**Assessing the impact of military service in the Health and Retirement Study:**

**Current status and suggestions for the future**

Avron Spiro[1,2,3]
Janet Wilmoth[4,5,6,7]
Andrew London[4,5,6,7]

[1]Department of Epidemiology, Boston University School of Public Health
[2]Department of Psychiatry, Boston University School of Medicine
[3]Massachusetts Veterans Epidemiology Research and Information Center, VA Boston Healthcare System
[4]Department of Sociology, Syracuse University
[5]Aging Studies Institute, Syracuse University
[6]Institute for Veterans and Military Families, Syracuse University
[7]Center for Policy Research, Syracuse University

## 1. INTRODUCTION

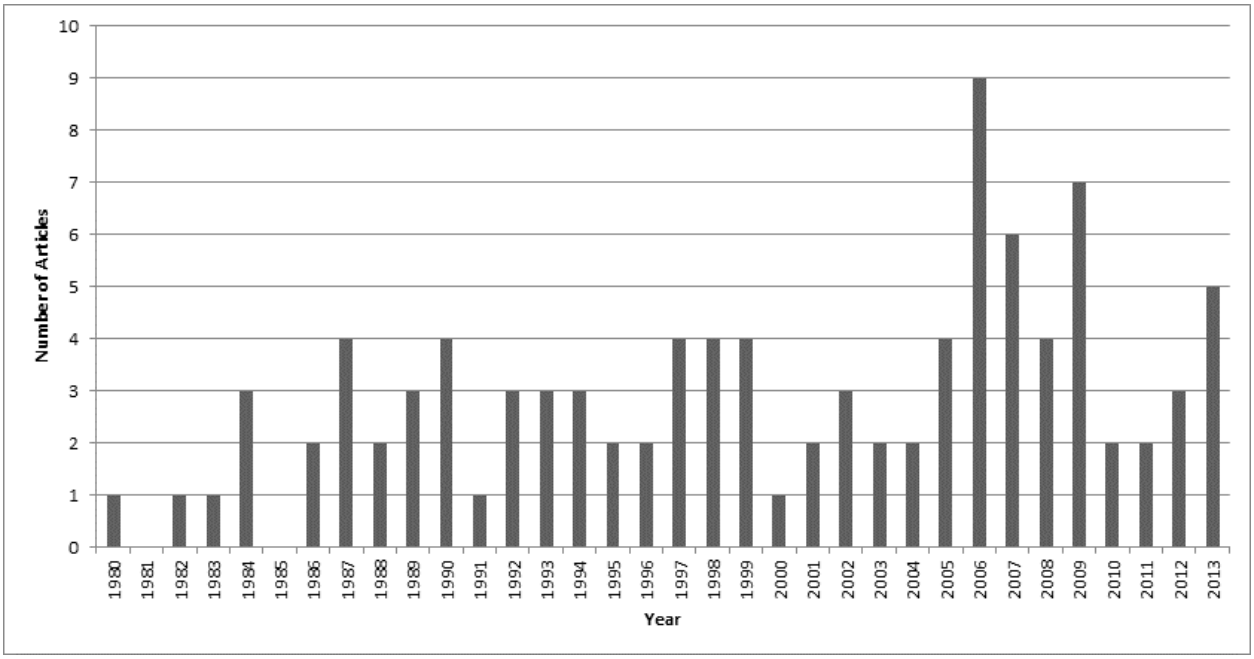
There are several active social-science communities interested in older veterans and in veterans aging across the life course. These include the Syracuse/Maryland sociologists (Wilmoth & London, 2013) and the psychosocialists in the NIA R24 military outcome network led by Spiro, Settersten, and Aldwin (*Long-term outcomes of military service: Perspectives in health and well-being*, volume in preparation). Several recent handbooks have included chapters on the military by Wilmoth and London (e.g., Handbook of the Life Course, Handbook of Aging and the Social Sciences). Further evidence of interest in this topic comes from recent issues of The Gerontologist, including the Special Issue on Veterans Aging and the Supplement on Women Veterans in the WHI, and the 2015 issue of Epidemiologic Reviews on veterans' health. There is a large, growing, and active community interested in the impact of military service on aging that is looking to the HRS among other studies to provide suitable data on nationally representative samples.

