



PTSD *Research Quarterly*

ADVANCING SCIENCE AND PROMOTING UNDERSTANDING OF TRAUMATIC STRESS

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PTSD and Aging

Population aging is a key demographic trend characterizing the United States (U.S.) and many industrialized countries, and an important consideration for research aiming to improve public health. Despite significant scientific advances in understanding the etiology and treatment of posttraumatic stress disorder (PTSD) since it became a formal diagnostic entity in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association [APA], 1980), PTSD and aging remains a largely understudied area. This issue of PTSD Research Quarterly provides a guide to some of the most important and well-conducted studies on this topic.

Population trends provide a context for understanding the lives of the aging population. Between 2016 and 2060, the proportion of the U.S. population aged 65+ is expected to rise from 15% (49 million) to 23% (95 million), and individuals aged 85+ will increase from 2% to 5% (19 million). Illustrating the female advantage in life expectancy, women comprised 50%, 56%, and 65% of the U.S. population under age 65, 65+, and 85+, respectively, in 2018 (United States Census Bureau, 2018). The social ecology of men and women appears to diverge in older ages: While men and women have similar marital status in midlife, among those aged 85+, 70% of women were widowed and 18% were married, compared to 33% and 58% men who were widowed or married, respectively (United States Census Bureau, 2018). The gender gap in poverty also widens with age: 9% of men and 11% of women aged 55-59 live in poverty, compared to 9% of men and 14% of women aged 85+ (United States Census Bureau, 2018). As discussed more fully below, it is important to note that age effects and cohort differences are confounded in these cross-sectional estimates. While military Veterans only made up 6% of the overall U.S. population in 2016,

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nearly one-fifth (19%) of those aged 65+ are Veterans. Gulf War (including post 9/11) and Vietnam era Veterans each comprise about one-third of the current U.S. Veteran population (National Center for Veterans Analysis and Statistics, 2016). Vietnam era Veterans are currently in their 60s, and the number of deaths in this cohort is expected increase linearly and peak between 2030 and 2035 (National Center for Veterans Analysis and Statistics, 2016).

A. Epidemiology of PTSD in Older Populations

Epidemiologic studies have generally reported lower prevalence of PTSD in older relative to younger adults. Lifetime prevalence of DSM-IV PTSD was estimated cross-sectionally to be 6% in ages 18-29, 8% in ages 30-44, 9% in ages 45-59, and 3% in ages 60 and older in the U.S. nationally representative National Comorbidity Survey Replication (NCS-R; Kessler et al., 2005). PTSD was assessed in NCS-R using the World Health Organization Composite International Diagnostic Interview (WMH-CIDI), a structured interview administered face-to-face by lay interviewers. Twelve-month prevalence of DSM-IV PTSD in the U.S. was estimated to be 4% in ages 20-34, 5% in ages 35-64, and 3% in ages 65-90 in Wave 2 of the nationally representative National Epidemiologic Survey on Alcohol and Related Conditions (NESARC-2; Reynolds et al., 2016). PTSD was assessed face-to-face by lay interviewers using the Alcohol Use Disorders and Associated Disabilities Interview Schedule IV (AUDADIS-IV). As for DSM-5 PTSD, a similar pattern of lower lifetime and 12-month prevalence in older than younger adults was found in NESARC-3 (Goldstein et al., 2016). Of note, these estimates are an underestimation because NESARC-3 used higher diagnostic thresholds for Criteria D and E than those in DSM-5.

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In terms of trauma exposure, NESARC-2 findings indicated that older adults endorsed exposure to fewer lifetime traumatic experiences than middle-aged and younger adults (Reynolds et al., 2016). When specific events were considered, older adults were more likely to endorse lifetime exposure to combat, but less likely to endorse exposure to intimate partner violence and sexual assault than younger and middle-aged adults (Reynolds et al., 2016). Outside of the U.S., a similar pattern of lower prevalence of PTSD and trauma exposure among older compared with younger adults have been reported (see Böttche, Kuwert, & Knaevelsrud, 2011 for a summary), but the estimates were based on a small number of studies which used different age cutoffs for the older groups (e.g., 55 vs. 60 vs. 65), thus the evidence cannot be considered conclusive. Of note, in a community-based sample from northeastern Germany, Spitzer et al. (2008) reported no age difference in lifetime and past-month PTSD prevalence as assessed by the Structured Clinical Interview for DSM-IV PTSD. For example, lifetime prevalence was 4%, 4%, and 3% for those aged ≤ 44 , 45-64, and 65+, respectively. In contrast to NESARC-2 findings in the U.S., a greater proportion of older adults (77%) than middle-aged (50%) and younger adults (42%) in this German sample reported having a history of any traumatic events.

PTSD prevalence is higher in military than civilian populations. Probable lifetime DSM-5 PTSD prevalence among U.S. Veterans was estimated cross-sectionally to be 29.3% in ages 18-29, 12.3% in ages 30-44, 11.5% in ages 45-59, and 4% in age 60 or older in the nationally representative National Health and Resilience in Veterans Study (NHRVS; Wisco et al., 2016). Probable lifetime PTSD was determined using a cutpoint of ≥ 38 on the PTSD Checklist-5 (PCL-5) administered via an internet survey. Period of military service is an important consideration. Prevalence estimates among World War II (WWII) and Korean Conflict Veterans are typically based on small samples and inherently biased by survival effects, as it was impossible to assess PTSD among Veterans who died before the diagnosis was formalized in 1980. In a nationally representative sample of Vietnam theater Veterans assessed with diagnostic interview (Clinician-Administered PTSD Scale for DSM-5 [CAPS5]) in 2012-3, prevalence of current (past-month) DSM-5 PTSD was 4.5% for men and 6.1% for women (Marmar et al., 2015). A nationally representative study of female Vietnam-era Veterans reported a higher current (past-year) DSM-IV prevalence of 15.9%, as assessed by the CIDI (Magruder et al., 2015). Methodological differences, such as anchoring of PTSD symptoms to the cumulative impact of warzone trauma (Marmar et al., 2015) versus the worst event (Magruder et al., 2015) and different time frames captured by current PTSD symptoms, likely underlie differences in these estimates.

Goldberg et al. (2016) considered differences in DSM-IV PTSD prevalence by cohort and Vietnam theater service in a large, U.S. national sample of male twins born between 1939-1957. A cohort-by-theater interaction was observed in both lifetime and current (12-month) estimates as assessed via the CIDI. Specifically, lifetime and 12-month prevalence were higher in theater than non-theater Veterans, and this difference was larger in those aged 60+ than those under age 60. For example, current PTSD prevalence estimates for theater and non-theater Veterans were 15% and 10%, respectively, in those under age 60, and 12.5% and 3.3%, respectively, in those age 60+.

To summarize, these epidemiologic findings highlight several trends regarding PTSD and aging: Prevalence estimates of trauma

exposure, and current and lifetime PTSD, are lower in older (age 60+ or 65+) than younger adults. The estimates are primarily based on U.S. samples, with some suggestion that the pattern may differ in non-U.S. populations. PTSD is more prevalent in military than civilian populations. Prevalence estimates tend to vary by periods of military service, which capture information regarding the nature of trauma exposure and sociohistorical context surrounding a war. Age differences in PTSD prevalence seem to be smaller among Veterans with warzone exposure, although this finding requires replication outside of the U.S. population of Vietnam-era Veterans. Study design is an important consideration in interpreting prevalence estimates; it is addressed in greater depth in Section C below.

B. Delayed Onset PTSD and Late-life Symptom Exacerbation

The typical onset age for PTSD is in young and middle adulthood. The NCS-R reported a median onset age of 23 (interquartile range: ages 15-39) among adults (Kessler et al., 2005). Two phenomena relevant to aging are delayed-onset PTSD and symptom exacerbation in late life. One of the earliest empirical studies on this topic included 244 community-dwelling WWII Prisoners of War (POWs; Port, Engdahl, & Frazier, 2001). In the early 1990s, a mail survey first assessed PTSD symptoms using the Mississippi Scale for Combat-Related PTSD, and then asked participants if they were “seriously troubled” by PTSD symptoms in 7 calendar periods since military discharge. One-tenth (11%) of the sample had “reactivated” PTSD symptoms – being troubled by symptoms early, followed by having no difficulties for 25-30 years, and then being troubled again in later life. A small proportion ($n = 6$; 2%) had “long delayed onset,” defined as being troubled by symptoms for the first time only in 1980 or after. Another well-known study with longitudinal PTSD data is Solomon and Miulincer’s (2006) 20-year follow-up of Israeli 1982 Lebanon War Veterans. The sample included 131 Veterans identified as having combat stress reaction due to the war, and 83 demographically similar combat Veterans from the same military units without combat stress reaction. DSM-III symptoms, psychological distress, and dysfunction were assessed at 1, 2, 3, and 20 years after the war. In both groups, the average number of PTSD symptoms was higher at Years 1 and 2 than Year 3, and again higher at Year 20 compared with Year 3 (mean number of symptoms over time: 5, 5, 4, 5); there was no group-by-time interaction in symptom count. Delayed onset PTSD, defined as meeting diagnostic criteria at any occasion after Year 1, was observed in 16% of the combat stress reaction group and 24% of the comparison group. Symptom profile was found to be temporally stable in the combat stress group, with recurrent images and thoughts about the war being most prevalent across all occasions. In the comparison group, symptom profile was less stable. For example, recurrent images and thoughts were among the most prevalent symptoms across assessment points, whereas memory difficulties became more common only 20 years after the war. Findings based on the WWII POWs and Lebanon War Veterans are limited in generalizability because the samples were small, military-based, and included only survivors who completed all follow-up visits. Nonetheless, these findings suggest the presence of delayed onset PTSD and heterogeneity in the longitudinal course of PTSD symptoms.

A meta-analysis reported that 25% of PTSD cases were delayed-onset, but estimates vary widely across studies (Utzon-Frank et al., 2014). A methodological issue in this literature is inconsistency in

how researchers have quantified “delayed onset.” For example, older studies have considered delayed onset defined as 1, 2, and 5 years after an index event (e.g., Andrews, Brewin, Philpott, and Stewart, 2007). Earlier versions of the DSM did not address whether delayed onset of symptoms referred to any vs. a full set of symptoms; however, the DSM-5 defines delayed expression as meeting diagnostic criteria at least 6 months after the index event, while allowing for onset and expression of some symptoms immediately after the event.

