

Vietnam Veterans and PTSD

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Forty Years After the War: How are Vietnam Veterans Doing Today?

Introduction

Understanding how the Vietnam Veteran generation is faring today in terms of behavioral, physical and social health is a critical undertaking for several reasons. First, Vietnam Veterans constitute the largest living cohort of United States (US) Veterans and are the modal users of US Department of Veterans Affairs (VA) services. There are also international cohorts of Vietnam Veterans, as Australia and South Korea deployed military personnel to support the US in the war. Second, assessment of this aging Veteran cohort over time provides new and unique information regarding the long-term trajectory of mental and behavioral health conditions following war exposure and across the life span. Thus, research investigating the current health status of Vietnam Veterans may inform health care policies and interventions to better address their needs and provide insights to help guide long-term prevention and treatment efforts for Veterans of more recent conflicts.

The US federal government, scientific community, and advocacy organizations have long recognized the central importance of gathering reliable and generalizable empirical data on the Vietnam generation to inform health care policies and practices and have invested in carrying out robustly designed cohort studies to that end. This overview provides a brief guide to the most recently published literature on well-designed epidemiological studies that focus on Vietnam Veterans' health and well-being, including mental/behavioral and physical health outcomes among women and men and special subpopulations (e.g., prisoners of war) who served in the war.

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Population-Based Cohort Studies

American Legion Vietnam Veterans Longitudinal Study
The American Legion Vietnam Veterans Longitudinal Study is a 14-year follow-up of a random sample of American Legionnaires who had served in Southeast Asia during the Vietnam War and were surveyed by mail in 1984 and again in 1998. Of the 1,377 Vietnam Veterans who served in the theater of operations and who responded at both Time 1 and Time 2, 11.8% had severe PTSD symptoms in 1984, compared with a prevalence of 10.5% in 1998, nearly 30 years after their return from Vietnam (Koenen, Stellman, Stellman, & Sommer, 2003; Koenen, Stellman, Sommer, & Stellman, 2008). The vast majority (83.0%) did not meet the *Diagnostic and Statistical Manual of Mental Disorders*, Version 3, revised (*DSM-III-R*) criteria for "severe PTSD" (based on a 17-item PTSD Frequency Scale) at either time, and only 5.3% met criteria for severe PTSD at both times. Among those who *changed* over the 14-year span, 6.5% and 5.2% had severe PTSD symptoms *only* in 1984 or 1998, respectively (Koenen et al., 2008). At both time periods, level of combat exposure assessed at baseline showed a consistent "dose-response" relationship with severe PTSD symptoms and multiple areas of functioning and well-being. In turn, persistent severe PTSD symptoms were associated with worse familial relationships, more smoking, less life satisfaction and happiness, more mental health service use, and more nonspecific health complaints in 1998. High combat exposure, perceived negative community attitudes at homecoming, minority race, depression, and more anger at baseline predicted a more chronic course for PTSD symptoms (Koenen et al., 2003).

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National Survey of Veterans

The 2001 National Survey of Veterans (NSV), a nationally representative survey of all non-institutionalized US Veterans (from all eras of military service), used a dual frame methodology—a majority of cases contacted using random digit dialing (RDD), augmented by a list sample selected from VA files—to contact and interview over 20,048 Veterans, achieving a screener response rate of 67.6%, and 76.4 and 62.8% response rates, respectively, for the extended interview in the RDD and list samples. Conducted 28 years after the end of the Vietnam War, data from the subsample of Veterans who served during the Vietnam era were analyzed to examine the long-term effects of military service during the Vietnam War era and compared several mental health outcomes for Veterans who served in Vietnam and those who served elsewhere (Brooks, Ladtka, & Ladtka, 2008a). PTSD and other mental health conditions were assessed based on Veterans' reports of having received treatment at VA facilities or elsewhere for these conditions in the past 12 months. Veterans who served in Vietnam had notably poorer mental health than those who served elsewhere during the Vietnam era, especially among younger Veterans (<60 years). Theater Veterans were (a) more than three times more likely to have received treatment for PTSD than those who served elsewhere, (b) significantly more likely to have been treated for other mental health conditions and to have had psychiatric treatment, and (c) substantially worse on several general measures of mental health well-being. Among those who were 60 years or older, those who served in Vietnam had significantly poorer mental health as well on most measures, although differences were smaller. For general health conditions, among those who were 60 or younger in 2001, those who served in Vietnam had significantly poorer self-rated health and higher reported treatment for stroke; among older Veterans, those who served in Vietnam had poorer self-rated health, higher risk of cancer, and were more likely to report receiving treatment for high blood pressure, lung conditions, stroke, and hearing loss (Brooks, Ladtka, & Ladtka, 2008b).

National Vietnam Veterans Readjustment (NVVRS)/Longitudinal Study (NVVLS)

The National Vietnam Veterans Longitudinal Study (NVVLS) is a VA-funded second wave assessment of a stratified, probability sample of US Vietnam Veterans still alive in 1987 ($N = 2,348$) selected from military records and first assessed in the late 1980s (Kulka et al., 1990). The first wave of the study, the National Vietnam Veterans Readjustment Study (NVVRS), showed that, although the vast majority of Vietnam Veterans had readjusted to civilian life smoothly, 15.2% of male and 8.5% of female theater Veterans had PTSD 15 or more years after their service; that those with higher levels of exposure to combat and other war zone stressors were four times more likely to have PTSD than those with lesser exposure; and that PTSD from war zone trauma was often comorbid with major depression, alcohol abuse, and many other postwar readjustment problems. Rates of current PTSD were markedly higher among male and female theater Veterans, compared to Vietnam era Veterans and civilian counterparts (Kulka et al., 1990).

The follow-up assessment of the Veteran cohort was conducted in 2012 and included a self-report written survey, a computer assisted self-report telephone interview, and for a random subsample, a clinical diagnostic interview administered by a doctoral level psychologist. Of the 1,839 Veterans living at the time of the follow-up assessment, 1,450 participated in one or more of the three components, for a response rate of 79% (Schlenger et al., 2015). The prevalence of current war zone PTSD among living Vietnam theater Veterans was 11.2% for males and 6.6% for females based on the PTSD Checklist-5 (PCL-5) and DSM-5 criteria (Marmar et al., 2015). Although clinical interviews using the Clinician Administered PTSD Scale-5 (CAPS-5) yielded substantially lower rates for male theater Veterans, a close agreement existed between the PCL-5 estimate of current war zone PTSD (11.2%) and the CAPS-5 estimate of current plus subthreshold PTSD (10.8%). Prevalence rates for war zone-related PTSD were much lower for male and female era Veterans (less than 5%). Current major depression was overrepresented among theater Veterans with clinically significant PTSD symptoms, occurring in more than 30% of those with subthreshold or current war zone PTSD compared to less than 1% among those without PTSD. Alcohol and drug abuse diagnoses were infrequent. Most theater Veterans experienced stable, low PTSD symptoms (75%) over time; however, 7% reported consistently high symptoms and 13% reported worsening symptoms according to Mississippi Scale for Combat-Related PTSD (M-PTSD) scores. Therefore, although the majority of Vietnam Veterans were functioning well in terms of psychological health, a notable minority (up to 20%) evidenced chronic, clinically significant PTSD symptoms and often struggled with comorbid depression.