Historically, this research community is a recent one, dating perhaps to the mid 1980's and work by Glen Elder and George Vaillant. For many years, the role of military service in men's (and more recently, women's) lives has been ignored, leading some to refer to it as a "hidden variable" in the study of aging (e.g., Settersten, 2006; Spiro, Schnurr & Aldwin, 1994; Wilmoth & London, 2016). Our notion of hidden variable has dual meanings. First, as demonstrated by Wilmoth and London's (2016) search of the aging literature in selected journals[1] from 1980 –

[1] They reviewed the journals from January 1980 through December 2013; the journals included five sponsored by the Gerontological Society of America (The Journals of Gerontology: Series A, The Journals of Gerontology: Series B, The Gerontologist, The Journal of Gerontology, and Public Policy & Aging Report), as well as Research on Aging, and Journal of Aging and Health.

2013, few gerontological researchers have studied veterans or military service. Over this 34-year period, 101 relevant papers were identified (about 3 per year), representing less than 1% of the nearly 12,000 articles reviewed (See Figure 1).

**Figure 1. Number of Military Service-Related Articles Published Per Year, Selected Aging Journals, 1980-2013**




Source: Janet M. Wilmoth and Andrew S. London. 2016. "The Influence of Military Service on Aging" in George, L and Ferraro, K (Eds.) Handbook of Aging and the Social Sciences (8th ed., pp. 227-250). Waltham, MA.: Elsevier.

The authors' review of these papers' abstracts revealed that most were cross-sectional studies using non-representative samples, primarily focusing on either veterans only or on VA healthcare users. Few of these studies included nationally representative samples (only 4 used HRS data), nearly all were cross-sectional and could not examine change. The focus on veterans to the exclusion of civilians meant that comparisons between the two groups could not be conducted, and the results were generally limited to the population of veterans. Thus, questions of whether military service might have altered the course of aging could not be explored.

As part of our work on the NIA-funded R24 network grant *Long-term outcomes of military service*, we examined a number of public-use datasets and their relevance to the study of military service. A summary of the various studies is available at our website, http://health.oregonstate.edu/healthy-aging/military-life-course, and indicates that most studies tend to overlook military service among aging populations, and seldom include items probing more than whether or not, and when, a respondent may have served in the Armed

Forces. There are a number of large-scale studies with some information on veteran status that are publically available, many of which are nationally representative, and which could be used to examine differences in changes between veterans and non-veterans over the course of later life. Some of these studies are panel studies (i.e., repeated cross-sections of the US population) such as the American Community Survey, Behavioral Risk Factor Surveillance Survey, Current Population Survey, General Social Survey, and National Health Interview Survey. Others are longitudinal studies which follow the same persons over time (e.g., Longitudinal Study of Generations; Midlife in the United States; National Health and Aging Trends Study; National Longitudinal Surveys; National Social Life, Health and Aging Project; National Survey of Families and Households; Panel Study of Income Dynamics; Project Talent; Wisconsin Longitudinal Study). While these studies included thousands of persons, span decades or more, and assessed hundreds of variables, all of them are quite limited in their coverage of military service, veterans benefits, and especially in their assessment of psychosocial aspects of service.

The HRS, in contrast, has from the beginning assessed some basic facts of veteran status and military service, and done an especially good job of measuring the financial and healthcare aspects of veterans benefits. Further, by its addition every six years of a new cohort of the US population aged 50 and above, its sample includes cohorts with varying types and degrees of military service from World War II through Vietnam and now into the post-9/11 conflicts. The recent addition of an item assessing combat exposure, the linkage to VA for healthcare data that is currently being developed, and the 2013 Veterans Mail Survey (sent to all HRS respondents who ever identified as veterans) are further examples of HRS's commitment to studying the effects of military service on aging. However, as we discuss below, more can, and we think should, be done to understand these effects in their full complexity.

Our second gloss on the notion of "military service as a hidden variable" is substantive, and related to the notion that the failure to consider its manifold existence (such as being selected into the military, being deployed, surviving and becoming a veteran) results in unobserved heterogeneity in aging, which can confound observed relationships. As one example, consider that veterans may be injured as part of their military service, and if such injuries are not fatal, the veteran is entitled to access VA for healthcare and for pension benefits. Thus, some variability in later-life health or wealth likely result from military service, and failure to take this into account can lead to a mis-specified model for the outcome. And further, the effects of military service extend beyond the veteran to affect the health and well-being of their spouse, children, and other family members as well. The pension benefits or healthcare that veterans can receive, or the educational and housing benefits available from the various GI Bills have the potential to affect the veteran and their family.

In our view, the failure to consider, and to properly assess, the presence and nature of military service in aging lives is pervasive (although less so than previously) and confounding, in that its omission from our conceptual and statistical models of aging processes likely lead to erroneous conclusions resulting from mis-specified models. A further confusion likely results from the several selection mechanisms associated with military service (Wilmoth & London, 2016; Wolf, Wing, & Lopoo, 2013). As these authors describe, recruits first undergo physical and mental

health screening, as well as cognitive assessment, to enlist in the military (the "healthy soldier" effect). Next, during times of war or conflict, those who are deployed on hazardous duty are further selected (the "healthy warrior" effect); finally, those who seek to make the military a career are selected yet again as not all are allowed to re-enlist ("career" selection). To properly understand the impact of military service on health and well-being in later life, the existence of military service, as well as its myriad effects, as well as these various selection factors, must be taken into account.