In a more recent study, Mota et al. (2016) examined symptom exacerbation in a nationally representative sample of Veterans aged 55+. They reported that 10% of the sample experienced a clinically significant exacerbation of their PTSD symptoms, defined as a minimum 0.5 standard deviation increase, when assessed 2 years apart.

C. Design and Methodological Issues in Aging Research

As seen above, prevalence estimates can vary as a function of methodological factors, including sample characteristics (e.g., military vs. civilian populations), assessment methods (e.g., interview vs. survey), definition of PTSD (e.g., DSM and ICD editions, time frame of symptoms), and anchoring of symptoms to trauma exposure (e.g., worst trauma vs. specific events among disaster survivors). Mortality or survival bias is an especially important consideration vis-à-vis aging: Because PTSD is associated with greater morbidity and mortality, healthier people who survive into older ages are less likely to have current or lifetime PTSD.

The age-period-cohort model lies at the foundation of modern gerontology research (Schaie, 1983) and provides a useful framework for studying PTSD and aging. Under this model, “aging effects” are broken down in 3 ways: (1) Age changes are within-person processes resulting from maturation; they can either be normative or pathological. For example, some physiologic processes, such as blood pressure reactivity to acute stressors, are age-dependent (Uchino, Holt-Lunstad, Flinders, 1999) and underlie PTSD symptoms. However, studies have not examined developmental dynamics between physiologic changes and PTSD symptoms. Maturation gains are also important to consider. For example, older age is associated with better emotion regulation, emotional well-being, and positivity biases in memory and appraisal (see reviews by Charles, 2010, and Charles & Carstensen, 2010), yet how age-related gains intersect with PTSD or psychopathology in later life is seldom investigated. Age-related declines in cognitive and physical function may also influence coping with PTSD and symptom manifestation. (2) Period effects are time-of-measurement effects, such as the effect of time since trauma on PTSD symptoms. Other examples include the changing definition of PTSD and changes in diagnostic instruments over time. (3) Cohort effects refer to between-person differences due to people entering the stream of historical time at different points. It is typically indexed by birth year, or in historically meaningful groupings such as periods of military service. Cohort differences are known to underlie age group differences in symptom endorsement (e.g., minimizing symptoms due to shame or stigma in earlier-born cohorts) and psychological mindedness. Cohort differences in trauma exposure (e.g., by war theater) can affect PTSD prevalence via differential exposure to risk and protective factors. Age, period, and cohort effects are not mutually exclusive, and they often co-exist.

D. Clinical Considerations of PTSD in Older Populations

Considerations regarding aging effects and cohort differences in construct, symptom manifestation, and reporting have motivated the development of age-specific norms and instruments for late-life depression and anxiety (e.g., Jorm, 2000). Few studies have addressed assessment and diagnosis of PTSD in older adults (see Pless Kaiser, Cook, Glick, and Moye, 2018 for a review). Pietrzak and colleagues (2012) shed light on these issues by examining the factor structure and diagnostic utility of the PCL in a sample of older adults exposed to Hurricane Ike. Confirmatory factor analysis indicated that a 5-factor model including re-experiencing, avoidance, numbing, dysphoric arousal, and anxious arousal symptom clusters best represented PTSD symptoms linked to the hurricane and the worst lifetime trauma in that sample. Receiver-operating characteristics (ROC) analysis further indicated that lower cutpoints (37-44) than those typically used in adult populations (44-50) are suitable for identifying probable PTSD in community-dwelling older adults. Additional psychometric studies conducted in older primary care (Cook, Elhai, & Areán, 2005; Yeager & Magruder, 2014) and POW samples (Cook, Thompson, Coyne, & Sheikh, 2003) have consistently supported the need for lower PCL cutpoints among older populations. These data may suggest the possibility of a “late life subtype” of PTSD with a lower diagnostic threshold. In developing this concept, it will be crucial to clarify age effects on the psychological, cognitive, and physiological manifestation of PTSD symptoms, while carefully addressing confounding by medical comorbidity and cohort differences. For example, studies to examine measurement invariance of the latent PTSD construct over age (using longitudinal data on DSM-5 symptoms), and across birth cohorts and subgroups that differ by health status, would be highly valuable.

While there is increasing interest in adapting psychotherapy developed for treating adult PTSD for use with older populations, current PTSD clinical practical guidelines (APA, 2017, Department of Veterans Affairs [VA] and Department of Defense [DoD], 2017; International Society for Traumatic Stress Studies [ISTSS], 2019) do not provide recommendations for working with older adults. The extant literature comprises mostly case reports. To date, there are 4 randomized controlled trials (RCTs) evaluating psychotherapy for PTSD in older adults. Thorp et al. (2019) was the only RCT comparing two active treatments for PTSD, namely, Prolonged Exposure (PE) and relaxation training. Their adaptation of PE for older adults and demonstration of its feasibility are important for addressing safety concerns of exposure-based procedures among providers. Knaevelsrud and colleagues (2017) evaluated Integrative Testimonial Therapy (ITT) against a wait-list condition among 94 older Germans who experienced WWII-related traumas as children. ITT is an internet-based, cognitive-behavioral therapy (CBT) with written exposure components delivered with therapist assistance. The findings are noteworthy for a low attrition rate (10%), evidence supporting the efficacy of ITT, and maintenance of treatment gains over 1 year. Web-based interventions can be a particularly appealing option for older adults with mobility concerns. A third RCT evaluated a spiritually focused group intervention in 43 older female survivors of interpersonal trauma and reported a decline in PTSD symptoms over the course of treatment (Bowland, Edmond, & Falot, 2012). The earliest RCT examined Narrative Exposure Therapy (NET) in 18 former political detainees and found that it was more efficacious than psychoeducation alone in reducing PTSD symptoms (Bichescu,

Neuner, Schauer, & Elbert, 2007). Together, these studies contribute to growing empirical evidence supporting the efficacy of psychotherapeutic interventions for PTSD in older adults.

Very few studies have examined predictors of treatment response in older vs. younger adults. A relevant study by Chard, Schumm, Owens, & Cottingham (2010) reported that Vietnam Veterans were less responsive to Cognitive Processing Therapy than OIF/OEF Veterans, even after adjusting for pre-treatment symptom severity and sessions attended. These findings resonate with Thorp et al.'s (2019) report that PE, while efficacious in older Veterans, produced less robust treatment response when compared with results based on younger samples. It is unknown, however, if treatment is less efficacious because older adults who meet diagnostic criteria represent more severe cases (given the aforementioned findings suggesting the need for a lower diagnostic threshold for older adults), or due to other considerations specific to older populations.

E. PTSD & Age-related Comorbidities

PTSD has been linked to elevated risks of chronic health conditions. Among adults aged 60+ in NESARC-2, lifetime PTSD was cross-sectionally associated with greater likelihood of reporting past-year diagnosis of hypertension, angina and tachycardia, stomach ulcer, gastritis and arthritis than no PTSD, after adjusting for sociodemographic status, and lifetime diagnoses of psychiatric disorder. Partial PTSD was also associated with greater odds of having angina than no PTSD (Pietrzak, Goldstein, Southwick, & Grant, 2012). Aside from physical health conditions, a study by Byers, Covinsky, Neyland, and Yaffe (2014) illustrates the burden of PTSD on quality of life in later life. Using data from a large, ethnically diverse, and nationally representative sample of adults, the authors reported that adults aged 55+ who had PTSD onset prior to age 55 and met criteria for current PTSD ("persistent PTSD") were more likely to experience functional impairment across multiple domains relative to those without PTSD. Individuals with PTSD with onset and resolution before age 55 also had somewhat greater functional impairment than the no-PTSD group. The sections below highlight the literature of PTSD and two major categories of age-related disease, namely, dementia and cardiometabolic conditions.

Dementia. Yaffe et al. (2010) was the first study to report an association between PTSD and incident dementia. Using nationwide VA administrative records, the authors compiled a large cohort of 181,093 Veterans who were initially free of dementia and tracked within the VA healthcare system. PTSD caseness was determined by receiving a diagnosis at least twice during the baseline period. The prospective PTSD-dementia association was consistent across dementia subtypes; it also withstood adjustment for baseline physical and psychiatric comorbidities and number of visits (as a proxy for PTSD severity). Since then, the association of PTSD to dementia onset has been replicated in other Veteran and civilian samples of men and women (see systematic review by Desmarais et al., 2019). Recent studies have further considered the role of psychotropic medications in the PTSD-dementia association. For example, Mawanda and colleagues (2017) examined whether dementia risk varied by both PTSD status and psychotropic medication use in nationwide VA administrative records of Veterans aged 56+. Medications included selective serotonin reuptake inhibitors [SSRI], serotonin-norepinephrine reuptake inhibitors [SNRI], mixed class or novel antidepressants [NA], atypical antipsychotics [AA], and benzodiazepines [BZA]. Significant effect modification was

observed for baseline use of SNRI, NA, and AA, such that Veterans with PTSD and using medication at baseline had greater risk of incident dementia during the follow-up period compared with the no-PTSD/no-medication group and the PTSD/no-medication group. Regardless of PTSD diagnosis, baseline use of SNRI or BZA was also linked to greater risk of incident dementia. Thus, the evidence to date is consistent with independent associations of PTSD and selected psychotropic medication use to incident dementia, and with greater risk of incident dementia among PTSD patients who were using selected psychotropic medications.

A smaller literature comprising mostly case reports has examined the role of dementia in triggering the onset, recurrence, or exacerbation of PTSD symptoms in later life (see review by Desmarais et al., 2019). A related body of work has investigated the association between PTSD and cognitive function. One study evaluated the associations of trauma exposure, PTSD, and depression to subsequent cognitive function in a large epidemiologic cohort of middle-aged women (Sumner et al., 2016). The key finding was that women with probable PTSD and depression were most likely to exhibit poor cognitive performance, relative to depression-free women with either trauma exposure or PTSD, PTSD-free women with both trauma exposure and probable depression, and women free of both trauma exposure and depression. It is unknown whether these findings may generalize to older women and men. While this study demonstrates a longitudinal association of PTSD and depression to subsequent cognitive function, further research on whether PTSD is associated with subsequent cognitive decline, would be particularly valuable (see Green, Fairchild, Kinoshita, Noda, & Yesavage, 2016, for a cross-sectional study on PTSD and cognitive performance in older adults).