The NVVLS (Schlenger et al., 2015) also assessed mortality among the NVVLS cohort of Veterans from the late 1980s through 2011. Sixteen percent of all Vietnam Veterans who were alive in the 1980s were deceased, with the majority of deaths due to chronic diseases (79%) or "external causes" (e.g., injuries, suicide, drug overdose; 10%). All-cause and cause-specific mortality was comparable between theater and era Veterans. The authors examined the relationship of war zone stress exposure and PTSD to mortality among theater Veterans. Male theater Veterans with a high probability of PTSD in the late 1980s were nearly twice as likely to have died than those without PTSD, even after adjustment for sociodemographic and other characteristics. A high level of exposure to war zone stress (cf. Dohrenwend et al., 2006) was also independently associated with increased mortality for both male and female theater Veterans after adjustment for sociodemographic characteristics, PTSD, and physical comorbid conditions.

Between 2007 and 2009, approximately one-fourth (2.3 million) of Vietnam era Veterans received services from the Veterans Health Administration (VHA; Hermes, Hoff, & Rosenheck, 2014). Findings from the NVVLS show that, as of 2012, over half (57%) of Vietnam Veterans reported outpatient visits in the past 6 months for physical health issues and less than a quarter (21%) reported visits within the VA (Schlenger et al., in press). Theater Veterans with stable elevated or increasing PTSD symptoms over time were significantly more likely to report recent VA outpatient visits than those with stable low symptoms. Among male theater

Veterans receiving outpatient care, those with elevated PTSD symptoms were more than five times as likely to discuss behavioral health issues with their provider than those with stable low symptoms, even after accounting for sociodemographic factors, depression and chronic health conditions.

Vietnam Era Twin (VET) Registry, CSP #569

Launched in 1986, the Vietnam Era Twin (VET) Registry is a large cohort of male-male twin Vietnam-era Veterans of the US military ($N = 7,369$ twin pairs). The portfolio of VET Registry research initiatives includes VA Cooperative Studies Program (CSP) #569: “A Twin Study of the Course and Consequences of PTSD in Vietnam Era Veterans” that was initiated in 2010. Overall, the lifetime prevalence of PTSD among theater Veterans was 17.6% versus 8.9% among non-theater Veterans; and current, 12 month prevalence was also greater among theater than non-theater Veterans, 12.8% vs. 5.6%, respectively. While rates of PTSD were significantly higher for theater compared to non-theater Veterans irrespective of age, differences in both lifetime and current PTSD prevalence associated with theater service were significantly larger among the older than younger Veterans. For example, for male theater Vietnam Veteran twins over 60 years old, the lifetime prevalence of PTSD was 16.9% compared to 5.5% among their non-theater Vietnam Veteran counterparts (Goldberg et al., in press). For those younger than 60 years old, PTSD lifetime prevalence was 22.0% for theater Veterans and 15.7% for their non-theater Veteran counterparts. Combat exposure was also strongly associated with prevalence of PTSD in the both the younger and older cohorts: Veterans exposed to medium/high combat were at four times the odds of both current and lifetime PTSD than those with no/low combat exposure in both the younger and older cohorts.

Magruder, et al. (2016) examined the trajectory of PTSD among Vietnam-era Veterans using the Diagnostic Interview Schedule (DIS) *DSM-III-R* diagnoses at time 1 (1992) and Composite International Diagnostic Interview (CIDI) *DSM-IV* derived diagnoses at follow-up nearly twenty years later. The investigators identified four specific PTSD trajectories: late onset PTSD, chronic PTSD, early recovery from PTSD, and late recovery from PTSD. In this study, a substantial majority of the male twin Vietnam-era Veteran participants never had a diagnosis of PTSD (79% of theater Veterans; 90.6% of non-theater Veterans), whereas 6.6% of theater Veterans and 3.3% of non-theater Veterans had late onset PTSD, and approximately 4% of theater and 1.2% of non-theater Veterans had chronic trajectories. Just over 17% of the Vietnam theater and 8.3% of the non-theater participants had early recoveries, while 7.4% of theater and 3.3% of non-theater Veterans had late recoveries from PTSD. Trajectory patterns for full PTSD combined with subthreshold PTSD were also examined, revealing upticks in the percentages of Veterans with substantial chronic PTSD symptoms (7.6% of theater Veterans; 3.3% of non-theater Veterans) and late onset symptoms (5.9% of theater Veterans; 3.6% of non-theater Veterans).

Other study findings revealed that of 4,340 male twin Veterans who reported no diabetes at initial assessment between 1987–1992, 658 reported a new diagnosis of treated type-2 diabetes at follow-up from 2010–2013 (Vaccarino et al., 2014).

Twins with PTSD at baseline had a higher rate of behavioral and metabolic risk factors for diabetes at follow-up, including less physical activity, more alcohol consumption, higher rates of smoking, hypertension, and higher Body Mass Index (BMI); and PTSD was associated with a 40% increased risk of new-onset type-2 diabetes.

Health of Vietnam Era Veteran Women's Study (CSP #579)

The Health of Vietnam Era Veteran Women's Study (CSP #579; HealthVIEWS) is a large study of the mental and physical health of women who served in the US military during the Vietnam era (who were mostly nurses) conducted nearly 40 years after the end of the war. Lifetime prevalence of PTSD was 20.1% for those women who served in Vietnam: higher than the estimated PTSD prevalence in the cohorts who served near Vietnam (Japan, the Philippines, Guam, South Korea, or Thailand; 11.5%) or in the US (14.1%; Magruder et al., 2015). Similarly, current PTSD prevalence was estimated at 15.9% for women who served in Vietnam, compared to 8.1% - 9.1% for the non-theater Veteran cohorts. Sexual discrimination or harassment, casualty- or environment-related stress, performance pressure, and danger or threats were significantly associated with PTSD.

HealthVIEWS also provided a comprehensive mortality assessment of Vietnam Veteran women, employing a retrospective design that examined mortality through 2010 in the three study groups (Kang et al., 2014). Disease-specific mortality was generally comparable between the groups, with the following notable exceptions: (1) nurses who served in Vietnam had elevated risk of pancreatic and brain cancer compared to non-deployed nurses, (2) the risk of death from heart disease was lower among the two deployed cohorts, and (3) women who served in Vietnam had excess death due to motor vehicle accidents compared to non-deployed Veterans and the US population. Vietnam-era Veteran women selected for the study had lower mortality than the general population of women from several specific causes, as well as from all causes combined.

Australian Vietnam Veterans Health Studies

The Australian Vietnam Veterans Health Study is a longitudinal study of a random sample of male Australian Army Vietnam Veterans who were assessed an average of 22 and 36 years after the war (O'Toole, Catts, Outram, Pierse & Cockburn, 2009). Compared to the Australian general population, Vietnam Veterans were more likely to report multiple (≥ 5) health conditions and had elevated rates of a multitude of specific health conditions, including musculoskeletal conditions and deafness. The primary correlate of poorer health outcomes was older age, and several military characteristics (e.g., duration of service, enlistment type) were associated with greater risk for specific conditions. Veterans also had elevated rates of mental health conditions related to alcohol abuse, depression, and anxiety and approximately half of all Veterans reported taking psychiatric medication. The prevalence of lifetime combat-related PTSD among the sample was 24.7% and PTSD at the first assessment was associated with greater likelihood of developing depression, other anxiety disorders and alcohol dependence (O'Toole et al., 2009).

Researchers later assessed the relationship of service member characteristics to spousal mental health by conducting independent interviews with 240 female spouses of the Australian Vietnam Veterans Health Study participants (O'Toole, Outram, Catts, & Pierse, 2010). The rates of mood disorders among spouses were elevated compared to the Australian general population and spousal depression was associated with service member military characteristics and mental health indices.