We believe that the HRS has taken the lead in examining military service among NIA's studies. Among publically available longitudinal studies, it has a more complete coverage of veterans than do most of its counterparts, and in some domains in particular, its items assess in more detail the implications of military service. Further, the HRS' approach has evolved over the past several decades to assess service in more detail, but as we outline below, more should be done. Based on the data available from HRS, one can examine questions such as, what are the life course benefits (and costs) of military service on economic, social, psychological, and health outcomes? Do these costs and benefits differ for various subgroups of veterans (e.g., based on war- vs. peace-time service) within the HRS? Do veterans "age" similarly to non-veterans, or differently? And with some of the changes we discuss, these questions could be refined further, and explored in more depth, to more completely understand whether military service confers risks or benefits (or more likely, both) on those aging veterans and their spouses.

## 2. WHO IS A "VETERAN"?

To answer questions regarding veterans, we need to define the term. According to the Federal definition used to determine eligibility for government services, there are multiple components, e.g., service on active duty of a minimum length, accompanied by a certain type of discharge (see also Moulta-Ali (2014)). According to the United States Code in 38 USC 101, "The term "veteran" means a person who served in the active military, naval, or air service, *and who was discharged or released therefrom under conditions other than dishonorable* [emphasis added]." But various surveys use a range of definitions of "veteran". For example, according to the American Community Survey, a veteran served on active duty in the Armed Forces; the 2014 BRFSS (Q8.5) also asks whether one served in the National Guard or a Reserve unit. In neither study, as in HRS (see Section 3 below), was the type of discharge considered.

In addition to identifying veterans, it is important to recognize that there are a number of other groups related to military service:

- Military retirees (who serve 20 or more years on active duty, and receive pension benefits and healthcare from DOD, not from VA)
- Among veterans, there are several subgroups with respect to use of VA benefits such as healthcare available from the Veterans Healthcare Administration [VHA]
    - VA enrollees (veterans who are eligible for, but have not received, VA healthcare)
    - VA healthcare users are those who actively receive some health care from VA (this is the target group of the VA-SDR project led by Ken Langa)

    - Among VA healthcare users, priority categories are assigned by the VA based on a variety of factors as determined from time to time by Congress, based on whether or not the condition is service-related and on income levels.
- There are also veterans who may use other (non-healthcare) benefits offered by VA (e.g., pension, housing, education) received through the Veterans Benefits Administration [VBA]
- Finally, there are veterans' dependents/survivors who may receive benefits from both VBA and VHA.

In 2010 (according to the VA's National Survey of Veterans), the US population included 22.2 million veterans, 1.04 million active duty, and 470,000 demobilized Reserve/Guard. In addition, the US population also includes 291,000 active duty spouses, 15.0 million spouses of veterans, and 5.8 million surviving spouses of veterans. The extent of the US population who may be eligible to receive government benefits related to military service is about 45 million persons, or about 15% of the US population in 2010 (not including children of veteran/active duty).

3. WHO ARE THE VETERANS IN HRS?

In the original core surveys, used in HRS 1992 and AHEAD 1993, the "veteran" questions were broad and did not refer to the type of discharge.

- 1992 core (V222): Have you ever been in the active military service?
- 1993 core (V146): Have you ever served in the active military of the United States?

Respondents who answer positively to these questions are then asked their dates of service.

Given that the Federal definition above in Section 2 excludes those with certain types of discharge from the military, do the HRS questions accurately identify veterans? On first blush, one might say , "No", because there is no mention of type of discharge or length of service. At the least, the HRS item cannot determine whether the veteran is eligible for Federal services. But perhaps a more inclusive question, combined with other information, would capture a broader segment of those who have served in the military.

Table 1 shows the prevalence of military service among the various HRS cohorts, e.g., AHEAD, War Babies, CODA, EBB. About half (46%) of men in HRS from 1992 to 2012 were veterans , varying across cohorts from 16% to 72%. Among women, very few, about 1%, reported being veterans, with slightly higher percentages among the more recent cohorts (consistent with the increased enrollment of women in the military since introduction of the All-Volunteer Force {AVF} in 1973).