Cardiometabolic conditions. Numerous studies have established the association of PTSD to greater risk of coronary heart disease (CHD) onset. Kubzansky and colleagues (2007) conducted the first prospective study on this topic. In a sample of 944 to 1002 older military Veterans, PTSD symptoms as assessed via the Mississippi Scale for Combat-Related PTSD and the MMPI-2 Keane PTSD scale were both associated with greater risk of incident CHD over a follow-up of up to 15 years. These results were generally maintained when adjusted for demographics, known coronary risk factors (e.g., body mass index [BMI], cholesterol), and depressive symptoms. Using a larger female epidemiologic sample, Sumner et al. (2015) further considered the independent associations of trauma exposure and PTSD to cardiovascular disease (CVD). Interestingly, both trauma exposure without PTSD and full PTSD, but not subthreshold PTSD symptoms, were associated with greater risk of CVD. These associations held up even after adjusting for depressive symptoms and childhood abuse. Findings from this study also speak to the role of health behaviors in the PTSD- and trauma-CVD associations. An earlier issue of *Research Quarterly* on PTSD and CVD provides further information on this topic (Arensen & Cohen, 2017).

PTSD has also been linked to metabolic conditions. Epidemiologic studies have established prospective associations between PTSD and incidence of Type 2 diabetes (e.g., Miller-Archie et al., 2014; Roberts et al., 2015). A recent study, using an informative design, demonstrated an association between clinically meaningful reduction of PTSD symptoms and lower subsequent risk of Type 2 diabetes incidence (Scherrer et al., 2019). Using national VA healthcare records, the authors first selected Veterans who made 2+ visits to PTSD specialty care during a 5-year baseline period. They further

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selected Veterans who had one PCL score ≥ 50 during this period, a second PCL score in the following 12 months, and were free of diabetes prior to the second PCL administration. Clinically meaningful reduction of PTSD symptoms was defined as a 20-point decrease from the first to second PCL administration. Records collected 2 to 6 years after the second PCL score were examined for incidence of diabetes. This design is particularly helpful in advancing causal inference regarding the direction from PTSD to diabetes incidence.

There is also epidemiologic evidence supporting an association of PTSD to incident hypertension. For example, Burg et al. (2017) analyzed administrative records and demonstrated that PTSD – particularly when untreated – is associated with greater risks of developing hypertension in a relatively young sample of male and female OIF/OEF Veterans. The association of PTSD to obesity is more challenging to establish, because unlike disease outcomes, obesity is based on weight, which tends to fluctuate over age. Therefore, a strong study design requires multiple assessments of weight over a follow-up period that is sufficiently long to observe meaningful change. For example, Kubzansky et al. (2014) examined a large epidemiologic cohort of women with up to 9 body-mass index (BMI) measurements between 1989 and 2005. PTSD related to worst lifetime trauma, age at worst trauma, and age at most recent symptoms, were assessed retrospectively in 2008 with a screening questionnaire. Women with subthreshold or probable PTSD at baseline (in 1989) exhibited faster BMI increase over time, relative to women with trauma exposure only. Women with onset of PTSD symptoms during the follow-up period had faster subsequent increase in BMI, compared with women who had trauma exposure but no PTSD symptoms. Relatedly, using a cross-lagged panel design, Wolf et al. (2016) assessed bidirectional associations between PTSD and risk for metabolic syndrome over two occasions in a sample of OIF/OEF Veterans. They found support for higher levels of PTSD symptoms as a predictor of higher subsequent levels of metabolic syndrome, after adjusting for initial levels of metabolic risk.

F. Summary & Future Directions

Research on PTSD and aging is at a nascent stage. There is much to be learned about the construct of PTSD in later life, as well as its assessment, diagnosis, and treatment. Age and cohort effects need to be examined with greater methodologic rigor, as they are often confounded in the literature. As longitudinal epidemiological data on trauma and PTSD become increasingly available, there are rich opportunities to better understand the etiology and developmental dynamics of PTSD across the lifespan. Although PTSD appears to be less prevalent in older than younger adults (at least in the U.S.), accumulating evidence has linked PTSD to multiple aging-related chronic health conditions. There is a pressing need to clarify the nature of these associations, for example, by using study designs that can improve causal inference, and identifying biological and psychosocial mechanisms by which PTSD contributes to poor later-life health.

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Byers, A. L., Covinsky, K. E., Neylan, T. C., & Yaffe, K. (2014). **Chronicity of posttraumatic stress disorder and risk of disability**

in older persons. *JAMA Psychiatry*, 71, 540-546. doi:10.1001/jamapsychiatry.2014.5 **Importance:** Little is known about the association of posttraumatic stress disorder (PTSD) with disability in late life. Most studies of late-life psychiatric disorders and function have focused on depression and generalized anxiety disorder (GAD). **Objective:** To determine the association between PTSD and disability among older adults, and investigate if association differs by chronicity of PTSD. **Design:** The Collaborative Psychiatric Epidemiology Surveys (CPES 2001-2003) includes three aggregated, nationally representative studies (National Comorbidity Survey Replication, National Survey of American Life, and National Latino and Asian American Study or NLAAS) totaling 20,013 participants 18 years and older. Analyses used weights and complex design-corrected statistical tests to infer generalizability to US population. **Setting:** Continental US; additionally Alaska and Hawaii for NLAAS. **Participants:** We studied 3,287 CPES participants aged 55 years and older (mean (SD) age = 66 (8.7) years, 60% female). **Main Outcome Measures:** Disability was defined by 5 domains (out of role, self-care, mobility, cognition, and social) using the WHO-DAS. **Results:** 3.7% of older adults had a history of PTSD defined by DSM-IV criteria. Of these, approximately half had persistent PTSD in later life (age of onset < 55 years as well as a recent diagnosis) (1.8%). Examining three PTSD groups, frequency of any disability was 79.7% for persistent PTSD, 69.6% for pre-late-life (age of onset < 55 years and age at last diagnosis < 55 years), and 36.9% for no PTSD ($P < .001$). In logistic regression analyses, adjusting for demographics, smoking, individual medical conditions, depression, GAD, and substance use disorders, respondents with persistent PTSD were three times more likely to have any disability than respondents with no PTSD (odds ratio [OR], 3.18; 95% CI, 1.32-7.64). Global disability results were non-significant for pre-late-life relative to no PTSD (OR, 1.99; 95% CI, 0.97-4.08). In addition, the results suggest that persistent PTSD relative to no PTSD has a strong association with all individual domains. **Conclusions and Relevance:** Disability in older Americans is strongly associated with PTSD, particularly PTSD that persists into later life. These findings suggest that monitoring and treatment of PTSD is important over the long term.

Burg, M. M., Brandt, C., Buta, E., Schwartz, J., Bathulapalli, H., Dziura, J., ... & Haskell, S. (2017). **Risk for incident hypertension associated with PTSD in military veterans, and the effect of PTSD treatment.** *Psychosomatic Medicine*, 79, 181-188. doi:10.1097/PSY.0000000000000376 **Objective:** PTSD increases cardiovascular disease and cardiovascular mortality risk. Neither the prospective relationship of PTSD to incident hypertension risk, nor the effect of PTSD treatment on hypertension risk has been established. **Methods:** Data from a nationally representative sample of 194,319 veterans were drawn from the Veterans Administration roster of United States service men and women. This included veterans whose end of last deployment was from September 2001 – July 2010, and whose first VA medical visit was from October 1, 2001 – January 1, 2009. Incident hypertension was modeled as 3 events: 1) a new diagnosis of hypertension; and/or 2) a new prescription for anti-hypertensive medication; and/or 3) a clinic BP reading in the hypertensive range (≥ 140 mmHg/90mmHg, systolic/diastolic). PTSD diagnosis was the main predictor. PTSD treatment was defined as, 1) at least 8 individual psychotherapy sessions of ≥ 50 min during any consecutive 6 months and/or 2) a prescription for SSRI medication. **Results:** Over a median 2.4 year follow-up, the

incident hypertension risk independently associated with PTSD ranged from $HR = 1.12$ (95% CI 1.08 – 1.17, $p < 0.0001$) to $HR = 1.30$ (95% CI 1.26 – 1.34, $p < 0.0001$). The interaction of PTSD and treatment revealed that treatment reduced the PTSD associated hypertension risk (e.g., from $HR = 1.44$ [95% CI 1.38 – 1.50, $p < 0.0001$] for those untreated, to $HR = 1.20$ [95% CI 1.15 – 1.25, $p < 0.0001$] for those treated). *Conclusions:* These results indicate that reducing the long-term health impact of PTSD and the associated costs, may require very early surveillance and treatment.

Chard, K. M., Schumm, J. A., Owens, G. P., & Cottingham, S. M. (2010). **A comparison of OEF and OIF veterans and Vietnam veterans receiving cognitive processing therapy.** *Journal of Traumatic Stress, 23*, 25-32. doi:10.1002/jts.20500 The current wars in Iraq and Afghanistan are producing large numbers of veterans who have experienced a variety of combat stressors. The potential impact of combat exposure has been established, including significant rates of posttraumatic stress disorder (PTSD). Limited research has examined potential differences between veteran groups and one study to date has examined differences between eras in terms of treatment response. The present study seeks to examine cohort differences between Operation Enduring Freedom and Operation Iraqi Freedom veterans and Vietnam veterans ($N = 101$) before and after completing treatment for PTSD using cognitive processing therapy. Findings suggest that veterans from these eras responded differently to treatment and there are multiple variables that should be considered in future cohort studies.

Charles, S. T. (2010). **Strength and vulnerability integration: A model of emotional well-being across adulthood.** *Psychological Bulletin, 136*, 1068-1091. doi:10.1037/a0021232 The following paper presents the theoretical model of Strength and Vulnerability Integration (SAVI) to explain factors that influence emotion regulation and emotional well-being across adulthood. The model posits that trajectories of adult development are marked by age-related enhancement in the use of strategies that serve to avoid or limit exposure to negative stimuli, but age-related vulnerabilities in situations that elicit high levels of sustained emotional arousal. When older adults avoid or reduce exposure to emotional distress, they often respond better than younger adults; when they experience high levels of sustained emotional arousal, however, age-related advantages in emotional well-being are attenuated, and older adults are hypothesized to have greater difficulties returning to homeostasis. SAVI provides a testable model to understand the literature on emotion and aging and to predict trajectories of emotional experience across the adult life span.

Charles, S. T., & Carstensen, L. L. (2009). **Social and emotional aging.** *Annual Review of Psychology, 61*, 383-409. doi:10.1146/annurev.psych.093008.100448 The past several decades have witnessed unidimensional decline models of aging give way to life-span developmental models that consider how specific processes and strategies facilitate adaptive aging. In part, this shift was provoked by the stark contrast between findings that clearly demonstrate decreased biological, physiological, and cognitive capacity and those suggesting that people are generally satisfied in old age and experience relatively high levels of emotional well-being. In recent years, this supposed “paradox” of aging has been reconciled through careful theoretical analysis and empirical

investigation. Viewing aging as adaptation sheds light on resilience, well-being, and emotional distress across adulthood.