The Australian Vietnam Veterans Health Study also included a prospective assessment of mortality among the Veteran cohort from the early 1990s through 2004 (O'Toole, Catts, Outram, Pierse, & Cockburn, 2010). Older age, not living with a wife/partner, smoking, chronic diabetes, bronchitis and blood disease, and recent treatment for cancer and heart disease were associated with greater mortality risk. Psychiatric conditions and military characteristics, including combat exposure, were *not* associated with mortality; however the authors caution that the study may have been underpowered to detect those effects.

Chemical Exposure

Reflecting early concerns related to the aerial spraying of herbicides in Vietnam, notably Agent Orange, a major focus of research on the health of Vietnam Veterans was the use of herbicides and the potential adverse outcomes of such exposure.

The Air Force Health Study (AFHS) was a prospective epidemiological study mounted in 1982 to determine whether adverse health outcomes existed among the US Air Force members assigned to Operation Ranch Hand (the unit responsible for aerially spraying herbicides in Vietnam from 1962 to 1971) and could be related to their occupational exposure to herbicides, specifically Agent Orange. The potential health, mortality rates and reproductive outcomes of 1,245 Ranch Hand personnel and a comparison group were assessed through six comprehensive physical examinations that began in 1982 and ended in 2005. A detailed comprehensive final report describes this monumental research effort, including the results of the six physical examinations (Air Force Health Study, 2005), the conclusions of which are further summarized in Robinson et al. (2006) and below:

Reproductive outcomes: Very few associations between a broad range of reproductive outcomes and paternal dioxin levels were observed, and those that were detected were regarded either as not biologically meaningful or unambiguously attributable to paternal dioxin levels.

Morbidity: No evidence of an association with chloracne or prevalence of cardiovascular disease was found. Some limited evidence existed of an association between dioxin levels and neurological disease related to the peripheral nerves. No clear evidence of psychological disorders or syndromes appeared that could be associated with exposure to herbicides and dioxin.

Mortality: An evaluation of post-service mortality through December 31, 2003 found an increased relative risk (RR) of all causes and circulatory system mortality in all Ranch Hands and in enlisted ground crew, the subgroup with highest dioxin levels. No increase in cancer mortality was observed (Ketchum & Michalek, 2005; Pavuk, Ketchum, & Fox, 2006).

US Army Chemical Corps study of Veterans who handled and sprayed herbicides in Vietnam (Kang et al., 2006) found that the RRs of diabetes, heart disease, hypertension, and chronic respiratory disease were elevated, but not significantly so, for those who served in Vietnam. Relative risks were significantly greater among those Vietnam Veterans who sprayed herbicides. This study also reported an increased risk of death attributable to digestive diseases, and a nonsignificant increase in the risk of death resulting from cancer (Dalager & Kang, 1997).

The Korean Veterans Health Study (KVHS) also evaluated the association between military service in Vietnam and Agent Orange exposure, and the morbidities and mortality from various diseases. Over 100,000 Veterans were examined, with disease prevalence determined from claims data and Agent Orange exposure from a GIS-based Exposure Opportunity Index (proximity of Veterans' military unit to an Agent Orange-sprayed area). The high exposure group had modest though significant elevated risks for both endocrine diseases combined and neurologic diseases combined, and prevalence was significantly higher in the high exposure group than in the low exposure group for a large number of specific diseases. In particular, Agent Orange exposure increased the prevalence of endocrine disorders, especially in the thyroid and pituitary gland; various neurologic diseases; Chronic Obstructive Pulmonary Disease (COPD); and liver cirrhosis (Yi, Hong, Ohrr, & Yi, 2014), as well as increasing the risk of cancers in all sites combined, and several specific cancers (Yi & Ohrr, 2014).

Repatriated Prisoners Of War

In considering the current health and well-being of Vietnam Veterans today, one cohort in particular, though small in numbers, is especially important to consider: Vietnam repatriated prisoners of war (RPW). These Veterans are the US' longest detained American prisoners of war, held in Vietnam in the 1960s through early 1970s, experiencing prolonged captivity, malnourishment, and physical and psychological torture. Of 662 US military personnel who were captured and survived imprisonment, 568 were repatriated in the spring of 1973, and since then have been eligible for annual medical and psychological follow-up. Excluding those who died as of July 2011, recent medical/psychiatric outcome data were available for 440 living RPWs.

A recent innovative study (Segovia, Moore, Linnville, Hoyt, & Hain, 2012) leveraged this unique longitudinal database to examine the concept, role and predictors of resilience, operationally defined as those who had never received *any* psychiatric diagnosis over the 37-year follow-up period. Two hundred and fifty-two of the 440 RPWs (57.3%) met this criterion. The complement to not being resilient is having been diagnosed during this time span as having at least one *DSM* disorder, i.e., an indicator of "lifetime" prevalence. One hundred and eighty-eight of the 440 RPWs had at least one such diagnosis, a prevalence of 42.7%, of which 112 or 25% (60 percent of the total) had PTSD only. Key predictors of increased resilience in this study are also predictors of an increased probability of a lifetime diagnosis: those who enlisted, those younger at time of capture, those with more time in solitary confinement, lower on optimism, higher antisocial/psychopathic personality traits, and higher on posttraumatic stress symptoms immediately following repatriation were more likely to have met *DSM* criteria for at least one disorder during the follow-up period.

Other research on the 292 members of this unique cohort suggest, however, that these RPW Veterans may have been higher functioning than this analysis implied (Park, Kaiser, Spiro, King, & King, 2012). For most RPWs, symptoms were within normal limits, but a substantial minority reported clinically elevated levels of anxiety and depression. In contrast, PTSD symptom scores were fairly low, with only 6% meeting or exceeding a total score that is often used as a cut point for a possible PTSD diagnosis among older Veterans. Being younger at age of capture and the presence of posttraumatic stress symptoms at repatriation predicted long-term mental health outcomes; physical torture also predicted long-term posttraumatic stress symptoms.

Summary

A substantial number of studies on the potential health and mental health impacts of the Vietnam War on those who served were conducted from 1985-1995. While the methods used and estimates derived from those studies vary, the preponderance of evidence indicated that, while the majority of Vietnam Veterans were able to readjust to civilian life, a substantial minority, both generally and in specific subgroups of that population, continued to suffer from mental and physical health problems, and many other persistent declines in health, functioning and general well-being 10 and even 20 years after the end of that conflict. However, until recently, little research has been available to document “how Vietnam Veterans are doing today,” more than 40 years after the end of the war. Although the variety of evidence highlighted here shows great variability with respect to definitions, criteria and methods used to address this question, the overall conclusions suggest that a substantial minority of those who served in Vietnam continue to suffer significant deficits in their physical health, mental health, functioning and overall well-being, which in turn have had a significant impact on their lives.

The evidence on the prevalence of *current* PTSD among Vietnam Veterans today appears to be remarkably consistent across studies, including those that have been able to re-interview the same Veterans at two points in time. These consistencies were found despite very substantial differences in sampled populations, diagnostic/*DSM* criteria and the measures and other methods used to derive these estimates. Current PTSD prevalence estimates from these very diverse studies hover around 10-15%. The few studies that report evidence on the course of PTSD show on average that those who make up this “10-15%” include both a core of Veterans who continue to suffer since they were first interviewed and roughly equal numbers who were initially symptomatic but no longer have PTSD and those who initially did not have PTSD but who currently suffer from the disorder. Most of these studies also show substantial consistency with earlier studies on the dominant and continuing impact of war zone stress exposure in particular and a number of other key risk factors on the development and persistence of PTSD, as well as the joint effects of PTSD and combat exposure and a broad range of other indicators (including age) on physical health, mental health, service use and a number of key domains of life functioning, including mortality.