**Table 1. Veteran Status by Gender and Sample Cohort, HRS 1992 - 2012**

| | Total | AHEAD | CODA | HRS | War Babies | Early Baby Boomers | Mid Baby Boomers | Not in any cohort |
|---|---|---|---|---|---|---|---|---|
| | | | | ***Men*** | | | | |
| ***N*** | 16,347 | 3141 | 2062 | 4976 | 1476 | 2107 | 2227 | 356 |
| ***% veteran*** | 46 % | 55 % | 72 % | 53 % | 47 % | 29 % | 17 % | 16 % |
| ***N veteran*** | 7576 | 1726 | 1483 | 2616 | 693 | 620 | 380 | 57 |
| | | | | ***Women*** | | | | |
| ***N*** | 20,973 | 4617 | 2164 | 5514 | 2177 | 2667 | 2808 | 1026 |
| ***% veteran*** | 1.2 % | 1.3 % | 0.8 % | 0.9 % | 0.8 % | 1.3 % | 1.9 % | 1.4 % |
| ***n veteran*** | 244 | 59 | 17 | 50 | 18 | 34 | 52 | 14 |

Notes:
Veteran Status is derived from two questions: "Have you ever been in the active military service?" (1992, 1994) and "Have you ever served in the active military of the United States?" (1993, 1995-2012).

Cohorts: AHEAD = <1924, CODA=1924-1930, HRS=1931-1941, War Babies=1942-1947, Early Baby Boomers =1948-1953, Mid Baby Boomers=1954-1959, Not in any cohort= >1959.

For additional information on the cohort measure, see
http://hrsonline.isr.umich.edu/modules/meta/rand/randhrso/randhrs_O.pdf

4. INFORMATION ON VETERANS AVAILABLE IN HRS

One of the limitations of HRS is the extremely limited information available on military service history.
The HRS is a complex study, with multiple measurement sequences conducted on multiple cohorts of respondents. Questions on veterans are distributed across various measurement sequences, with most in the Core. Relevant items are also included in off-year mail surveys, and leave-behind surveys (which began 2006).

- core survey – items on military history including start and stop dates of service (which can be used to construct a measure of service era); veterans benefits, self-reported military-related disability, etc. This information refers only to the core/exit interviews, and does not include off-year or supplemental modules (or the RAND data).
- off-year Health care study 2011 - items regarding use of DOD/VA healthcare (A7, A8, E5-EE14); also on dates of service (E1, E2) and service-connected disability (E3, E4)

- off-year veterans mail survey 2013 – was sent to 3811 HRS respondents (1871 respondents) who had previously indicated serving on active duty; items assess general health, military service, service-connected disability rating, use of VA services, military experiences, friends from the military
- Leave-behind surveys - An Item on combat ("Have you ever fired a weapon in combat or been fired upon in combat?") included in Leave-Behind surveys for 2006 (KLB037C), 2008 (LLB037C), 2010 (MLB037C) and 2012 (NLB037C).
- The 2014 Core Module - includes items on Traumatic Brain Injury (OV001-OV017), also has items on PTSD for self or other (OV355, OV357)

In 2013, the HRS sent a mail survey to all respondents who had ever identified themselves as veterans; permission was also sought from these respondents to permit linkage to VA healthcare data. This HRS-VA SDR linkage project is obtaining VA healthcare data for users who consented or are deceased (data not yet available). For FAQ on VA healthcare, see Panangala and Bagalman (2014); for information on VA healthcare data and their availability, see the VIREC website.

Table 2 presents a comparison of some aspects of military service between men and women based on the HRS core data from 1992 – 2012, and separately from the 2013 Veterans survey. First, there are some differences between the Core and the Mail survey in the distribution of veterans among conflicts, with nearly a third of men in the Core samples having served during World War II, compared to 13% of men in the 2013 survey, likely due to aging/survival affecting the latter group of respondents. Among men, combat exposure was reported by 35% of veterans in Core surveys, compared to 26% of 2013 Mail respondents. And the presence of a service-connected disability rating (SCDR) was higher among the 2013 Mail respondents (16%) than among the Core respondents (4%).

As an aside, let us note here that obtaining the actual percent of the disability rating for all veterans in the core survey would be important, although perhaps subject to some error (related to whether or not the veterans takes advantage of their disability rating to receive VA pension or healthcare benefits). Different levels of this rating are used by VA to determine levels of access to healthcare; for example, veterans with a SCDR of 50% or more is eligible for complete VA healthcare, while those with SCDR's less than 50% have lower eligibility and can receive care related only to the disability.

