater than or equal to 70% maximal stenosis) were compared with two control groups: arteriographic controls (entirely normal coronaries) and visitor controls. Findings suggest that there is a relation between exposure to both acute and chronic war events and coronary artery disease in this patient population. The reporting of exposure to acute war events was significantly higher in cases compared with both visitor controls (odds ratio (OR) = 2.4, 95% confidence interval (CI) 1.17-4.90) and arteriographic controls (OR = 2.8, 95% CI 0.93-8.47)). Crossing the "green-lines" that separate two belligerent sides, considered as an attribute of war-related chronic stress, was more frequent in cases compared with visitor controls (OR = 3.25, 95% CI 1.54-6.89) and arteriographic controls (OR = 5.38, 95 % CI 1.65-17.6). The relation observed between wartime stress and coronary artery disease could not be explained by possible over-reporting of stressful events in patients with suspected coronary artery disease or by an increase in clinical awareness for the disease for those under continuous stress. Adjusting for the effect of the well-established coronary artery disease risk factors did not alter the above findings.

THOMAS, T.L., KANG, H.K., & DALAGER, N.A. (1991). **Mortality among women Vietnam veterans, 1973-1987.** *American Journal of Epidemiology, 134,* 973-980. A retrospective cohort mortality study was conducted to examine health effects of U.S. military service in Vietnam on women veterans who served there between July 4, 1965 and March 28, 1973. About 4,600 women Vietnam veterans and 5,300 women veterans who had never served in Vietnam were identified from military records and followed for vital status on December 31, 1987. Mortality rates for all causes of death combined and for all cancers among Vietnam veterans were similar to those among non-Vietnam veterans (relative risk (RR) = 0.93). There was a slight excess of mortality from external causes among women Vietnam veterans compared with non-Vietnam veterans (RR = 1.33), primarily due to an excess of motor vehicle accidents (RR = 3.19). Suicide rates were nearly the same in both cohorts (RR = 0.96). Vietnam veterans had twofold increases in mortality from cancers of the pancreas and uterine corpus compared with non-Vietnam veterans. Women Vietnam veterans and non-Vietnam veterans had lower-than-expected mortality from all causes of death combined (standardized mortality ratio (SMR) = 0.82 and 0.88, respectively), based on rates for US women, due to significant deficits of deaths from circulatory disease. Compared with rates for US women, mortality from cancers of the pancreas (5 deaths, SMR = 3.27) and uterine corpus (4 deaths, SMR = 4.05) was significantly elevated among Vietnam veteran nurses.

WOLFE, J., SCHNURR, P.P., BROWN, P.J., & FUREY, J.A. (1994). **Posttraumatic stress disorder and war-zone exposure as correlates of perceived health in female Vietnam War veterans.** *Journal of Consulting and Clinical Psychology, 62,* 1235-1240. Previous studies have identified traumatic exposure and PTSD as predictors of physical health complaints without considering the

relationship between exposure and PTSD. This study examined the unique associations of war-zone exposure and PTSD with perceived physical health outcomes in a nontreatment-seeking sample of 109 female veterans of the Vietnam War who responded to a series of psychological, exposure, and health questionnaires. Both PTSD and exposure were associated with reports of negative health outcomes when each variable was not adjusted for the other. The effects associated with exposure decreased when PTSD was controlled for, whereas the effects associated with PTSD remained when exposure was controlled for. Results suggest that effects of traumatic exposure on perceived health are partially mediated by increases in PTSD after exposure, supporting studies on the effects of stress on health.

ADDITIONAL CITATIONS
Annotated by the Editors

BEEBE, G.W. (1975). **Follow-up studies of World War II and Korean War Prisoners: II. Morbidity, disability, and maladjustments.** *American Journal of Epidemiology, 101,* 400-422. Cited in *PTSD Research Quarterly, 2(1),* 1991.

BRESLAU, N. & DAVIS, G.C. (1992). **Posttraumatic stress disorder in an urban population of young adults: Risk factors for chronicity.** *American Journal of Psychiatry, 149,* 671-675.
Examined risk factors for chronic PTSD (duration ≥ 1 year) in a sample of 93 young adults with PTSD. Individuals who had chronic PTSD were more likely than those who had non-chronic PTSD to have a self-reported history of 4 of 11 conditions studied: arthritis, bronchitis, migraine, and, among women only, gynecologic complaints.

CENTERS FOR DISEASE CONTROL VIETNAM EXPERIENCE STUDY. (1987). **Postservice mortality among Vietnam veterans.** *Journal of the American Medical Association, 257,* 790-795.
Assessed mortality through 1983 in a cohort of 9,324 U.S. Army Vietnam and Vietnam-era veterans. Total mortality, which was 17% higher among Vietnam veterans, occurred primarily during the first five years after discharge and was observed only for death due to external causes, such as accidents and suicide. Mortality due to circulatory disease was lower in Vietnam veterans than in era veterans.