These findings support ongoing national efforts to implement evidence-based psychotherapies for PTSD in the Vietnam Veteran cohort and to continue to invest in clinical research to develop effective rehabilitative, psychological, and pharmacotherapies to alleviate symptoms of PTSD and its comorbidities among Vietnam Veterans.

FEATURED ARTICLES

Air Force Health Study (AFHS). 2005. **An epidemiologic investigation of health effects in Air Force personnel following exposure to herbicides: Comprehensive report.** Science Application International Corporation: McLean, VA. Contract No. F41624-01-C-1012. SAIC Project No. 01-0813-04-2273. This report summarizes results from the AFHS 2002 follow-up physical examination. The AFHS was undertaken to determine whether adverse health effects attributable to exposure to herbicides existed in Veterans of Operation Ranch Hand. The men assigned to Operation Ranch Hand flew aerial herbicide spray missions in Vietnam from 1962 to 1971. A comparison cohort comprised Air Force Veterans who served in Southeast Asia during the same time period and who were not involved with spraying herbicides. A total of 1,951 Veterans participated in the 2002 physical examination 777 Ranch Hands & 1,174 Comparisons. Statistical analyses assessed differences between Ranch Hands & Comparisons & associations between health-related endpoints & extrapolated initial dioxin, dioxin category, and dioxin measured in 1987. The study has insufficient statistical power to assess increases in the risk of rare diseases. Consistent with past AFHS reports, current results indicate a significant & clinically meaningful adverse relation between type-2 diabetes & exposure to dioxin.

Brooks, M.S., Laditka, S.B., & Laditka, J.N. (2008a). **Long-term effects of military service on mental health among Veterans of the Vietnam war era.** *Military Medicine*, 173, 570-575. doi:10.7205/MILMED.173.6.570 Comparing outcomes of Veterans who served in Vietnam and those who served elsewhere, we examined treatment of PTSD, treatment of other mental health conditions, psychiatric treatment location, and six mental health well-being measures. The analytic sample consisted of nationally representative data from the 2001 NSV. Analyses included multivariate logistic regression that controlled for sociodemographic characteristics. Of Vietnam War-era Veterans in the NSV ($N = 7,914$), 3,937 served in Vietnam and 3,977 served elsewhere. These Veterans were stratified into < 60 years of age ($n = 6,141$) and > or = 60 years of age ($n = 1,766$). Veterans who served in Vietnam had notably poorer mental health than did those who served elsewhere. There were striking mental health differences between younger and older Veterans; younger Veterans had substantially worse measures of mental health. These results suggest greater resource needs among younger Vietnam War Veterans. Clinicians and the VA should focus on mental health services for younger Veterans.

Goldberg, J., Magruder, K.M., Forsberg, C.W., Friedman, M.J., Litz, B.T., Vaccarino, V., . . . Smith, N.L. (in press). **Prevalence of posttraumatic stress disorder in aging Vietnam-era Veterans: VA Cooperative Study 569: Course and consequences of posttraumatic stress disorder in Vietnam-era Veteran twins.**

The American Journal of Geriatric Psychiatry. doi:10.1016/j.jagp.2015.05.004 **Objective:** The prevalence of PTSD among aging Vietnam-era Veterans is not well characterized. **Methods:** In a cross-sectional study, 5,598 male Vietnam-era Veterans and members of the VET Registry were assessed for PTSD using the Composite International Diagnostic Interview. Current symptoms were measured with the PTSD Checklist (PCL). PTSD was estimated according to age (<60 or ≥ 60) and Vietnam theater service. **Results:** The lifetime prevalence of PTSD in theater Veterans aged at least 60 years was 16.9% (95% CI: 13.9%–20.5%) and higher than the 5.5% (95% CI: 4.3%–7.0%) among non-theater Veterans. Among Veterans younger than 60 years, the comparable prevalence was 22.0% for theater (95% CI: 16.7%–28.4%) and 15.7% for non-theater (95% CI: 13.4%–18.2%) Veterans. Similar results were found for theater service and current PTSD prevalence (past 12 months). PCL scores were significantly higher in theater compared with non-theater Veterans in both younger and older cohorts. In both the younger and older cohorts significant differences in lifetime and current PTSD prevalence and PCL scores persisted in theater service discordant twin pairs. **Conclusion:** Vietnam service is related to elevated PTSD prevalence and current symptom burden in aging Veterans. More than 30 years after the end of the Vietnam conflict, many Veterans continue to suffer from PTSD, which highlights the need for continuing outreach throughout the life course.

Hermes, E.D.A., Hoff, R., & Rosenheck, R.A. (2014). **Sources of the increasing number of Vietnam era Veterans with a diagnosis of PTSD using VHA services.** *Psychiatric Services*, 65, 830-832. doi:10.1176/appi.ps.201300232 **Objective:** Correlates of the sharp increase in Vietnam-era Veterans diagnosed as having PTSD in the VHA were examined. **Methods:** Analyses compared receipt of a PTSD diagnosis and service-connected disability compensation in 2004–2006 and 2007–2009. **Results:** Among Vietnam-era Veterans, the percentage with a PTSD diagnosis in 2007–2009 was 22.2% higher than the percentage with PTSD in 2004–2006; the percentage without PTSD was 6.2% higher than in 2004–2006. Of those with PTSD in 2007–2009, 22.6% were previous VHA service users newly diagnosed (“conversions”); only 12.8% were entirely new to VHA (“recents”). Rates of disability compensation among recents and conversions were almost two and three times higher, respectively, than among those without PTSD. **Conclusions:** The increase in Vietnam-era Veterans with PTSD is associated with more frequent “conversion” to PTSD among previous VHA users and receipt of disability compensation.

Kang, H.K., Dalager, N.A, Needham, L.L., Patterson, D.G., Lees, P.S.J., Yates, K. & Matanoski, G.M. (2006). **Health status of Army Chemical Corps Vietnam Veterans who sprayed defoliant in Vietnam.** *American Journal of Industrial Medicine*, 49, 875-884. doi:10.1002/ajim.20385 **Background:** US Army Chemical Corps Veterans handled and sprayed herbicides in Vietnam resulting in exposure to Agent Orange and its contaminant 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD or dioxin). This study examined the long-term health effects associated with herbicide exposure among these Vietnam Veterans.

Methods: A health survey of these 1,499 Vietnam Veterans and a group of 1,428 non-Vietnam Veterans assigned to chemical operations jobs was conducted using a computer-assisted telephone interview (CATI) system. Exposure to herbicides was assessed by analyzing serum specimens from a sample of 897 Veterans for dioxin. Logistic regression analyses were used to estimate the risk of selected medical outcomes associated with herbicide exposure. **Results:** Odds ratios for diabetes, heart disease, hypertension, and chronic respiratory disease were elevated, but not significantly ($P>0.05$) for those who served in Vietnam. However, they were significantly elevated among those Vietnam Veterans who sprayed herbicides: diabetes, odds ratio (OR) = 1.50 (95% confidence interval [CI; 95% CI] = 1.15-1.95); heart disease, OR = 1.52 (1.18-1.94); hypertension, OR = 1.32 (1.08-1.61); and chronic respiratory condition, OR = 1.62 (1.28-2.05). Hepatitis was associated with Vietnam service, but not with herbicide application. **Conclusions:** Vietnam Veterans who were occupationally exposed to herbicide experienced a higher risk of several chronic medical conditions relative to other non-Vietnam Veterans. A potential selection bias is of concern. However, there were relatively high participation rates in both the Vietnam and non-Vietnam Veteran groups, and the prevalence rates of some of these medical conditions among non-Vietnam Veterans were comparable to general populations. Therefore, self-selection factors are considered unlikely to have biased the study results.