**Table 2. Select Characteristics of Health and Retirement Study Veterans by Gender**

| | All 1992-2012 HRS Veterans | | | 2013 Veterans Mail Survey | | |
|---|---|---|---|---|---|---|
| | **Total** | **Men** | **Women** | **Total** | **Men** | **Women** |
| Service Era | | | | | | |
| World War I | 6 (.1%) | 6 (.1%) | | 1 (.05%) | | 1 (1%) |
| World War II | 2368 (30%) | 2368 | | 237 (13%) | 237 (13%) | |
| Korean War | 1698 (22%) | (31%) | | 396 (21%) | 396 (22%) | |
| Vietnam War | 1884 (24%) | 1698 | 19 (8%) | 705 (38%) | 696 (29%) | 9 (12%) |
| Multiple Wars | 353 (5%) | (22%) | | 75 (4%) | 75 (4%) | |
| | | 1865 | | | | |
| Served but not | | (25%) | | | | |
| during wartime | 1455 (19%) | 353 (5%) | 225 (92%) | 453 (24%) | 389 (22%) | 64 (86%) |
| Unknown | 56 (1%) | | | 3 (.2%) | 3 (.2%) | |
| | | 1230 (16%) | | | | |
| | | 56 (1%) | | | | |
| Exposed to combat fire | | | | | | |
| Yes | 1143 (15%) | 1138 | 5 (2%) | 473 (25%) | 471 (26%) | 2 (3%) |
| No | 2737 (35%) | (35%) | 111 | 1282 | 1222 | 60 (81%) |
| Unknown | 3940 (50%) | 1138 | (45%) | (69%) | (68%) | 12 (16%) |
| | | (15%) | 128 | 115 (6%) | 103 (6%) | |
| | | 3812 | (52%) | | | |
| | | (50%) | | | | |
| Service Connected Disability Rating | | | | | | |
| Yes | 303 (4%) | 385 (4%) | 18 (7%) | 303 (15%) | 285 (16%) | 18 (25%) |
| No | 1346 (17%) | 1297 | 49 (20%) | 1346 | 1297 | 49 (67%) |
| Unknown | 6171 (79%) | (17%) | 177 | (72%) | (72%) | 7 (8%) |
| | | 5994 | (73%) | 221 (12%) | 214 (12%) | |
| | | (79%) | | | | |

5. LIMITATIONS OF THE HRS VETERAN MEASURES

Compared to many of these other aging studies, HRS assesses multiple aspects of veterans' experiences (especially in Core questions regarding assets and income, disability, health services and insurance, widowhood). However, the HRS contains relatively little information on important demographic and psychosocial aspects of military service that would enhance its value to the "aging veteran" research communities described above. For example, it was 2006 before an item about combat was added ("Have you ever fired a weapon in combat or been

fired upon in combat?"; in the Leave Behind Q, asked only of a random half of the sample at each wave), and the specificity of this item makes it less useful for determining whether a respondent "merely" served in a combat area. [We would recommend a more "nested" item structure, e.g., first asking whether the respondent had been deployed to a combat area, and if so, whether they fired or were fired upon].

Demographic questions (included in the core) on military history enquire about service in the Armed Forces, and when, but do not obtain further information such as branch, rank, and type of service (i.e., Armed Forces vs. Guard or Reserves), or deployment history. Each of these "omitted variables" makes it more challenging to understand the heterogeneity in military service among the sample and their impacts on health and well-being in later life.

As for assessing psychosocial aspects of military service, several papers have examined data from the VA Normative Aging Study, the Harvard Study of Adult Development, and the Oakland/Berkeley Growth Studies and suggested that appraisals of military service change over time, and that these appraisals might have more impact on health and well-being in later life than do more 'objective' aspects (Aldwin, Levenson & Spiro, 1994; Elder & Clipp, 1989; Settersten et al., 2012). But no such variables are assessed in HRS.

In the interest of harmonization, it would be useful (although we did not address this question at this time) to consider whether and to what extent the HRS "sister-studies" (e.g., ELSA, SHARE) include information on military service. And if not, could such information be added? While it might be too late to obtain much useful information, since many of these countries have not been actively engaged in military activity during the recent past, many of the European countries have universal service, and whether deployed to warzones or not, military service does have its risk and hazards.

## 6. WHAT DATA COULD/SHOULD BE ADDED TO HRS?

Based on our interests in examining the effects of military service on aging, and our experiences working with various studies that have addressed this topic to varying degrees, we propose that the HRS consider how best to obtain further information from those who served. We believe that this information could be quite useful in further understanding military service and its role in aging.