EISEN, S.A., GOLDBERG, J., TRUE, W.R., & HENDERSON, W.G. (1991). **A co-twin control study of the effects of the Vietnam War on the self-reported physical health of veterans.** *American Journal of Epidemiology, 134,* 49-58.
Assessed the effect of combat exposure on self-reports of 13 physical health problems in a sample of 2,260 male monozygotic twin pairs who served in the U.S. military during the Vietnam War. Relative to twins who did not serve in Southeast Asia, co-twins who served in Southeast Asia had increased odds of hearing problems, persistent skin conditions, and having been hospitalized for a stomach condition. These effects were observed even when the authors controlled for PTSD and demographic and military service factors.

EITINGER, L. (1973). **A follow-up study of the Norwegian concentration camp survivors' mortality and morbidity.** *Israel Annals of Psychiatry and Related Disciplines, 11,* 199-209.
Assessed morbidity and mortality thru 1966 in Norwegian concentration camp survivors. Mortality was much higher among survivors, relative to the general population of Norway. Tuberculosis and other infectious diseases were the most common causes of death.

ESCOBAR, J.I., CANINO, G.J., RUBIO-STIPEC, M., & BRAVO, M. (1992). **Somatic symptoms after a natural disaster: A prospective study.** *American Journal of Psychiatry, 149,* 965-967.
Interviewed participants in a Puerto Rican epidemiological study before and after their exposure to severe floods and mudslides. Disaster exposure was unrelated to persistent symptoms but increased the likelihood of reporting a new gastrointestinal or cardiorespiratory symptom.

KEEHN, R.J. (1980). **Follow-up studies of World War II and Korean conflict prisoners: III. Mortality to January 1, 1976.** *American Journal of Epidemiology, 111,* 194-211.
Combined the assessment of mortality in a cohort of male U.S. Army veterans who were prisoners of war during either World War II or the Korean conflict. There was no increase in mortality due to chronic or degenerative disease, although increases were observed due to cirrhosis, tuberculosis, and external causes.

LITZ, B.T., KEANE, T.M., FISHER, L., MARX, B., & MONACO, V. (1992). **Physical health complaints in combat-related posttraumatic stress disorder: A preliminary report.** *Journal of Traumatic Stress, 5,* 131-141.
Compared self-reports of physical symptoms and of physician-diagnosed disease in male Vietnam combat veterans with and without PTSD. Relative to the veterans without PTSD, those with PTSD reported more symptoms but not physician-diagnosed disease.

PHIFER, J.F. (1990). **Psychological distress and somatic symptoms after natural disaster: Differential vulnerability among older adults.** *Psychology and Aging, 5,* 412-420.
Assessed change in somatic and other symptoms among a panel of older adults who experienced a severe flood while taking part in a study designed for other purposes. Somatic symptoms increased after the flood. The effect of prior somatic symptoms on post-exposure symptoms was unrelated to sociodemographic factors.

ROSEN, J. & FIELDS, R.B. (1988). **The long-term effects of extraordinary trauma: A look beyond PTSD.** *Journal of Anxiety Disorders, 2,* 179-191.
Presents a model of the etiology of health problems in PTSD. The model focuses on the neurobiological correlates of PTSD and on increased autonomic reactivity as key mechanisms in promoting poor health.

SOLOMON, Z. & MIKULINCER, M. (1987). **Combat stress reactions, post traumatic stress disorder and somatic complaints among Israeli soldiers.** *Journal of Psychosomatic Research, 31,* 131-137.
Conducted a one-year follow-up of three groups of Israeli military veterans: those who suffered a combat stress reaction, combat controls, and noncombat controls. PTSD was associated with increased likelihood of smoking and alcohol consumption.

RESEARCH AT THE NATIONAL CENTER FOR PTSD: WOMEN'S HEALTH SCIENCES DIVISION

Jessica Wolfe, PhD

The Women's Health Sciences Division was added to the National Center for PTSD during Fiscal Year 1993. Research in this Division is designed to address correlates and aspects of gender that are potentially linked to PTSD and closely associated disorders. The Division is under the direction of Dr. Jessica Wolfe and is based at the Boston VA Medical Center. Dr. Wolfe was previously a senior clinical research psychologist in the Behavioral Science Division of the National Center, Boston.

Early research initiatives of the Division included Dr. Wolfe's examination of cognitive information processing and memory among female Vietnam veterans. In addition, the Division pioneered the development of gender-appropriate psychological assessment methodologies for trauma, initiated large-scale surveys of the female veteran population, and began a series of stress and health studies of women returning from service in Operation Desert Storm. Increasingly, the Division has focused its research efforts toward an understanding of the impact of sexual assault on women's mental health as well as the implications of PTSD symptomatology on women's medical problems and long-range physical health.

Dr. Diana Hearst-Ikeda joined the Division during its first year. Her research has largely been concerned with the need for increased understanding of the assessment of psychological, physical, and psychosocial reactions in women who have been assaulted. She has organized a program of research around the theme of concealment and disclosure of highly stressful or traumatic experiences and how they serve to exacerbate or ameliorate stress reactions and subsequent mental and physical health.