Kang, H.K., Cypel, Y., Kilbourne, A.M., Magruder, K.M., Serpi, T., Collins, J.F., . . . Spiro, A. (2014). **HealthVIEWS: Mortality study of female US Vietnam era Veterans, 1965-2010.** *American Journal of Epidemiology*, 179, 721-730. doi:10.1093/aje/kwt319 We conducted a retrospective study among 4,734 women who served in the US military in Vietnam (Vietnam cohort), 2,062 women who served in countries near Vietnam (near-Vietnam cohort), and 5,313 nondeployed US military women (US cohort) to evaluate the associations of mortality outcomes with Vietnam War service. Veterans were identified from military records and followed for 40 years through December 31, 2010. Information on underlying causes of death was obtained from death certificates and the National Death Index. Based on 2,743 deaths, all 3 Veteran cohorts had lower mortality risk from all causes combined and from several major causes, such as diabetes mellitus, heart disease, COPD, and nervous system disease relative to comparable US women. However, excess deaths from motor vehicle accidents were observed in the Vietnam cohort (standardized mortality ratio = 3.67, 95% CI: 2.30, 5.56) and in the US cohort (standardized mortality ratio = 1.91, 95% CI: 1.02, 3.27). More than two-thirds of women in the study were military nurses. Nurses in the Vietnam cohort had a 2-fold higher risk of pancreatic cancer death (adjusted RR = 2.07, 95% CI: 1.00, 4.25) and an almost 5-fold higher risk of brain cancer death compared with nurses in the US cohort (adjusted RR = 4.61, 95% CI: 1.27, 16.83). Findings of all-cause and motor vehicle accident deaths among female Vietnam Veterans were consistent with patterns of postwar mortality risk among other war Veterans.

Ketchum, N.S & Michalek, J.E. (2005). **Postservice mortality of Air Force Veterans occupationally exposed to herbicides during the Vietnam War: 20-year follow-up results.** *Military Medicine*, 170, 406-413. Since 1982, the AFHS has continued to assess the mortality for Veterans of Operation Ranch Hand, the unit responsible for aerially spraying herbicides in Vietnam. The mortality for 1,262 Ranch Hand Veterans to December 31, 1999 was contrasted with that for 19,078 comparison Veterans. The RR for all-cause death was borderline significantly increased (RR, 1.15; 95% CI, 1.0-1.3; $p = 0.06$). The risk of death caused by cancer was not increased ($RR = 1.0$), but the risk of death caused by circulatory system diseases was significantly increased among en-listed ground crew workers ($RR = 1.7$; 95% CI, 1.2-2.4; $p = 0.001$). Results for Ranch Hand all-cause death differed from previous reports, with the RR now exceeding 1.0. The risk of death attributable to circulatory system diseases continues to be increased, especially for enlisted ground crew, a subgroup with relatively high skin exposure to herbicides.

Koenen, K.C., Stellman, S.D., Sommer, J.F., & Stellman, J.M (2008). **Persisting posttraumatic stress disorder symptoms and their relationship to functioning in Vietnam Veterans: A 14-year follow-up.** *Journal of Traumatic Stress*, 21, 49-57. doi:10.1002/jts.20304

The authors examined the longitudinal association between persisting PTSD symptoms and multiple domains of life functioning in a community sample of 1,377 American Legionnaire Vietnam Veterans first assessed in 1984 and followed-up 14 years later. Almost 30 years after their return from Vietnam, 10% of Veterans continued to experience severe PTSD symptoms. At all levels of combat exposure, persisting severe PTSD symptoms were associated with worse family relationships, more smoking, less life satisfaction and happiness, more mental health service use, and more nonspecific health complaints at the 14-year follow-up. Further investigation is needed to determine whether the PTSD-functioning relationship is causal and if successful treatment of PTSD is associated with improvement in functioning.

Koenen, K.C., Stellman, J.M., Stellman, S.D., & Sommer, J.F. (2003). **Risk factors for course of posttraumatic stress disorder among Vietnam Veterans: A 14-year follow-up of American Legionnaires.** *Journal of Consulting and Clinical Psychology*, 71, 980-986. doi:10.1037/0022-006X.71.6.980

Risk factors affecting the course of PTSD are poorly understood. As part of a larger study on characterizing exposure to herbicides in Vietnam, the authors investigated this issue in a random sample of 1,377 American Legionnaires who had served in Southeast Asia during the Vietnam War and were followed over a 14-year period. High combat exposure, perceived negative community attitudes at homecoming, minority race, depression symptoms at Time 1, and more anger at Time 1 predicted a more chronic course. Community involvement at Time 1 was protective and associated with decreased risk at Time 2. Discomfort in disclosing Vietnam experiences was associated with an increased risk for developing PTSD but did not predict its course. Combat exposure predicted PTSD course more strongly than any other risk factor. Findings suggest recovery from PTSD is significantly influenced by perceived social support.

Magruder, K.M., Serpi, T., Kimerling, R., Kilbourne, A.M., Collins, J.F., Cypel, Y., . . . Kang, H. (2015). **Prevalence of posttraumatic stress disorder in Vietnam-era woman Veterans: The health of Vietnam-era women's study (Health VIEWS).** *JAMA Psychiatry*, 72, 1127-1134. doi:10.1001/jamapsychiatry.2015.1786

Importance: Many Vietnam-era women Veterans served in or near war zones and may have experienced stressful or traumatic events during their service. Although PTSD is well studied among men who served in Vietnam, no major epidemiologic investigation of PTSD among women has been performed. **Objectives:** To assess (1) the onset and prevalence of lifetime and current PTSD for women who served during the Vietnam era, stratified by wartime location (Vietnam, near Vietnam, or the US), and (2) the extent to which wartime location was associated with PTSD, with adjustment for demographics, service characteristics, and wartime exposures. **Design, Setting, and Participants:** Survey of 8,742 women who were active-duty military personnel in the US Armed Forces at any time from July 4, 1965, through March 28, 1973, and alive as of survey receipt as part of VA Cooperative Study 579, HealthVIEWS. Data were obtained from mailed and telephone surveys from May 16, 2011, through August 5, 2012, and analyzed from June 26, 2013, through July 30, 2015. **Main Outcomes and Measures:** Lifetime and current PTSD as measured by the PTSD module of the CIDI, version 3.0; onset of PTSD; and wartime experiences as measured by the Women's Wartime Exposure Scale-Revised. **Results:** Among the 4219 women (48.3%) who completed the survey and a telephone interview, the weighted prevalence (95% CI) of lifetime PTSD was 20.1% (18.3%-21.8%), 11.5% (9.1%-13.9%), and 14.1% (12.4%-15.8%) for the Vietnam, near-Vietnam, and US cohorts, respectively. The weighted prevalence (95% CI) of current PTSD was 15.9% (14.3%-17.5%), 8.1% (6.0%-10.2%), and 9.1% (7.7%-10.5%) for the 3 cohorts, respectively. Few cases of PTSD among the Vietnam or near-Vietnam cohorts were attributable to premilitary onset (weighted prevalence, 2.9% [95% CI, 2.2%-3.7%] and 2.9% [95% CI, 1.7%-4.2%], respectively). Unadjusted models for lifetime and current PTSD indicated that women who served in Vietnam were more likely to meet PTSD criteria than women who mainly served in the US (OR for lifetime PTSD, 1.53 [95% CI, 1.28-1.83]; OR for current PTSD, 1.89 [95% CI, 1.53-2.33]). When adjusted for wartime exposures, serving in Vietnam or near Vietnam did not increase the odds of having current PTSD (adjusted ORs, 1.05 [95% CI, 0.75-1.46] and 0.77 [95% CI, 0.52-1.14], respectively). **Conclusions and Relevance:** The prevalence of PTSD for the Vietnam cohort was higher than previously documented. Vietnam service significantly increased the odds of PTSD relative to US service; this effect appears to be associated with wartime exposures, especially sexual discrimination or harassment and job performance pressures. Results suggest long-lasting mental health effects of Vietnam-era service among women Veterans.