- For veterans, what was your: Rank? Military occupational specialty (MOS)? What was your unit? The first two questions would allow further differentiation of military experiences among veterans; the latter might allow linkage to historical data on deployments and other unit-based activities when linked to period of service.
- For additional questions, see the module for assessing military service developed by our NIA-funded R24 research network on Military Outcomes; also see also the VA Military Health History pocket card http://www.va.gov/oaa/pocketcard/ for potential items. Items from the R24 module were used in the HRS 2013 Veteran survey.
- There are other sources of administrative data from Defense and Veterans Affairs that could be explored for linkage to respondents. For example, could HRS link to the

Defense Manpower Data Center (DMDC) to obtain military service records (DD-214), or to the VBA to obtain information on pensions and use of VA benefits for housing or education?

In the HRS, the questions have evolved over the years, and in some cases, important new ones have been added to supplemental or off-year measures but may not be available for the entire cohort. For example, the service-connected disability rating was only asked in the 2013 Veterans Mail Survey. Consequently, the service-connected disability rating status is unknown for 79% of the veterans contained in the HRS. Adding a service-connected disability rating question to the HRS core would capture this information for a wider range of (surviving) veterans, which would enable researchers to better understand how service-connected disability affects health and health care utilization in later life. Thus, in addition to suggesting that HRS obtain more information on military service for veterans, we would ask that this information be obtained for all veterans. And note that, as is currently the case, many of these aspects of military service need only be asked once, because they are not likely to change over time.

In addition to learning more about the veteran and their service, we believe it is also important to consider the impact of military service on the veteran's family. Thus, we think questions such as the following might be useful, for example for assessing attitudes toward the military and veterans, or in consideration of familial transmission of military service.

- Ask the respondent if their spouse (current, former) and (step)child(ren) are now serving, or have previously served, in the military.
- Do respondents have other family members now (or previously) in the military?

It would be interesting to determine whether spouses and children know that their spouse/parent was a veteran? What if anything do they know about their service. And to perhaps fill-in some information previously omitted (e.g., service-connected disability ratings for deceased veterans), it might be informative to ask surviving wives if their husband was a veteran.

Finally, we might note that many veterans develop, over the course of their lifetime, mental as well as physical sequelae as a result of their service. Physical sequelae can occur as a result of injuries during training, exposures to hazardous materials or environments, and injuries or wounds resulting from deployment. Among veterans of the recent conflicts in Iraq and Afghanistan, traumatic brain injuries are common; thus the addition of an item on this should prove useful especially in future cohorts sampling those who served in this era. Mental sequelae often include post-traumatic stress disorder (PTSD), which can be experienced during/after deployment, or can (re)surface decades later (Davison et al., 2016). At present, HRS collects limited information on mental health (only a short version of the CES-D). To evaluate the impact of military service, it might help to add short measure of PTSD (e.g., PC-PTSD-5) or a general measure of distress (K6, used in BRFSS, or PHQ-9) to the core.

## 7. USES OF HRS VETERAN DATA

In preparation for this report, we identified about two dozen papers that used HRS data to address questions regarding veterans or military service (See Appendix 1 for their titles/abstracts). Table 3 summarizes some aspects of these various papers. Of these 22 papers, dated 2005 through several currently in press, most (16) were published. Topic varied widely (see Appendix I), as did sample sizes (from several hundred [Vable, 2016b] to over 16,000 [Wilmoth et al., in press]), depending in part on whether the analysis involved veterans only, or the total sample. Several studies used data from all HRS core waves (various works by Wilmoth and colleagues), while others used data from the 2006 or 2008 psychosocial surveys (Aldwin et al., in press; Gould et al., 2015), the 2013 Veteran Mail survey (Taylor et al., 2016) or biomarker waves (Aldwin, in press; Edwards & MacLean, 2014); and several included the RAND files (Schmitz et al., 2016; Yang & Burr, 2016).

Eight studies were cross-sectional, seven were longitudinal, one a panel study, and five were prospective (survival) studies. Various statistical methods were used to analyze the data, with the cross sectional studies typically replying on regression analysis (OLS or logistic, depending on the outcome), the prospective studies on survival analysis, and the longitudinal studies generally using growth curve models.