Goldstein, R. B., Smith, S. M., Chou, S. P., Saha, T. D., Jung, J., Zhang, H., ... & Grant, B. F. (2016). **The epidemiology of DSM-5 posttraumatic stress disorder in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions-III.** *Social Psychiatry and Psychiatric Epidemiology, 51*, 1137-1148. doi:10.1007/s00127-016-1208-5 *Objectives:* To present current, nationally representative US findings on the past-year and lifetime prevalences, sociodemographic correlates, psychiatric comorbidity, associated disability, and treatment of DSM-5 posttraumatic stress disorder (PTSD). *Methods:* Face-to-face interviews with 36,309 adults in the 2012–2013 National Epidemiologic Survey on Alcohol and Related Conditions-III. PTSD, alcohol and drug use disorders, and selected mood, anxiety, and personality disorders were assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-5. *Results:* Past-year and lifetime prevalences were 4.7 and 6.1 %, higher for female, white, Native American, younger, and previously married respondents, those with <high school education and lower incomes, and rural residents. PTSD was significantly associated with a broad range of substance use, mood, anxiety, and personality disorders, and past-month disability. Among respondents with lifetime PTSD, 59.4 % sought treatment; an average of 4.5 years elapsed from disorder onset to first treatment. *Conclusions:* DSM-5 PTSD is prevalent, highly comorbid, disabling, and associated with delayed help seeking. Additional research is needed to elucidate relationships identified herein, estimate PTSD-related costs, investigate hypotheses regarding etiology, course, and treatment, and support decisions about resource allocation to service delivery and research. Initiatives are needed to destigmatize PTSD, educate the public about its treatment, and encourage affected individuals to seek help.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). **Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication.** *Archives of General Psychiatry, 62*, 593-602. doi:10.1001/archpsyc.62.6.593 *Context:* Little is known about lifetime prevalence or age of onset of DSM-IV disorders. *Objective:* To estimate lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the recently completed National Comorbidity Survey Replication. *Design and Setting:* Nationally representative face-to-face household survey conducted between February 2001 and April 2003 using the fully structured World Health Organization World Mental Health Survey version of the Composite International Diagnostic Interview. *Participants:* Nine thousand two hundred eighty-two English-speaking respondents aged 18 years and older. *Main Outcome Measures:* Lifetime DSM-IV anxiety, mood, impulse-control, and substance use disorders. *Results:* Lifetime prevalence estimates are as follows: anxiety disorders, 28.8%; mood disorders, 20.8%; impulse-control disorders, 24.8%; substance use disorders, 14.6%; any disorder, 46.4%. Median age of onset is much earlier for anxiety (11 years) and impulse-control (11 years) disorders than for substance use (20 years) and mood (30 years) disorders. Half of all lifetime cases start by age 14 years and three fourths by age 24 years. Later onsets are mostly of comorbid conditions, with estimated lifetime risk of any disorder at age 75 years (50.8%) only slightly higher than observed lifetime prevalence (46.4%). Lifetime prevalence

estimates are higher in recent cohorts than in earlier cohorts and have fairly stable intercohort differences across the life course that vary in substantively plausible ways among sociodemographic subgroups. *Conclusions:* About half of Americans will meet the criteria for a DSM-IV disorder sometime in their life, with first onset usually in childhood or adolescence. Interventions aimed at prevention or early treatment need to focus on youth.

Kubzansky, L. D., Bordelois, P., Jun, H. J., Roberts, A. L., Cerda, M., Bluestone, N., & Koenen, K. C. (2014). **The weight of traumatic stress: A prospective study of posttraumatic stress disorder symptoms and weight status in women.** *JAMA Psychiatry, 71*, 44-51. doi:10.1001/jamapsychiatry.2013.2798 *Importance:*

Posttraumatic stress disorder (PTSD) indicates a chronic stress reaction in response to trauma. This prevalent condition has been identified as a possible risk factor for obesity. Whether PTSD symptoms alter the trajectory of weight gain or constitute a comorbid condition has not been established. *Objective:* To determine whether women who develop PTSD symptoms are subsequently more likely to gain weight and become obese relative to trauma-exposed women who do not develop PTSD symptoms or women with no trauma exposure or PTSD symptoms and whether the effects are independent of depression. *Design, Setting, and Participants:* The Nurses' Health Study II, a prospective observational study initiated in 1989 with follow-up to 2005, using a PTSD screener to measure PTSD symptoms and time of onset. We included the subsample of the Nurses' Health Study II (54 224 participants; ages 24-44 years in 1989) in whom trauma and PTSD symptoms were measured. *Exposures:* Trauma and PTSD symptoms. *Main Outcomes and Measures:* Development of overweight and obesity using body mass index (BMI) (calculated as weight in kilograms divided by height in meters squared) cut points 25.0 and 30.0, respectively; change in BMI during follow-up among women reporting PTSD symptom onset before 1989; and BMI trajectory before and after PTSD symptom onset among women who developed PTSD symptoms in 1989 or during follow-up. *Results:* Among women with at least 4 PTSD symptoms before 1989 (cohort initiation), BMI increased more steeply ($b=0.09$ [SE=0.01]; $P<.001$) during the follow-up. Among women who developed PTSD symptoms in 1989 or later, BMI trajectory did not differ by PTSD status before PTSD onset. After PTSD symptom onset, women with at least 4 symptoms had a faster rise in BMI ($b=0.08$ [SE= 0.02]; $P<.001$). The onset of at least 4 PTSD symptoms in 1989 or later was also associated with an increased risk of becoming overweight or obese (odds ratio, 1.36 [95% CI, 1.19-1.56]) among women with a normal BMI in 1989. Effects were maintained after adjusting for depression. *Conclusions and Relevance:* Experience of PTSD symptoms is associated with an increased risk of becoming overweight or obese, and PTSD symptom onset alters BMI trajectories over time. The presence of PTSD symptoms should raise clinician concerns about physical health problems that may develop and prompt closer attention to weight status.

Kubzansky, L. D., Koenen, K. C., Spiro, A., Vokonas, P. S., & Sparrow, D. (2007). **Prospective study of posttraumatic stress disorder symptoms and coronary heart disease in the Normative Aging Study.** *Archives of General Psychiatry, 64*, 109-116. doi:10.1001/archpsyc.64.1.109 *Context:* Various correlates of

posttraumatic stress disorder (PTSD), such as high levels of sympathetic activation and hypothalamic-pituitary-adrenal axis dysregulation, have been linked to arterial damage and coronary heart disease (CHD) risk. While psychological disturbance is frequently found among patients with cardiac disease, whether psychological problems precede or occur as a result of having a potentially fatal disease is not clear. To our knowledge, no prospective studies to date have evaluated whether PTSD is associated with increased risk of CHD. *Objective:* To test the hypothesis that high levels of PTSD symptoms may increase CHD risk, using 2 different measures of PTSD. *Design:* Prospective cohort study. *Setting:* Community-dwelling men from the Greater Boston, Mass, area who served in the military. *Participants:* Data are from the Veterans Affairs Normative Aging Study. Men who completed either the Mississippi Scale for Combat-Related PTSD in 1990 ($n = 1002$) or the Keane PTSD scale in 1986 ($n = 944$) were included in the study. *Main Outcome Measure:* Incident CHD occurring during follow-up through May 2001. *Results:* Levels of PTSD symptoms in this cohort were low to moderate. Men with preexisting CHD at baseline were excluded, and PTSD was measured with the Mississippi Scale for Combat-Related PTSD. For each SD increase in symptom level, men had age-adjusted relative risks of 1.26 (95% confidence interval, 1.05-1.51) for nonfatal myocardial infarction and fatal CHD combined and 1.21 (95% confidence interval, 1.05-1.41) for all of the CHD outcomes combined (nonfatal myocardial infarction, fatal CHD, and angina). Findings were replicated using the Keane PTSD scale and somewhat strengthened after controlling for levels of depressive symptoms. *Conclusions:* To our knowledge, this is the first study to demonstrate a prospective association between PTSD symptoms and CHD even after controlling for depressive symptoms. These results suggest that a higher level of PTSD symptoms may increase the risk of incident CHD in older men.

Magruder, K., Serpi, T., Kimerling, R., Kilbourne, A. M., Collins, J. F., Cypel, Y., ... & Kang, H. (2015). **Prevalence of posttraumatic stress disorder in Vietnam-era women veterans: The Health of Vietnam-Era Women's Study (HealthVIEWS).** *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 posttraumatic stress disorder (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 United States), 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 8742 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 Department of Veterans Affairs 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 Composite International Diagnostic Interview, 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 United States (odds ratio [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 we 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.

Marmar, C. R., Schlenger, W., 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 Vietnam Veterans Longitudinal Study (NVVLS) is a congressionally mandated assessment of Vietnam veterans who underwent previous assessment in the National Vietnam Veterans Readjustment Study (NVVRS). *Objective:* To determine the prevalence, course, and comorbidities of war-zone posttraumatic stress disorder (PTSD) across a 25-year interval. *Design, Setting, and Participants:* The NVVLS survey consisted of a self-report health questionnaire (n = 1409), a computer-assisted telephone survey health interview (n = 1279), 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 2348 NVVRS participants, 1920 were alive at the outset of the NVVLS, and 81 died during recruitment; 1450 of the remaining 1839 (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, PTSD Checklist for DSM-IV supplemented with PTSD Checklist 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 Mississippi Scale for Combat-Related 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.