Magruder, K.M., Goldberg, J., Forsberg, C.W., Friedman, M.J., Litz, B.T., Vaccarino, V., . . . Smith, N.L. (2016). **Long-term trajectories of PTSD in Vietnam-era Veterans: The course and consequences of PTSD in twins.** *Journal of Traumatic Stress*, 29, 1-12. doi:10.1002/jts.22075

We estimated the temporal course of PTSD in Vietnam-era Veterans using a national sample of male twins with a 20-year follow-up. The complete sample included those twins with a PTSD diagnostic assessment in 1992 and who completed a DSM-IV PTSD diagnostic assessment and a self-report PTSD checklist in 2012 ($n = 4,138$).

Using PTSD diagnostic data, we classified Veterans into 5 mutually exclusive groups, including those who never had PTSD, and 4 PTSD trajectory groups: (a) early recovery, (b) late recovery, (c) late onset, and (d) chronic. The majority of Veterans remained unaffected by PTSD throughout their lives (79.05% of those with theater service, 90.85% of those with non-theater service); however, an important minority (10.50% of theater Veterans, 4.45% of non-theater Veterans) in 2012 had current PTSD that was either late onset (6.55% theater, 3.29% non-theater) or chronic (3.95% theater, 1.16% non-theater). The distribution of trajectories was significantly different by theater service ($p < .001$). PTSD remains a prominent issue for many Vietnam-era Veterans, especially for those who served in Vietnam.

Marmar, C.R., Schlenger, W.E., Henn-Haase, C., Qian, M., Purchia, E., Li, M., . . . Kulka, R.A. (2015). **Course of posttraumatic stress disorder 40 years after the Vietnam War: Findings from the National Vietnam Veterans Longitudinal Study.** *JAMA Psychiatry*, *72*, 875-881. doi:10.1001/jamapsychiatry.2015.0803

Importance: The long-term course of readjustment problems in military personnel has not been evaluated in a nationally representative sample. The National NVVLS is a congressionally mandated assessment of Vietnam Veterans who underwent previous assessment in the National NVVRS. **Objective:** To determine the prevalence, course, and comorbidities of war-zone PTSD across a 25-year interval. **Design, Setting, and Participants:** The NVVLS survey consisted of a self-report health questionnaire ($n = 1,409$), a computer-assisted telephone survey health interview ($n = 1,279$), and a telephone clinical interview ($n = 400$) in a representative national sample of Veterans who served in the Vietnam theater of operations (theater Veterans) from July 3, 2012, through May 17, 2013. Of 2,348 NVVRS participants, 1,920 were alive at the outset of the NVVLS, and 81 died during recruitment; 1,450 of the remaining 1,839 (78.8%) participated in at least 1 NVVLS study phase. Data analysis was performed from May 18, 2013, through January 9, 2015, with further analyses continued through April 13, 2015. **Main Outcomes and Measures:** Study instruments included the Mississippi Scale for Combat-Related PTSD, PCL for DSM-IV supplemented with PCL for DSM-5 items (PCL-5+), Clinician-Administered PTSD Scale for DSM-5 (CAPS-5), and Structured Clinical Interview for DSM-IV, Nonpatient Version. **Results:** Among male theater Veterans, we estimated a prevalence (95% CI) of 4.5% (1.7%-7.3%) based on CAPS-5 criteria for a current PTSD diagnosis; 10.8% (6.5%-15.1%) based on CAPS-5 full plus subthreshold PTSD; and 11.2% (8.3%-14.2%) based on PCL-5+ criteria for current war-zone PTSD. Among female Veterans, estimates were 6.1% (1.8%-10.3%), 8.7% (3.8%-13.6%), and 6.6% (3.5%-9.6%), respectively. The PCL-5+ prevalence (95% CI) of current non-war-zone PTSD was 4.6% (2.6%-6.6%) in male and 5.1% (2.3%-8.0%) in female theater Veterans. Comorbid major depression occurred in 36.7% (95% CI, 6.2%-67.2%) of Veterans with current war-zone PTSD. With regard to the course of PTSD, 16.0% of theater Veterans reported an increase and 7.6% reported a decrease of greater than 20 points in M-PTSD symptoms. The prevalence (95% CI) of current PCL-5+-derived PTSD in study respondents was 1.2% (0.0%-3.0%) for male and 3.9% (0.0%-8.1%) for female Vietnam Veterans. **Conclusions and Relevance:** Approximately 271,000 Vietnam theater Veterans have current full PTSD plus subthreshold war-zone PTSD, one-third of whom have current major depressive disorder, 40 or more years after the war. These findings underscore the need for mental health services for many decades for Veterans with PTSD symptoms.

O'Toole, B.I., Catts, S.V., Outram, S., Pierse, K.R., & Cockburn, J. (2009). **The physical and mental health of Australian Vietnam Veterans three decades after the war and its relation to military service, combat, and post-traumatic stress disorder.** *American Journal of Epidemiology*, *170*, 318-330. doi:10.1093/aje/kwp146

The long-term health consequences of war service remain unclear, despite burgeoning scientific interest. A longitudinal cohort study of a random sample of Australian Vietnam Veterans was designed to assess Veterans' postwar physical and mental health 36 years after the war (2005-2006) and to examine its relation to Army service, combat, and PTSD assessed 14 years previously (1990-1993). Prevalences in Veterans ($n = 450$) were compared with those in the Australian general population. Veterans' Army service and data from the first assessments were evaluated using multivariate logistic regression prediction modeling. Veterans' general health and some health risk factors were poorer and medical consultation rates were higher than Australian population expectations. Of 67 long-term conditions, the prevalences of 47 were higher and the prevalences of 4 were lower when compared with population expectations. Half of all Veterans took some form of medication for mental well-being. The prevalence of psychiatric diagnoses exceeded Australian population expectations. Military and war service characteristics and age were the most frequent predictors of physical health endpoints, while PTSD was most strongly associated with psychiatric diagnoses. Draftees had better physical health than regular enlistees but no better mental health. Army service and war-related PTSD are associated with risk of illness in later life among Australian Vietnam Veterans.

O'Toole, B.I., Catts, S.V., Outram, S., Pierse, K.R., & Cockburn, J. (2010). **Factors associated with civilian mortality in Australian Vietnam Veterans three decades after the war.** *Military Medicine*, *175*, 88-95.

A prospective cohort study of a random sample of 1,000 Australian Army Vietnam Veterans analyzed risk factors for postwar mortality using information from Army records and personal interview assessments of physical and mental health measured approximately 15 years earlier. This enabled examination of the role of combat, military service, and psychiatric status including PTSD on postwar civilian mortality. Factors predicting mortality were identified using multivariate statistical methods including logistic and Cox regression. Mortality was associated principally with age, enlistment route (regular vs. national service conscripts), and conduct while in service in the whole cohort. Additional analysis using interview data revealed that mortality was predicted by age, smoking status, chronic diabetes, bronchitis and blood diseases, and treatment for cancer and heart disease. Psychiatric status including PTSD diagnosis was not associated with mortality. Veterans' mortality risk may be reduced by attention to smoking and alcohol both in-service and postservice.