| Paper | source | Data | Years | N | % vets | Design | analysis |
|---|---|---|---|---|---|---|---|
| Liu 2005 | P | AHEAD Wave 1 (linked to 1995 NDI) | 1993-94 | 7,071 | 21% | prospective | survival analysis |
| Fitzgerald 2006 | P | HRS Wave 1 | 1992 | 5,800 | 56% | cross-sectional | OLS regression |
| London 2006 | P | HRS baseline, AHEAD baseline; 2002 | 1992 (n=5639); 1993 (n=2899); 2002 (dead/alive) | 8,538 | 57% | prospective | logistic regression |
| Wolf 2007 | u | HRS baseline (linked to NDI mortality 2002) | 1992 (men born 1931-35) | 1,773 | 50% | prospective | frailty model |
| Edwards 2010 | u | HRS | 2008 | 6,789 | 51% | cross-sectional | regression (IV) |
| Wilmoth 2010 | P | HRS, RAND | 1992-2006 | 12,631 | 55% | longitudinal | growth curve |
| Wilmoth 2011 | u | HRS, RAND | 1992-2006 | 12,631 | 55% | longitudinal | growth curve |
| Assari 2014 | P | HRS | 1992-2012 | 8,375 | ? | prospective | logistic regression |
| Brown 2014 | P | HRS | 1995-2006 | 6,863 | 59% | longitudinal | growth curve |
| Edwards 2014 | u | HRS | 2006 & 2008 biomarker waves | 3,100 | 100% | cross-sectional | regression |
| Fang 2015 | u | 2012 Core linked to 2011 and 2013 OYMO | 2012, 2011, 2013 | 8,262 | 100% | prospective | logit regression |
| Gould 2015 | P | HRS | 2006 wave & psychosocial | 6,577 | 49% | cross-sectional | logistic regression |
| Gustman 2015 | u | HRS baselines | 1992 (n=1145); 1998 (n=466); 2004 (n=363); 2010 (n=270) | 2,244 | 100% | panel | regression |
| Wilmoth 2015 | P | HRS | 1992 - 2010 | 12,277 | 55% | longitudinal | growth curve |
| Schmitz 2016 | P | HRS; RAND; DNA | 1992 - 2010 | 631 | 100% Vietnam | | |
| Taylor 2016 | P | HRS | 2013 veteran survey & RAND 2000-2010 data | 1,552 | 100% | longitudinal | latent class |
| Vable 2016a | P | HRS | 2010 | 486 | 51% Korean Vets | cross-sectional | CEM & regression (OLS, logistic) |
| Vable 2016b | P | HRS | 2010 | 352 | wives of 128 Korean vets | cross-sectional | CEM & regression (OLS, logistic) |
| Yang 2016 | P | HRS; RAND | 2008 | 2,961 | 100% | cross-sectional | logistic regression |
| Aldwin in press | P | HRS | 2006 & 2008 psychosocial | 3,412 | 55% | cross-sectional | regression |
| Stawski in press | P | HRS | 1998-2010 | 7,020 | 60% | longitudinal | growth curve |
| Wilmoth in press | P | HRS | 1992-2012 | 16,347 | 53% | longitudinal | growth curve |

Note. P=published; U=unpublished. IV = instrumental variables. CEM = coarsened exact matching.

## 8. RESEARCH QUESTIONS THAT CAN BE ASKED REGARDING MILITARY SERVICE IN HRS

With the data available currently in HRS, there are a number of questions that can be asked, some methodological to allow a better assessment of the relevance of the existing veteran data, and others substantive, to further explore the role of military service as a factor in the respondents' lives.

The first methodological question is, given the HRS sampling plan (e.g., Heeringa & Connor, 1995) which uses a multi-stage area probability sample design, does the inclusion of some geographic clusters rather than others affect the probability of sampling veterans (who tend to live in certain locations; cf. Teachman, 2012)?. In other words, how representative is the sample of veterans included in HRS? And should it be shown to be biased in some manner, how could this be corrected (or adjusted), and is it worth the effort? And if it is not worth the effort for NIA/HRS to adjust, might the VA or DOD be approached to see if they would be interested in supporting a more representative sampling?

A broader issue that crosses the substantive-methodological boundary is whether veteran status should be considered as a variable (or a set of variables) in models predicting many of the outcomes (e.g., health, wealth, family function) studied by HRS. There are several rich literatures (briefly mentioned in the first paragraph of this report; also Spiro, Settersten, & Aldwin, 2016) that strongly suggest veterans are, to paraphrase Kluckhohn and Murray (1953), like all other men, like some other men, and like no other man. Veterans' experiences of military service are diverse, and are not always negative, even for those with some of the more severe and traumatic exposures. Aside from the experiences and events that can occur while one is serving in the military, most veterans are also eligible for a variety of governmental services that are not available to non-veterans, and these services can alter life-course trajectories for the veteran and their family. By excluding measures of veteran status and military experience from conceptual and statistical models, one could argue that the results, especially for men, are likely biased for many types of outcomes.

If one accepts the argument that military service should be included in accounting for outcomes, the next question is how to do so. Simply including a dichotomous variable for veteran status might suffice, but is likely to be a poor proxy for both the experiences of military service and for the access to health, education, and housing benefits that likely distinguish some respondents from others. While the HRS does include a number of demographic variables related to military service (e.g., using dates of service can help determine whether a veteran served during war- or peace-time, and also how long a military career they had), there is sparse information on the nature of the veteran's experiences, short of the combat item first included in the 2006 Leave Behind questionnaire. The HRS does a thorough job of assessing income etc, resulting from government benefits to veterans.