Mawanda, F., Wallace, R. B., McCoy, K., & Abrams, T. E. (2017). **PTSD, psychotropic medication use, and the risk of dementia among US veterans: A retrospective cohort study.** *Journal of the American Geriatrics Society, 65*, 1043-1050. doi:10.1111/jgs.14756

Objective: To determine the associations between PTSD, psychotropic medication use, and the risk for dementia. *Design:* Retrospective cohort. *Participants:* Nationwide sample of US veterans (N = 417,172) aged ≥56 years during fiscal year (FY) 2003 without a diagnosis of dementia or mild cognitive impairment at baseline (FY02-03) and ≥1 clinical encounter every 2 years during follow-up (FY04-12). *Measures:* Demographic characteristics; diagnosis of PTSD, dementia, and medical and psychiatric comorbidity (defined by ICD-9 codes); and psychotropic medication use including selective serotonin reuptake inhibitors (SSRI), serotonin-norepinephrine reuptake inhibitors (SNRI), novel antidepressants (NA), benzodiazepines (BZA), and atypical antipsychotics (AA). Cox proportional hazard models examined for associations between PTSD diagnosis, psychotropic medication use, and risk for a dementia diagnosis. *Results:* PTSD diagnosis significantly increased the risk for dementia diagnosis (HR = 1.35; [95% CI = 1.27–1.43]). However, there were significant interactions between PTSD diagnosis and use of SSRIs (P < .001), NAs (P = .014), and AAs (P < .001) on the risk for dementia diagnosis. HR for dementia diagnosis among veterans diagnosed with PTSD and not using psychotropic medications was 1.55 [1.45–1.67]. Among veterans diagnosed with PTSD prescribed SSRI, SNRI, or AA, HR for dementia diagnosis varied by drug class use ranging from 1.99 for SSRI to 4.21 for AA, relative to veterans without a PTSD diagnosis and no psychotropic medication receipt. BZAs or SNRIs use at baseline was associated with a significantly increased risk for dementia diagnosis independent of a PTSD diagnosis. *Conclusion:* PTSD diagnosis is associated with an increased risk for dementia diagnosis that varied with receipt of psychotropic medications. Further research would help to delineate if these findings are due to differences in PTSD severity, psychiatric comorbidity, or independent effects of psychotropic medications on cognitive decline.

Miller-Archie, S. A., Jordan, H. T., Ruff, R. R., Chamany, S., Cone, J. E., Brackbill, R. M., ... & Stellman, S. D. (2014). **Posttraumatic stress disorder and new-onset diabetes among adult survivors of the World Trade Center disaster.** *Preventive Medicine, 66*,

34-38. doi:10.1016/j.ypped.2014.05.016 *Objective:* To explore the temporal relationship between 9/11-related posttraumatic stress disorder (PTSD) and new-onset diabetes in World Trade Center (WTC) survivors up to 11 years after the attack in 2001. *Methods:* Three waves of surveys (conducted from 2003 to 2012) from the WTC Health Registry cohort collected data on physical and mental health status, sociodemographic characteristics, and 9/11-related exposures. Diabetes was defined as self-reported, physician-diagnosed diabetes reported after enrollment. After excluding prevalent cases, there were 36,899 eligible adult enrollees. Logistic regression and generalized multilevel growth models were used to assess the association between PTSD measured at enrollment and subsequent diabetes. *Results:* We identified 2143 cases of diabetes. After adjustment, we observed a significant association between PTSD and diabetes in the logistic model [adjusted odds ratio (AOR) 1.28, 95% confidence interval (CI) 1.14–1.44]. Results from the growth model were similar (AOR 1.37, 95% CI 1.23–1.52). *Conclusion:* This exploratory study found that PTSD, a common 9/11-related health outcome, was a risk factor for self-reported diabetes. Clinicians treating survivors of both the WTC attacks and other disasters should be aware that diabetes may be a long-term consequence.

Mota, N., Tsai, J., Kirwin, P. D., Harpaz-Rotem, I., Krystal, J. H., Southwick, S. M., & Pietrzak, R. H. (2016). **Late-life exacerbation of PTSD symptoms in US veterans: Results from the National Health and Resilience in Veterans Study.** *Journal of Clinical Psychiatry, 77*, 348-354. doi:10.4088/JCP.15m10101 More than 60% of US military veterans are 55 years or older. Although several case studies have suggested that older age is associated with a higher likelihood of reactivated or delayed-onset posttraumatic stress disorder (PTSD) symptoms in veterans, population-based data on the prevalence and determinants of this phenomenon are lacking. Using data from the National Health and Resilience in Veterans Study (NHRVS: Wave 1 = October 2011-December 2011; Wave 2 = September 2013), a nationally representative, cohort study of US veterans, we evaluated the prevalence and determinants of exacerbated PTSD symptoms in 1,441 veterans 55 years or older using a DSM-IV-based measure in 2011 and a DSM-5-based measure in 2013. Veterans whose worst trauma occurred at least 5 years prior to Wave 2 of the NHRVS (mean = 28.6 years) and who reported a clinically significant increase (ie, ≥ 0.5 standard deviation [SD]; mean = 1.27, SD = 0.78) in PTSD symptoms from Wave 1 (lifetime) to Wave 2 (past-month) were identified as having exacerbated PTSD symptoms. Results revealed that 9.9% of older US veterans experienced exacerbated PTSD symptoms an average of nearly 3 decades after their worst trauma. A multivariable logistic regression model indicated that greater self-reported cognitive difficulties at Wave 1 independently predicted exacerbated PTSD symptoms at Wave 2. Post hoc analysis revealed that this association was driven by greater severity of executive dysfunction (adjusted odds ratio range, 1.27-3.22). Approximately 1 in 10 older US veterans experiences a clinically significant exacerbation of PTSD symptoms in late life. Executive dysfunction may contribute to risk for exacerbated PTSD symptoms. These results suggest that exacerbated PTSD symptoms are prevalent in US veterans and highlight potential targets for identifying veterans at risk for this phenomenon.

Pietrzak, R. H., Van Ness, P. H., Fried, T. R., Galea, S., & Norris, F. (2012). **Diagnostic utility and factor structure of the PTSD Checklist in older adults.** *International Psychogeriatrics, 24*, 1684-1696. doi:10.1017/S1041610212000853 *Background:* Little research has examined the diagnostic utility and factor structure of commonly used posttraumatic stress disorder (PTSD) assessment instruments in older persons. *Methods:* A total of 206 adults aged 60 or older (mean age = 69 years; range = 60–92), who resided in the Galveston Bay area when Hurricane Ike struck in September 2008, completed a computer-assisted telephone interview two–five months after this disaster. Using the PTSD Checklist (PCL), PTSD symptoms were assessed related both to this disaster and to participants' worst lifetime traumatic event. Total PCL scores were compared to PCL-based, *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV)-derived probable diagnoses of PTSD to determine optimal cut scores. Confirmatory factor analyses (CFAs) were conducted to evaluate PTSD symptom structure. *Results:* Receiver operating characteristic analyses indicated that a PCL score of 39 achieved optimal sensitivity and specificity in assessing a PCL-based, algorithm-derived DSM-IV diagnosis of worst event-related PTSD; and that a score of 37 optimally assessed probable Ike-related PTSD. CFAs revealed that a recently proposed five-factor model – comprised of re-experiencing, avoidance, numbing, dysphoric arousal, and anxious arousal factors – provided a better fitting representation of both worst event- and disaster-related PTSD symptoms than alternative models. Current Ike-related anxious arousal symptoms demonstrated a significantly stronger association with current generalized anxiety than depressive symptoms, thereby supporting the construct validity of this five-factor model of PTSD symptomatology. *Conclusions:* A PCL score of 37 to 39 may help identify probable PTSD in older persons. The expression of PTSD symptoms in older adults may be best characterized by a recently proposed five-factor model with distinct dysphoric arousal and anxious arousal clusters.

Pietrzak, R. H., Goldstein, R. B., Southwick, S. M., & Grant, B. F. (2012). **Physical health conditions associated with posttraumatic stress disorder in US older adults: Results from wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions.** *Journal of the American Geriatrics Society, 60*, 296-303. doi:10.1111/j.1532-5415.2011.03788.x *Objectives:* To present findings on past-year medical conditions associated with lifetime trauma exposure and full and partial posttraumatic stress disorder (PTSD) in a nationally representative sample of U.S. older adults. *Design:* Face-to-face diagnostic interviews. *Setting:* Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *Participants:* Nine thousand four hundred sixty-three adults aged 60 and older. *Measurements:* Logistic regression analyses adjusting for sociodemographic characteristics and psychiatric comorbidity were used to evaluate associations between PTSD status and past-year medical disorders; linear regression models evaluated associations with past-month physical functioning. *Results:* After adjustment for sociodemographic characteristics and comorbid lifetime mood, anxiety, substance use, attention-deficit/hyperactivity, and personality disorders, respondents with lifetime PTSD were more likely than respondents who reported experiencing one or more traumatic life events but who did not meet lifetime criteria for full or partial PTSD (trauma controls) to report being diagnosed with hypertension, angina pectoris, tachycardia, other heart disease,

stomach ulcer, gastritis, and arthritis (odds ratios (ORs) = 1.3–1.8) by a healthcare professional; they also scored lower on a measure of physical functioning than controls and respondents with partial PTSD. Respondents with lifetime partial PTSD were more likely than controls to report past-year diagnoses of gastritis (OR = 1.7), angina pectoris (OR = 1.5), and arthritis (OR = 1.4) and reported worse physical functioning. Number of lifetime traumatic event types was associated with most of the medical conditions assessed; adjustment for these events reduced the magnitudes of and rendered nonsignificant most associations between PTSD status and medical conditions. *Conclusion:* Older adults with lifetime PTSD have high rates of several physical health conditions, many of which are chronic disorders of aging, and poorer physical functioning. Older adults with lifetime partial PTSD have higher rates of gastritis, angina pectoris, and arthritis and poorer physical functioning.

Port, C. L., Engdahl, B., & Frazier, P. (2001). **A longitudinal and retrospective study of PTSD among older prisoners of war.** *American Journal of Psychiatry*, 158, 1474-1479. doi:10.1176/appi.ajp.158.9.1474 *Objective:* The authors examined the longitudinal changes in posttraumatic stress disorder (PTSD) symptom levels and prevalence rates over a 4-year time period among American former prisoners of war (POWs) from World War II and the Korean War. Retrospective symptom reports by World War II POWs dating back to shortly after repatriation were examined for 1) additional evidence of changing PTSD symptom levels and 2) evidence of PTSD cases with a long-delayed onset. *Method:* PTSD prevalence rates and symptom levels were measured by the Mississippi Scale for Combat-Related Posttraumatic Stress Disorder. For the longitudinal portion of the study, participants were 177 community-dwelling World War II and Korean POWs. For the retrospective portion, participants were 244 community-dwelling World War II POWs. *Results:* PTSD prevalence rates and symptom levels increased significantly over the 4-year measurement interval. Retrospective symptom reports indicated that symptoms were highest shortly after the war, declined for several decades, and increased within the past two decades. Long-delayed onset of PTSD symptoms was rare. Demographic and psychosocial variables were used to characterize participants whose symptoms increased over 4 years and differentiate participants who reported a long-delayed symptom onset. *Conclusions:* Both longitudinal and retrospective data support a PTSD symptom pattern of immediate onset and gradual decline, followed by increasing PTSD symptom levels among older survivors of remote trauma.