Drs. Marie Caulfield and Glenn Saxe offer research interests and perspectives in developmental psychopathology. Dr. Caulfield, who joined the staff in 1994, has conducted studies on the prevalence and impact of relationship violence among adolescents and young adults, and, more recently, has pursued research work with chronically abused female adolescents. Dr. Saxe, who became a staff member in 1995, has examined acute stress disorder and plotted the course of PTSD symptom development among children who have experienced severe burn injuries. In addition, Dr. Saxe has devoted research time to the importance of dissociation as a factor contributing to psychopathology, with special emphasis on child trauma.

The Division enhanced its research breadth upon the addition of Dr. Amy Stern, a gerontologist and health outcomes researcher, in early 1995. Dr. Stern has worked closely with Dr. Wolfe on two funded studies concerning female veterans' perceptions and experiences in accessing VA health care and predictors of functional status among Persian Gulf War veterans.

In late 1995, Drs. Tamara Newton and Lynda King joined the staff of the Division. Dr. Newton is a clinical psychologist with a specialty in the areas of health and behavioral medicine. Her research concerns gender, emotion, and biological responses to stress, with particular emphasis on interpersonal stressors. Dr. King is a quantitative psychologist with interests related to psychometrics, research design, and statistics. Other staff in the Women's Health Sciences Division who have active research programs are three post-doctoral fellows: Drs. Nicole Harrington, Erica Sharkansky, and Amy Wagner.

The Division was recently awarded a grant from the Department of Defense's Defense Women's Health Research Program to study gender-related differences in attrition among female and male Marine Corps recruits. The principal investigator is Dr. Wolfe, in collaboration with Drs. Caulfield and Newton.

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PILOTS UPDATE

Eitinger Classic Selected as 10,000th PILOTS Record

Seven years ago, the newly established National Center for Post-Traumatic Stress Disorder undertook as one of its first projects the establishment of an electronic index to the Published International Literature On Traumatic Stress—the PILOTS database. Our goal was to make this rapidly growing interdisciplinary literature more accessible to both the nationwide staff of the Department of Veterans Affairs and the worldwide community of clinicians, researchers, policy makers, and students concerned with PTSD.

The PILOTS database was first made available for public use in April 1991. At that time it contained citations to 1,950 papers. Since then the database has grown rapidly. At its most recent update, a total of 10,307 publications has been indexed. We are proud of that growth, but we are even more proud of the increasing use that has been made of the database. During the past twelve months, more than 4,000 searches were performed by users from all over the world.

This summer we celebrated these milestones with a small ceremony at the ISTSS world conference in Jerusalem. We chose as the 10,000th PILOTS record a work first published over thirty years ago that retains permanent value as a contribution to the scientific study of traumatic stress. Its author has continued to be an active participant in traumatic stress research, publishing a steady stream of journal articles and book chapters in several languages and on at least three continents. He has also made his own valuable contribution to traumatic stress bibliography.

Leo Eitinger's book, *Concentration Camp Survivors in Norway and Israel,* was first published in 1964. It was the first extended scientific enquiry into the psychiatric consequences of the Holocaust. Although Dr. Eitinger has since modified some of the etiological conclusions that he reached in that book, it remains a valuable study, based on careful observation and description. It is still cited by writers three decades later, and will doubtless continue to be used in the future by those who have undertaken the task of dealing with the aftermath of persecution and genocide.

We established the PILOTS database so that the world's cumulated observation, experimentation, and reflection on traumatic stress might be more readily applied—across the boundaries of time, space, language, and discipline—to the solution of the human problems arising from exposure to trauma. The work represented in Dr. Eitinger's book will benefit generations to come—so long as we humans maintain our unfortunate habit of inflicting pain on others. It is therefore most appropriate that we remind ourselves of the purpose underlying our bibliographical work by recognizing Dr. Eitinger's contribution to traumatic stress studies. In honor of this achievement, the National Center for PTSD has recognized Dr. Leo Eitinger, author of *Concentration Camp Survivors in Norway and Israel,* as the author of the 10,000th publication to be indexed in the PILOTS database.

Eitinger, L. *Concentration camp survivors in Norway and Israel.* Oslo: Universitetsforlaeget, 1964; reprint, The Hague: Martinus Nijhoff, 1972.

This monograph describes a comparative study of three Norwegian and three Israeli groups of concentration-camp survivors. The first Norwegian group consisted of patients who were admitted to the Department of Psychiatry, University of Oslo, without any connection to their experiences during the war. The second group was a selection of ex-prisoners who at the time of the examination had been more or less incapacitated, while the third group consisted of apparently healthy, able-bodied individuals. The first Israeli group were survivors who on a particular day were hospitalized in Israeli psychiatric hospitals. The second group were psychiatric outpatients, and the third were able-bodied individuals examined in two Israeli kibbutzim.

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