Park, C.L., Kaiser, A.P., Spiro, A., King, D.W., & King, L.A. (2012). **Does wartime captivity affect late-life mental health? A study of Vietnam-era repatriated prisoners of war.** *Research in Human Development*, *9*, 191-209. doi:10.1080/15427609.2012.705554

This study extended our previous analyses of predictors of well-being shortly after homecoming among US Vietnam-era repatriated prisoners of war. We examined associations of demographic factors, captivity stressors, and repatriation mental health with posttraumatic stress, anxiety, and depression nearly 30 years later in 292 Vietnam-era repatriated prisoners of war.

For most, symptoms were within normal limits, but a substantial minority reported clinically elevated levels. Age at capture and posttraumatic stress symptoms at repatriation predicted all three long-term mental health outcomes. Physical torture also predicted long-term posttraumatic stress symptoms. Findings highlight both long-term effects of captivity and significant capacity for resilience.

Schlenger, W.E., Corry, N., Williams, C., Kulka, R.A., Mulvaney-Day, N., DeBakey, S., . . . Marmar, C.R. (2015). **A prospective study of mortality and trauma-related risk factors among a nationally representative sample of Vietnam Veterans.** *American Journal of Epidemiology*, *182*, 980-990. doi:10.1093/aje/kwv217 Because Vietnam Veterans comprise the majority of all living Veterans and most are now older adults, the urgency and potential value of studying the long-term health effects of service in the Vietnam War, including effects on mortality, is increasing. The present study is the first prospective mortality assessment of a representative sample of Vietnam Veterans. We used one of the longest follow-up periods to date (spanning older adulthood) and conducted one of the most comprehensive assessments of potential risk factors. Vital status and cause of death were ascertained for the 1,632 Veterans who fought in the Vietnam theater (hereafter referred to as theater Veterans) and for 716 Vietnam War-era Veterans (hereafter referred to as era Veterans) who participated in the NVVRS (1987–2011). As of April 2011, 16.0% (95% CI: 13.1, 19.0) of all Vietnam Veterans who were alive in the 1980s were deceased. Male theater Veterans with a high probability of PTSD were nearly two times more likely to have died than were those without PTSD, even after adjustment for sociodemographic and other characteristics. A high level of exposure to war zone stress was independently associated with mortality for both male and female theater Veterans after adjustment for sociodemographic characteristics, PTSD, and physical comorbid conditions. Theater Veterans with a high level of exposure to war zone stress and a high probability of PTSD had the greatest mortality risk (adjusted hazard ratio = 2.34, 95% CI: 1.24, 4.43).

Schlenger, W.E., Mulvaney-Day, N., Williams, C.S., Kulka, R.A., Corry, N.H., Mauch, D., . . . Marmar, C.R. (in press). **PTSD and use of outpatient general medical services among Veterans of the Vietnam War.** *Journal of Psychiatric Services*. doi:10.1176/appi.ps.201400576 *Objective:* The primary goal of this analysis was to assess whether recent use of outpatient services for general medical concerns by Vietnam Veterans varies according to level of PTSD symptomatology over time. Another goal was to determine whether PTSD symptomatology was associated with Veterans' reports of discussing behavioral health issues as part of a general medical visit. *Methods:* Self-reported service use data and measures of PTSD were from a nationally representative sample of 848 male and female Vietnam theater Veterans (individuals who were deployed to the Vietnam theater of operations) who participated in the NVVRS, a 25-year follow-up of a cohort of Veterans originally interviewed from 1984–1988 as part of the NVVRS. Four categories of PTSD symptomatology course over 25 years were defined, and logistic regression models were used to assess their relationship with recent use of outpatient general medical services. *Results:* Male and female theater Veterans with high or increasing PTSD symptomatology over the period were more likely than those with low symptomatology to report recent VA outpatient visits.

Males in the increasing and high categories were also more likely to discuss behavioral health issues at general medical visits. *Conclusions:* Vietnam Veterans with high and increasing PTSD symptomatology over time were likely to use VA outpatient general health services. Attention to stressors of the aging process and to persistence of PTSD symptoms is important for Vietnam Veterans, as is addressing PTSD with other psychiatric and medical comorbidities within the context of outpatient general medical care.

Segovia, F., Moore, J.L., Linnville, S.E., Hoyt, R.E., & Hain, R.E. (2012). **Optimism predicts resilience in repatriated prisoners of war: A 37-year longitudinal study.** *Journal of Traumatic Stress*, *25*, 330–336. doi:10.1002/jts.21691 Resilience, exhibiting intact psychological functioning despite exposure to trauma, is one perspective as to why some people who are exposed to trauma do not develop symptoms. This study examines the prisoner of war experience to expand our understanding of this phenomenon in extreme cases of trauma such as prolonged captivity, malnourishment, and physical and psychological torture. The study examined the US' longest detained American prisoners of war, those held in Vietnam in the 1960s through early 1970s. A logistic regression analysis using resilience, defined as never receiving any psychiatric diagnosis over a 37-year follow-up period, as the outcome was performed ($n = 224$ with complete data). Six variables showing at least small effects emerged: officer/enlisted status, age at time of capture, length of solitary confinement, low antisocial/psychopathic personality traits, low posttraumatic stress symptoms following repatriation, and optimism. ORs and CIs confirmed the significance and relative strength of these variables, with a range from $OR = 0.54$, 95% CI [0.13, 2.29] to $OR = 1.11$, 95% CI [1.04, 1.17]. When all variables were examined continuously and categorically, dispositional optimism was the strongest variable, accounting for 17%, continuously, and 14%, categorically. We discuss optimism as a protective factor for confronting trauma and the possibility of training to increase it.

Vaccarino, V., Goldberg, J., Magruder, K.M., Forsberg, C.W., Friedman, M.J., Litz, B.T., . . . Smith, N.L. (2014). **Posttraumatic stress disorder and incidence of type-2 diabetes: a prospective twin study.** *Journal of Psychiatric Research*, *56*, 158-164. doi:10.1016/j.jpsychires.2014.05.019 Growing evidence has linked PTSD to insulin resistance and type-2 diabetes, but most previous studies were cross-sectional. We examined the association between PTSD and incidence of diabetes in a prospective study of middle-aged male twins from the VET Registry. Lifetime PTSD was diagnosed at baseline with the DIS according to *DSM-III-R* criteria. Subthreshold PTSD was defined by meeting some, but not all, criteria for PTSD. A total of 4340 respondents without self-reported diabetes at baseline were included. Of these, 658 reported a new diagnosis of treated diabetes over a median of 19.4 years of follow-up. At baseline, twins with PTSD showed more behavioral and metabolic risk factors such as overweight and hypertension. The age-adjusted cumulative incidence of diabetes was significantly higher in twins with PTSD (18.9%) than those without PTSD (14.4%), [$OR = 1.4$, 95% CI 1.03–1.8], and intermediate in those with subthreshold PTSD (16.4%) ($OR = 1.2$, 95% CI 0.9–1.5, p for trend = 0.03). Adjustment for military, lifestyle and metabolic factors diminished the association.

FEATURED ARTICLES *continued*

No significant association was found comparing twin pairs discordant for PTSD. In conclusion, PTSD was prospectively associated with a 40% increased risk of new-onset type-2 diabetes which was partially explained by a cluster of metabolic and behavioral risk factors known to influence insulin resistance. Shared biological or behavioral precursors which occur within families may lead to both PTSD and insulin resistance/diabetes. Thus, PTSD could be a marker of neuroendocrine and metabolic dysregulation which may lead to type-2 diabetes.