Reynolds, K., Pietrzak, R. H., Mackenzie, C. S., Chou, K. L., & Sareen, J. (2016). **Post-traumatic stress disorder across the adult lifespan: Findings from a nationally representative survey.** *American Journal of Geriatric Psychiatry*, 24, 81-93. doi:10.1016/j.jagp.2015.11.001 *Objective:* There is a dearth of community-based epidemiologic literature that examines post-traumatic stress disorder (PTSD) across the adult lifespan. In the current study the authors address this gap by examining the ways in which PTSD differs among young (ages 20–34), middle-aged (ages 35–64), and older (age 65+) adults with respect to past-year prevalence, nature of “worst” stressful experience ever experienced before the onset of PTSD, all traumatic experiences, symptom expression, psychiatric comorbidities, and mental health–related quality of life. *Methods:* We analyzed Wave 2 data from the National

Epidemiologic Survey on Alcohol and Related Conditions, including adults with past-year diagnoses of PTSD (N = 1,715). *Results:* The prevalence of past-year PTSD was significantly higher for young (4.3% [SE: 0.3]) and middle-aged (5.2% [SE: 0.2]) adults compared with older adults (2.6% [SE: 0.2]). Respondents in the three age groups differed with regard to their “worst” stressful experience ever experienced before the onset of PTSD and to all traumatic experiences. Older adults experienced significantly fewer traumatic experiences (mean: 5.2; SE: 0.2) compared with young (mean: 5.7; SE: 0.2) and middle-aged adults (mean: 6.4; SE: 0.1). Young and middle-aged adults had significantly greater symptom counts and greater odds of comorbid psychiatric disorders when compared with older adults. PTSD had similar effects on mental health–related quality of life across the adult lifespan. *Conclusion:* Results highlight key differences in the characteristics of PTSD across the adult lifespan. The overall pattern of findings indicates that increasing age is associated with less severe PTSD profiles, including lower prevalence, fewer traumatic experiences, lower symptom counts, and lower odds of psychiatric comorbidity.

Roberts, A. L., Agnew-Blais, J. C., Spiegelman, D., Kubzansky, L. D., Mason, S. M., Galea, S., ... & Koenen, K. C. (2015). **Posttraumatic stress disorder and incidence of type 2 diabetes mellitus in a sample of women: A 22-year longitudinal study.** *JAMA Psychiatry*, 72, 203-210. doi:10.1001/jamapsychiatry.2014.2632 *Importance:* Posttraumatic stress disorder (PTSD) is a common, debilitating mental disorder that has been associated with type 2 diabetes mellitus (T2D) and its risk factors, including obesity, in cross-sectional studies. If PTSD increases risk of incident T2D, enhanced surveillance in high-risk populations may be warranted. *Objective:* To conduct one of the first longitudinal studies of PTSD and incidence of T2D in a civilian sample of women. *Design, Setting, and Participants:* The Nurses' Health Study II, a US longitudinal cohort of women (N = 49 739). We examined the association between PTSD symptoms and T2D incidence over a 22-year follow-up period. *Main Outcomes and Measures:* Type 2 diabetes, self-reported and confirmed with self-report of diagnostic test results, symptoms, and medications, a method previously validated by physician medical record review. Posttraumatic stress disorder was assessed by the Short Screening Scale for DSM-IV PTSD. We examined longitudinal assessments of body mass index, smoking, alcohol intake, diet quality, physical activity, and antidepressant use as mediators of possible increased risk of T2D for women with PTSD. The study hypothesis was formulated prior to PTSD ascertainment. *Results:* Symptoms of PTSD were associated in a dose-response fashion with T2D incidence (1-3 symptoms: hazard ratio, 1.4 [95% CI, 1.2-1.6]; 4 or 5 symptoms; hazard ratio, 1.5 [95% CI, 1.3-1.7]; 6 or 7 symptoms: hazard ratio, 1.8 [95% CI, 1.5-2.1]). Antidepressant use and a higher body mass index associated with PTSD accounted for nearly half of the increased risk of T2D for women with PTSD. Smoking, diet quality, alcohol intake, and physical activity did not further account for increased risk of T2D for women with PTSD. *Conclusions and Relevance:* Women with the highest number of PTSD symptoms had a nearly 2-fold increased risk of T2D over follow-up than women with no trauma exposure. Health professionals treating women with PTSD should be aware that these patients are at risk of increased body mass index and T2D. Comprehensive PTSD treatment should be expanded to address the health behaviors that contribute to obesity and chronic disease in affected populations.

Scherrer, J. F., Salas, J., Norman, S. B., Schnurr, P. P., Chard, K. M., Tuerk, P., ... & Lustman, P. J. (2019). **Association Between Clinically Meaningful Posttraumatic Stress Disorder Improvement and Risk of Type 2 Diabetes.** *JAMA Psychiatry, 76*, 1159-1166. doi:10.1001/jamapsychiatry.2019.2096 *Importance:* Posttraumatic stress disorder (PTSD) is associated with increased risk of type 2 diabetes (T2D). Improvement in PTSD has been associated with improved self-reported physical health and hypertension; however, there is no literature, to our knowledge, on whether PTSD improvement is associated with T2D risk. *Objective:* To examine whether clinically meaningful PTSD symptom reduction is associated with lower risk of T2D. *Design, Setting, and Participants:* This retrospective cohort study examined Veterans Health Affairs medical record data from 5916 patients who received PTSD specialty care between fiscal years 2008 and 2012 and were followed up through fiscal year 2015. Eligible patients had 1 or more PTSD Checklist (PCL) scores of 50 or higher between fiscal years 2008 and 2012 and a second PCL score within the following 12 months and at least 8 weeks after the first PCL score of 50 or higher. The index date was 12 months after the first PCL score. Patients were free of T2D diagnosis or an antidiabetic medication use for 12 months before the index date and had at least 1 visit after the index date. Data analyses were completed during January 2019. *Exposures:* Reduction in PCL scores during a 12-month period was used to define patients as those with a clinically meaningful improvement (≥ 20 -point PCL score decrease) and patients with less or no improvement (< 20 -point PCL score decrease). *Main Outcomes and Measures:* Incident T2D diagnosed during a 2- to 6-year follow-up. *Results:* Medical records from a total of 1598 patients (mean [SD] age, 42.1 [13.4] years; 1347 [84.3%] male; 1060 [66.3%] white) were studied. The age-adjusted cumulative incidence of T2D was 2.6% among patients with a clinically meaningful PCL score decrease and 5.9% among patients without a clinically meaningful PCL score decrease ($P = .003$). After control for confounding, patients with a clinically meaningful PCL score decrease were significantly less likely to develop T2DM compared with those without a clinically meaningful decrease (hazard ratio, 0.51; 95% CI, 0.26-0.98). *Conclusions and Relevance:* The findings suggest that clinically meaningful reductions in PTSD symptoms are associated with a lower risk of T2D. A decrease in PCL score, whether through treatment or spontaneous improvement, may help mitigate the greater risk of T2D in patients with PTSD.

Solomon, Z., & Mikulincer, M. (2006). **Trajectories of PTSD: A 20-year longitudinal study.** *American Journal of Psychiatry, 163*, 659-666. doi:10.1176/ajp.2006.163.4.659 *Objective:* This study assessed the psychopathological effects of combat in veterans with and without combat stress reaction. *Method:* Veterans ($N = 214$) from the 1982 Lebanon War were assessed in a prospective longitudinal design: 131 suffered from combat stress reaction during the war, and 83 did not. They were evaluated 1, 2, 3, and 20 years after the war. *Results:* Combat stress reaction is an important vulnerability marker. Veterans with combat stress reaction were 6.6 times more likely to endorse posttraumatic stress disorder (PTSD) at all four measurements, their PTSD was more severe, and they were at increased risk for exacerbation/reactivation. A qualitative analysis of the profile of PTSD symptoms revealed some time-related changes in the symptom configuration of veterans who did not suffer from combat stress reaction. In both groups, the course

fluctuated; PTSD rates dropped 3 years postwar and rose again 17 years later; 23% of veterans without combat stress reaction reported delayed PTSD. *Conclusions:* These findings suggest that the detrimental effects of combat are deep and enduring and follow a complex course, especially in combat stress reaction casualties. The implications of aging and ongoing terror in impeding recovery from the psychological wounds of war are discussed.

Spitzer, C., Barnow, S., Völzke, H., John, U., Freyberger, H. J., & Grabe, H. J. (2008). **Trauma and posttraumatic stress disorder in the elderly: Findings from a German community study.** *Journal of Clinical Psychiatry, 69*, 693-700. doi:10.4088/JCP.v69n0501 *Objective:* The present study assessed the risk of trauma exposure and subsequent posttraumatic stress disorder (PTSD) in an elderly community sample. Furthermore, gender differences and psychiatric comorbidity were analyzed. *Method:* 3170 adults living in a German community were assessed by the PTSD module of the Structured Clinical Interview for DSM-IV and the Composite International Diagnostic-Screener. They were assigned to 3 age groups: young (44 years and younger; $N = 997$), middle-aged (45-64 years; $N = 1322$), and elderly (65 years and older; $N = 851$). Data for the present study were collected between December 2002 and December 2006. *Results:* At least 1 trauma was reported by 54.6%, and the odds for trauma exposure were almost 4-fold in the elderly compared to the younger age groups ($OR = 3.74$; 95% $CI = 3.13$ to 4.47). Among those traumatized, the lifetime and 1-month prevalence rates of PTSD in the elderly were 3.1% and 1.5%, respectively, and did not differ from the rates of the young and middle-aged adults. Elderly men had a significantly increased risk for trauma exposure in general than elderly women ($p = .012$), but there were no gender differences in PTSD prevalence rates. Elderly PTSD-positive participants had significantly higher odds for any psychiatric syndrome than those without PTSD ($OR = 9.10$; 95% $CI = 2.64$ to 31.28) with depression and anxiety being the most frequent conditions. *Conclusion:* Our findings suggest that PTSD is certainly not rare in the elderly and that a lifetime diagnosis of PTSD is associated with symptoms of depression and anxiety. Assessment of trauma and PTSD should be integrated into routine examinations of the elderly to improve management and treatment provisions.

Sumner, J. A., Kubzansky, L. D., Elkind, M. S. V., Roberts, A. L., Agnew-Blais, J., Chen, Q., ... & Koenen, K. C. (2015). **Trauma exposure and posttraumatic stress disorder symptoms predict onset of cardiovascular events in women.** *Circulation, 132*, 251-259. doi:10.1161/CIRCULATIONAHA.114.014492 *Background:* Psychological stress is a proposed risk factor for cardiovascular disease (CVD), and posttraumatic stress disorder (PTSD), the sentinel stress-related mental disorder, occurs twice as frequently in women as men. However, whether PTSD contributes to CVD risk in women is not established. *Methods and Results:* We examined trauma exposure and PTSD symptoms in relation to incident CVD over a 20-year period in 49978 women in the Nurses' Health Study II. Proportional hazards models estimated hazard ratios and 95% confidence intervals for CVD events confirmed by additional information or medical record review ($n = 548$, including myocardial infarction [$n = 277$] and stroke [$n = 271$]). Trauma exposure and PTSD symptoms were assessed by using the Brief Trauma Questionnaire and a PTSD screen. In comparison with no trauma exposure, endorsing ≥ 4 PTSD symptoms was associated with increased CVD

risk after adjusting for age, family history, and childhood factors (hazard ratio, 1.60; 95% confidence interval, 1.20–2.13). Being trauma-exposed and endorsing no PTSD symptoms was associated with elevated CVD risk (hazard ratio, 1.45; 95% confidence interval, 1.15–1.83), although being trauma-exposed and endorsing 1 to 3 PTSD symptoms was not. After adjusting for adult health behaviors and medical risk factors, this pattern of findings was maintained. Health behaviors and medical risk factors accounted for 14% of the trauma/no symptoms–CVD association and 47% of the trauma/4+ symptoms–CVD association. *Conclusion:* Trauma exposure and elevated PTSD symptoms may increase the risk of CVD in this population of women. These findings suggest that screening for CVD risk and reducing health risk behaviors in trauma-exposed women may be promising avenues for prevention and intervention.

Uchino, B. N., Uno, D., Holt-Lunstad, J., & Flinders, J. B. (1999). **Age-related differences in cardiovascular reactivity during acute psychological stress in men and women.** *Journals of Gerontology: Psychological Sciences*, 54B, P339–P346. doi:10.1093/geronb/54B.6.P339 We examined potential age and gender differences in cardiovascular reactivity during acute psychosocial stress in 133 normotensive participants using a cross-sectional design. Results revealed that age predicted increased systolic blood pressure (SBP) reactivity during stress ($p < .001$). The greater SBP reactivity found in older individuals appeared due to an age-associated increase in both cardiac output and total peripheral resistance during stress as statistically controlling for these changes rendered the age and SBP reactivity effect nonsignificant. Similar analyses revealed that the age-related increase in cardiac output reactivity appeared to be driven by increased cardiac sympathetic control of myocardial contractility as measured by pre-ejection period. Older individuals also had greater vagal withdrawal during stress compared to younger individuals as indexed by respiratory sinus arrhythmia ($p < .01$). These results were comparable for men and women, and could not be explained by task-specific affective responses, task performance, or demographic factors. Implications for the study of age, cardiovascular reactivity, and health are discussed.

Utzon-Frank, N., Breinegaard, N., Bertelsen, M., Borritz, M., Eller, N. H., Nordentott, M., ... & Bonde, J. P. (2014). **Occurrence of delayed-onset post-traumatic stress disorder: A systematic review and meta-analysis of prospective studies.** *Scandinavian Journal of Work, Environment & Health*, 40, 215–229. <https://www.jstor.org/stable/43188012> *Objective:* Post-traumatic stress disorder (PTSD) develops according to consensus criteria within the first 1–6 months after a horrifying traumatic event, but it is alleged that PTSD may develop later. The objective was to review the evidence addressing occurrence of PTSD with onset >6 months after a traumatic event (delayed-onset PTSD). *Methods:* Through a systematic search in PubMed, EMBASE, and PsycINFO, we identified 39 studies with prospective ascertainment of PTSD. A meta-analysis was performed in order to obtain a weighted estimate of the average proportion of delayed-onset PTSD cases, and meta-regression was used to examine effects of several characteristics. *Results:* Delayed-onset PTSD was reported in all studies except one, and the average prevalence across all follow-up time was 5.6% [95% confidence interval (95% CI) 4.3–7.3%]. The proportion with delayed-onset PTSD relative to all cases of PTSD

was on average 24.5% (95% CI 19.5–30.3%) with large variation across studies. In six studies with sub-threshold symptom data, delayed-onset PTSD seemed most likely an aggravation of early symptoms. The proportion with delayed-onset PTSD was almost twice as high among veterans and other professional groups compared to non-professional victims. *Conclusion:* Descriptive follow-up data suggest that PTSD may manifest itself >6 months after a traumatic event, delayed-onset PTSD most often, if not always, is preceded by sub-threshold PTSD symptoms, and a higher proportion of PTSD cases are delayed among professional groups. Contextual factors and biased recall may inflate reporting of PTSD and a cautious interpretation of prevalence rates seems prudent.

Wisco, B. E., Marx, B. P., Miller, M. W., Wolf, E. J., Mota, N. P., Krystal, J. H., ... & Pietrzak, R. H. (2016). **Probable posttraumatic stress disorder in the US veteran population according to DSM-5: Results from the National Health and Resilience in Veterans Study.** *Journal of Clinical Psychiatry*, 77, 1503–1510. doi:10.4088/JCP.15m10188 With the publication of DSM-5, important changes were made to the diagnostic criteria for posttraumatic stress disorder (PTSD), including the addition of 3 new symptoms. Some have argued that these changes will further increase the already high rates of comorbidity between PTSD and other psychiatric disorders. This study examined the prevalence of DSM-5 PTSD, conditional probability of PTSD given certain trauma exposures, endorsement of specific PTSD symptoms, and psychiatric comorbidities in the US veteran population. Data were analyzed from the National Health and Resilience in Veterans Study (NHRVS), a Web-based survey of a cross-sectional, nationally representative, population-based sample of 1,484 US veterans, which was fielded from September through October 2013. Probable PTSD was assessed using the PTSD Checklist-5. The weighted lifetime and past-month prevalence of probable DSM-5 PTSD was 8.1% ($SE = 0.7%$) and 4.7% ($SE = 0.6%$), respectively. Conditional probability of lifetime probable PTSD ranged from 10.1% (sudden death of close family member or friend) to 28.0% (childhood sexual abuse). The DSM-5 PTSD symptoms with the lowest prevalence among veterans with probable PTSD were trauma-related amnesia and reckless and self-destructive behavior. Probable PTSD was associated with increased odds of mood and anxiety disorders ($OR = 7.6$ – 62.8 , $P < .001$), substance use disorders ($OR = 3.9$ – 4.5 , $P < .001$), and suicidal behaviors ($OR = 6.7$ – 15.1 , $P < .001$). In US veterans, the prevalence of DSM-5 probable PTSD, conditional probability of probable PTSD, and odds of psychiatric comorbidity were similar to prior findings with DSM-IV-based measures; we found no evidence that changes in DSM-5 increase psychiatric comorbidity. Results underscore the high rates of exposure to both military and nonmilitary trauma and the high public health burden of DSM-5 PTSD and comorbid conditions in veterans.

Yaffe, K., Vittinghoff, E., Lindquist, K., Barnes, D., Covinsky, K. E., Neylan, T., ... & Marmar, C. (2010). **Posttraumatic stress disorder and risk of dementia among US veterans.** *Archives of General Psychiatry*, 67, 608–613. doi:10.1001/archgenpsychiatry.2010.61 *Context:* Posttraumatic stress disorder (PTSD) is highly prevalent among US veterans because of combat and may impair cognition. *Objective:* To determine whether PTSD is associated with the risk of developing dementia among older US veterans receiving treatment

FEATURED ARTICLES *continued*

in the Department of Veterans Affairs medical centers. *Design:* A stratified, retrospective cohort study conducted using the Department of Veterans Affairs National Patient Care Database. *Setting:* Department of Veterans Affairs medical centers in the United States. *Participants:* A total of 181 093 veterans 55 years or older without dementia from fiscal years 1997 through 2000 (53 155 veterans with and 127 938 veterans without PTSD). *Main Outcome Measures:* During the follow-up period between October 1, 2000, and December 31, 2007, 31 107 (17.2%) veterans were ascertained to have newly diagnosed dementia according to International Classification of Diseases, Ninth Revision, Clinical Modification codes. *Results:* The mean baseline age of the veterans was 68.8 years, and 174 806 (96.5%) were men. Veterans with PTSD had a 7-year cumulative incident dementia rate of 10.6%, whereas those without had a rate of 6.6% ($P < .001$). With age as the time scale, Cox proportional hazards models indicated that patients with PTSD were more than twice as likely to develop incident dementia compared with those without PTSD (hazard ratio, 2.31; 95% confidence interval, 2.24-2.39). After multivariable adjustment, patients with PTSD were still more likely to develop dementia (hazard ratio, 1.77; 95% confidence interval, 1.70-1.85). Results were similar when we excluded those with a history of head injury, substance abuse, or clinical depression. *Conclusions:* In a predominantly male veteran cohort, those diagnosed as having PTSD were at a nearly 2-fold-higher risk of developing dementia compared with those without PTSD. Mechanisms linking these important disorders need to be identified with the hope of finding ways to reduce the increased risk of dementia associated with PTSD.

ADDITIONAL CITATIONS

American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental Disorders (3rd ed.)*. Washington, DC: Author.

American Psychiatric Association (2017). *Clinical Practice Guideline for the Treatment of Posttraumatic Stress Disorder (PTSD) in Adults*. Washington, DC: Author.

Andrews, B., Brewin, C. R., Philpott, R., & Stewart, L. (2007). **Delayed-onset posttraumatic stress disorder: A systematic review of the evidence.** *American Journal of Psychiatry, 164*, 1319-1326. doi:10.1176/appi.ajp.2007.06091491 This is a systematic review of 19 empirical studies and 10 case reports on delayed-onset PTSD. It provides a thoughtful critique of methodological issues in comparing studies on delayed onset PTSD, such as differences in defining delayed onset, and use of prospective vs. retrospective designs. For empirical studies, summary statistics are provided for trauma type, posttrauma period covered, definition of delayed onset, and prevalence of delayed-onset PTSD. Results suggested that delayed-onset PTSD after an initial symptom-free period was rare, whereas, delayed-onset PTSD characterized by exacerbation or reactivation of subthreshold symptoms accounted for, on average, 38% and 15% of PTSD cases in military and civilian samples, respectively.