Yi, S-W., Hong, J-S., Ohrr, H., & Yi, J-J. (2014). **Agent Orange exposure and disease prevalence in Korean Vietnam Veterans: The Korean Veterans Health Study.** *Environmental Research*, 133, 56-65. doi:10.1016/j.envres.2014.04.027 Between 1961 and 1971, military herbicides were used by the US and allied forces for military purposes. Agent Orange, the most-used herbicide, was a mixture of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid, and contained an impurity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Many Korean Vietnam Veterans were exposed to Agent Orange during the Vietnam War. The aim of this study was to evaluate the association between Agent Orange exposure and the prevalence of diseases of the endocrine, nervous, circulatory, respiratory, and digestive systems. The Agent Orange exposure was assessed by a geographic information system-based model. A total of 111,726 Korean Vietnam Veterans were analyzed for prevalence using the Korea National Health Insurance claims data from January 2000 to September 2005. After adjusting for covariates, the high exposure group had modestly elevated ORs for endocrine diseases combined and neurologic diseases combined. The adjusted ORs were significantly higher in the high exposure group than in the low exposure group for hypothyroidism ($OR=1.13$), autoimmune thyroiditis ($OR=1.93$), diabetes mellitus ($OR=1.04$), other endocrine gland disorders including pituitary gland disorders ($OR=1.43$), amyloidosis ($OR=3.02$), systemic atrophies affecting the nervous system including spinal muscular atrophy ($OR=1.27$), Alzheimer disease ($OR=1.64$), peripheral polyneuropathies ($OR=1.09$), angina pectoris ($OR=1.04$), stroke ($OR=1.09$), COPD including chronic bronchitis ($OR=1.05$) and bronchiectasis ($OR=1.16$), asthma ($OR=1.04$), peptic ulcer ($OR=1.03$), and liver cirrhosis ($OR=1.08$). In conclusion, Agent Orange exposure increased the prevalence of endocrine disorders, especially in the thyroid and pituitary gland; various neurologic diseases; COPD; and liver cirrhosis. Overall, this study suggests that Agent Orange/2, 4-D/TCDD exposure several decades earlier may increase morbidity from various diseases, some of which have rarely been explored in previous epidemiologic studies.

ADDITIONAL CITATIONS

Brooks, M.S., Laditka, S.B., & Laditka, J.N. (2008b). **Evidence of greater health care needs among older Veterans of the Vietnam War.** *Military Medicine*, 173, 715-720. doi:10.7205/MILMED.173.8.715 Using the 2001 NSV to examine differences in health status between those who served in Vietnam and those who served elsewhere, this study found evidence that, among Veterans who served during the Vietnam War, health status may be worse for those who served in Vietnam, particularly among older Veterans.

ADDITIONAL CITATIONS *continued*

Dalager, N.A. & Kang, H.K. (1997). **Mortality among Army Chemical Corps Vietnam Veterans.** *American Journal of Industrial Medicine*, 31, 719-726. doi:10.1002/(SICI)1097-0274(199706)31:6<719::AID-AJIM8>3.0.CO;2-L This study was designed as an extension of an earlier evaluation of the mortality experience of 894 Army Chemical Corps Vietnam Veterans in an effort to address earlier limitations of that study.

Dohrenwend, B.P., Turner, J.B., Turse, N.A., Adams, B.G., Koenen, K.C., & Marshall, R. (2006). **The psychological risks of Vietnam for U.S. Veterans: A revisit with new data and methods.** *Science*, 313, 979-982. doi:10.1126/science.1128944 This study validated Veterans' self-reported exposure levels in the NVVRS against a newly constructed exposure measure based on military records, finding little evidence of falsification and a strong dose-response relationship. The authors also produced modified estimates of current PTSD by applying different methods and diagnostic algorithms to the NVVRS data.

Kulka, R., Schlenger, W., Fairbank, J., Jordan, B., Hough, R., Marmar, C., & Weiss, D. (1990). **Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study.** New York: Brunner/Mazel Publishers. This book provides a detailed description of the NVVRS design, major results, and policy implications for addressing and understanding the physical and mental health needs of the Vietnam Veteran generation.

O'Toole, B.I., Outram, S., Catts, S.V., & Pierse, K.R. (2010). **The mental health of partners of Australian Vietnam Veterans three decades after the war and its relation to Veteran military service, combat, and PTSD.** *The Journal of Nervous and Mental Disease*, 198, 841-845. doi:10.1097/NMD.0b013e3181f98037 This study found that anxiety and depression were the most prevalent psychiatric diagnoses among spouses of Australian Vietnam Veterans and that Veterans' combat and PTSD status were significantly associated with spousal depression.

Pavuk, M., Ketchum N.S., & Fox K.A. (2006). **Mortality in US Air Force Veterans of Operation Ranch Hand.** *Organohalogen Compounds*, 68, 2136-2139. This report updates our earlier findings on mortality by summarizing current all-cause and cause-specific post-service mortality in Veterans of Operation Ranch Hand through December 31, 2003.

Phillips, A.C., Batty, G.D., Gale, C.R., Deary, I.J., Osborn, D., MacIntyre, K., & Carroll, D. (2009). **Generalized anxiety disorder, major depressive disorder, and their comorbidity as predictors of all-cause and cardiovascular mortality: The Vietnam Experience Study.** *Psychosomatic Medicine*, 71, 395-403. doi:10.1097/PSY.0b013e31819e6706 This study found that, among a subset of Vietnam Veterans who participated in the medical examination component of the Vietnam Experience Study, generalized anxiety disorder and major depressive disorder were associated with greater all-cause mortality.

Robinson, J.N., Fox, K.A., Jackson, W.G., Ketchum, N.S., Pavuk, M., & Grubbs, W. (2006). **Air Force Health Study – An overview.** *Organohalogen Compounds*, 68, 752-755. This paper provides a very brief summary of the purpose, design and results of AFHS, conducted between 1984 to March 2005 to determine whether

ADDITIONAL CITATIONS *continued*

adverse health outcome—morbidity, mortality, and reproductive health—existed among the US Air Force members (Ranch Hands) assigned to Operation Ranch Hand and whether these adverse outcomes could be related to occupational exposure to herbicides, specifically Agent Orange.

Schlenger, W.E., Corry, N.H., Kulka, R.A., Williams, C.S., Henn-Haase, C., & Marmar, C.R (2015). **Design and methods of the National Vietnam Veterans Longitudinal Study.** *International Journal of Methods in Psychiatric Research*, 24, 186-203. [doi:10.1002/mpr.1469](https://doi.org/10.1002/mpr.1469)

This article provides a description of the NVVLS design and methods, including detailed information regarding data collection and response rates.

Yi, S-W. & Ohrr, H.H. (2014). **Agent Orange exposure and cancer incidence in Korean Vietnam Veterans: A prospective cohort Study.** *Cancer*, 120, 3699-3706. [doi:10.1002/cncr.28961](https://doi.org/10.1002/cncr.28961) This study found that exposure to Agent Orange several decades earlier may increase the risk of cancers in all sites combined, as well as several specific cancers, among Korean Veterans of the Vietnam War. Separate analyses focused on the incidence of some cancers that could not be attributed to Agent Orange exposure (based on previous cohort studies conducted mostly with Western populations).

Corry, N., Kulka, R., Fairbank, J., and Schlenger, W. Forty Years After the War: How are Vietnam Veterans Doing Today? (2016). National Center for PTSD. PTSD Research Quarterly, Vol 27, No 1.

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