Arenson, M. & Cohen, B. (2017) **Posttraumatic stress disorder and cardiovascular disease.** *PTSD Research Quarterly, 28(1)*, 1-9. Retrieved from: https://www.ptsd.va.gov/publications/rq_docs/

ADDITIONAL CITATIONS *continued*

[V28N1.pdf](#) In an earlier issue of Research Quarterly, Arenson and Cohen provided a guide to population-based and clinical studies on the association between PTSD and cardiovascular disease, as well as potential mechanisms underlying the association.

Böttche, M., Kuwert, P., & Knaevelsrud, C. (2012). **Posttraumatic stress disorder in older adults: An overview of characteristics and treatment approaches.** *International Journal of Geriatric Psychiatry, 27*, 230-239. doi:10.1002/gps.2725 This is a review of PTSD in older adults and includes sections on the epidemiology, symptom profile, longitudinal course, and treatment. Compared to other reviews on this topic, this paper has a stronger focus on studies conducted outside of the U.S.

Bowland, S., Edmond, T., & Fallot, R. D. (2012). **Evaluation of a spiritually focused intervention with older trauma survivors.** *Social Work, 57*, 73-82. doi:10.1093/sw/swr001 This study involves a randomized controlled trial comparing an 11-session, spiritually focused group intervention against a waitlist control group. Participants were 43 women aged 55-83 who had a history in the Christian tradition and prior exposure to interpersonal trauma. PTSD symptoms, as assessed with the Posttraumatic Stress Diagnostic Scale, declined significantly from pre- to post-treatment in the intervention group. However, the authors did not evaluate whether there was any treatment group effect on PTSD symptom change over time.

Bichescu, D., Neuner, F., Schauer, M., & Elbert, T. (2007). **Narrative exposure therapy for political imprisonment-related chronic posttraumatic stress disorder and depression.** *Behaviour Research and Therapy, 45*, 2212-2220. doi:10.1016/j.brat.2006.12.006 This study describes a randomized controlled trial comparing narrative exposure therapy (NET) with psychoeducation in a sample of 18 former political detainees in Romania. Primary outcomes include PTSD and depressive symptoms, as assessed via interview with the CIDI and Beck Depression Scale, respectively, at pre-treatment and 6-month after treatment completion. There was a significant treatment-by-time interaction for both PTSD and depressive symptoms, suggesting that NET was more efficacious than psychoeducation alone in reducing symptoms.

Cook, J. M., Elhai, J. D., & Areán, P. A. (2005). **Psychometric properties of the PTSD Checklist with older primary care patients.** *Journal of Traumatic Stress, 18*, 371-376. doi:10.1002/jts.20038 This study evaluated the diagnostic utility of the PCL-S in an ethnically diverse sample of 142 community-dwelling older adults (age range: 65-103, mean age: 75). PCL scores were compared against PCL algorithm-derived diagnosis. ROC analysis indicated that an optimal cutoff score of 37 provided a sensitivity of 0.96 and specificity of 0.92 in detecting PTSD. These findings highlight the need for age-sensitive norms in assessing PTSD among older adults.

Cook, J. M., Thompson, R., Coyne, J. C., & Sheikh, J. I. (2003). **Algorithm versus cut-point derived PTSD in ex-prisoners of war.** *Journal of Psychopathology and Behavioral Assessment, 25*, 267-271. doi:10.1023/A:1025851129948 This study evaluated the diagnostic utility of the PCL among 504 former WWII POWs (mean age = 80). PCL scores were compared against PCL algorithm-derived diagnosis. ROC analysis indicated that an optimal cutoff

score of 42 provided a sensitivity of 0.95 and specificity of 0.88 in detecting PTSD. This study also speaks to the need for age-sensitive norms in assessing PTSD among older adults.

Department of Veterans Affairs and Department of Defense (2017). *VA/DoD Clinical Practice Guideline for the Management of Posttraumatic Stress Disorder and Acute Stress Disorder. Version 3.0*. Retrieved from: <https://www.healthquality.va.gov/guidelines/MH/ptsd/>

Desmarais, P., Weidman, D., Wassef, A., Bruneau, M.-A., Friedland, J., Bajsarowicz, P., . . . & Nguyen, Q. D. (2019). **The interplay between post-traumatic stress disorder and dementia: A systematic review**. *American Journal of Geriatric Psychiatry*. Advance online publication. <http://dx.doi.org/10.1016/j.jagp.2019.08.006>

This systematic review evaluates evidence for a bidirectional association between PTSD and dementia. The authors identified 14 studies on examining PTSD as a risk factor for developing dementia; findings supported an association between PTSD in midlife and greater risk of subsequent dementia onset. They also identified 11 articles describing delayed-onset, recurrent, or worsening PTSD following the onset of dementia; these publications were all case reports. Evidence appears to be consistent with a bidirectional association between PTSD and dementia, but rigorous empirical studies are particularly needed to clarify the dementia à PTSD association.

Green, E., Fairchild, J. K., Kinoshita, L. M., Noda, A., & Yesavage, J. (2016). **Effects of posttraumatic stress disorder and metabolic syndrome on cognitive aging in veterans**. *The Gerontologist*, 56, 72-81. doi:10.1093/geront/gnv040 This study considered the cross-sectional association of PTSD, metabolic syndrome (MetS), and cognitive performance as assessed by neuropsychological evaluation in a sample of 204 male U.S. Veterans (age range: 55-95, mean age = 63). PTSD was assessed by CAPS and components of MetS were measured by questionnaire and fasting blood collection. Veterans with MetS performed worse on tasks assessing executive function and immediate verbal memory than those without MetS, after adjusting for PTSD. PTSD status was not associated with cognitive function after accounting for MetS. A PTSD-by-MetS interaction was observed, such that among Veterans without PTSD, having MetS was associated with worse delayed verbal recall; the association was not observed in Veterans with PTSD. While the cross-sectional design is a limitation, this is among the first studies to examine PTSD and neuropsychological test performance in older adults.

International Society for Traumatic Stress Studies (2019). *Posttraumatic stress disorder prevention and treatment guidelines: Methodology and recommendations*. Retrieved from: https://www.istss.org/getattachment/Treating-Trauma/New-ISTSS-Prevention-and-Treatment-Guidelines/ISTSS_PreventionTreatmentGuidelines_FNL.pdf.aspx

Jorm, A. F. (2000). **Does old age reduce the risk of anxiety and depression? A review of epidemiological studies across the adult life span**. *Psychological Medicine*, 30, 11-22. doi:10.1017/S0033291799001452 This is a review of studies examining the prevalence, incidence, or level of anxiety, depression, and general

distress across the adult life span in general population samples. The author reported that the most common trend was an inverted-U shape in prevalence across age group. This paper provides a thoughtful critique of methodological and substantive issues in considering prevalence estimates of psychopathology with respect to aging, such as the confounding of age and cohort effects discussed in this issue of *Research Quarterly*.

National Center for Veterans Analysis and Statistics (2016). *Veteran Population Projections Model (VetPop 2016), Tables 2L, 5L, and 8D*. Retrieved from www.va.gov/vetdata/veteran_population.asp At the time of publication, these tables are the latest official Veteran population projection from the U.S. Department of Veterans Affairs. The Veteran Population Project Model 2016 (VetPop2016) projects living and deceased Veteran counts by demographic characteristics, such as gender, ethnicity, and period of service.

Pless Kaiser, A., Cook, J. M., Glick, D. M., & Moye, J. (2019). **Posttraumatic stress disorder in older adults: A conceptual review**. *Clinical Gerontologist*, 42, 359-376. doi:10.1080/07317115.2018.1539801 This is a scoping review on the assessment, diagnosis, and non-pharmacological treatment of PTSD among older U.S. military Veterans. Being a scoping review, this paper synthesizes the literature on late-life PTSD with the clinical perspectives of the authors and expert practitioners of psychotherapy with older adult trauma survivors. The latter was obtained via querying expert practitioners about specific topics in the assessment (e.g., possible reasons for late-life onset), diagnosis (e.g., comorbidities), and treatment (e.g., integrated care, cohort considerations) of PTSD in later life.

Schaie, K. W. (1983). **What can we learn from the longitudinal study of adult psychological development?** In K. W. Schaie (Ed.), *Longitudinal Studies of Adult Psychological Development* (pp. 1-19). New York: Guilford Press. This classic chapter describes the use of longitudinal studies to understand developmental processes. It begins by making the distinction between interindividual differences and intraindividual changes. It elaborates on design issues regarding the internal and external validity of longitudinal data. It also describes longitudinal study designs that can be used to tease apart aging, cohort, and time effects on developmental processes.

United States Census Bureau (2018). *The Older Population in the United States: 2018, Tables 1, 2, and 11*. Retrieved from <https://www.census.gov/data/tables/2018/demo/age-and-sex/2018-older-population.html> These are data from the Current Population Survey 2018 on the U.S. population aged 55 and over by age and sex, marital status, and poverty status.

Wolf, E.J., Bovin, M.J., Green, J.D., Mitchell, K.S., Stoop, T.B., Barretto, K.M., . . . & Marx, B.P. (2016). **Longitudinal associations between post-traumatic stress disorder and metabolic syndrome severity**. *Psychological Medicine*, 46, 2215-2226. doi:10.1017/S0033291716000817 This study evaluated bidirectional associations between PTSD symptom severity and MetS severity in a sample of 1355 male and female OIF/OEF military Veterans enrolled in VA healthcare services derived from Project VALOR (Veterans' After-Discharge Longitudinal Registry). In a cross-lagged panel model based on two measurement occasions, greater initial

PTSD severity was associated with more severe MetS subsequently, after adjusting for initial MetS severity. There was little evidence to suggest an association between initial MetS severity and subsequent PTSD symptoms. This study provides evidence consistent with PTSD as an etiologic factor of metabolic pathology.

Yeager, D. E., & Magruder, K. M. (2014). **PTSD Checklist scoring rules for elderly Veterans Affairs outpatients.** *American Journal of Geriatric Psychiatry, 22*, 545-550. [doi:10.1016/j.jagp.2013.03.009](https://doi.org/10.1016/j.jagp.2013.03.009)

This study assessed the diagnostic performance of the PCL in 3 groups of men and women patients of VA medical centers aged 21-49, 50-64, and 65-81 (total $N = 858$). When compared to the CAPS as gold standard, ROC analysis showed that the PCL performed similarly well across the 3 age groups in determining PTSD caseness. However, the optimal cutpoint differed by age (24 for the oldest group, 34 for the middle group, and 43 for the youngest group), suggesting a need for age-specific norms in screening for PTSD.