We would also like to underscore that it is difficult to ascertain the impact of military service on later-life outcomes without directly comparing veterans and non-veterans. Of course, various issues related to selection (into military service, into combat, into life-long military service)

make it difficult to adequately isolate the effects of military service. The HRS contains a range of retrospective early-life indicators that are measured prior to military service that can be used to control for some of the factors that might select individuals into military service. But more consideration needs to be given to the sources of unobserved heterogeneity that might influence observed veteran status differences. Some researchers (e.g., Wilmoth and colleagues) have tried to use the Vietnam Era Draft Lottery to instrument military service in the HRS data but have found the data to be under-powered.

Here, we mention briefly some areas within existing HRS work where a more thorough consideration of veteran status and military experience might be useful. As one example, ADAMS was conducted to, among other outcomes, estimate prevalence of dementia in US, and its economic costs (Hurd et al., 2013, NEJM). Would it have been useful to consider the impact of military service (with its potential for PTSD, TBI, or other factors) on the various outcomes, as a potential predictor of dementia onset or severity? A recent special issue of Alzheimer's and Dementia on "Military Risk Factors for Alzheimer's Disorder and Neurodegenerative Disease" included a number of papers linking aspects of military experience to dementia.

As another example, might the recent changes in mortality among men in the US (e.g., Case & Deaton, 2016; Chetty et al., 2016) be related to military service? Historically, over the span of cohorts included in HRS, the majority of veterans were men, and most were white. Beginning with the Vietnam conflict, minority men became a larger segment of the military, and since the creation of the AVF in 1973 and the Gulf War and current War on Terror, minorities and women are increasing larger segments of the military and veteran populations. How might these changes in the military, and the growing access of these groups to veterans' benefits, affect the health and wealth of aging Americans, and the inequalities among them?

## 9. CONCLUSION

In sum, we believe that the HRS is one of the best available sources of nationally representative longitudinal data on aging veterans, and that it assesses a broader range of information on them than any comparable study. But, as aging veteran researchers, we are concerned that more needs to be done. We were able to identify 22 papers that have used HRS data to assess veterans or military service, of the thousands of papers that have been written. In our view, HRS lacks salient information on demographic aspects of military service, some items are asked only of subsamples or were added too late for the earlier HRS cohorts that included most veterans of World War II and Korea, and nearly no data are available on the psychosocial or mental health impact of military service. We have offered suggestions for some key additional variables to be added, and tried to emphasize their importance to those of us who study military service in aging.

We hope that our arguments as to the importance of assessing the impact of military service in later life are convincing. In our view, HRS is no more or less guilty than other aging enterprises in its failure to consider the role of this "hidden variable" on health, wealth, and well-being in later life. Military service, which has been ignored for too long in the study of men's aging, may

soon begin to confound women's aging as well, and HRS may be in a position to ensure that continued ignorance is not an option. We are sure that our recommendations for improving the assessment of veteran status and military service will be considered thoughtfully, and we look forward to the opportunity to work together to implement them.

APPENDIX I. PAPERS ON VETERANS/MILITARY SERVICE USING HRS DATA

Liu, X., Engel Jr, C. C., Kang, H., & Cowan, D. (2005). The effect of veteran status on mortality among older Americans and its pathways. *Population Research and Policy Review*, *24*(6), 573-592.

This research examines excess mortality among American veterans age 70 years or older during a two-to-three year interval from 1993/94 to the end of 1995. Using a structural hazard rate model, we analyzed data on a sample of respondents age 70 or over from the Survey of Asset and Health Dynamics among the Oldest Old (AHEAD). We found that at age 70, older veterans have a slightly higher death rate than their nonveteran counterparts, implying a mortality crossover right before this age. Such excess mortality among veterans increases considerably with age, when other factors are held equal. The direct and indirect effects of veteran status on mortality by means of physical and mental health mostly perform in opposite directions, and such effects vary greatly in magnitude and direction as a function of age. The intervening effects of physical and mental health status decrease substantially with increasing age. Many of the mechanisms inherent in the excess mortality among older veterans are not captured by variations in their health status, especially among the oldest-old. A more extensive study on this topic is urgently needed.

Fitzgerald, K. G. (2006). The effect of military service on wealth accumulation. *Research on Aging*, *28*(1), 56-83.

This study examines the association between serving active military duty and wealth accumulation. It was expected that those who served active duty would be more likely to accumulate less wealth than nonveterans. Using data from the first wave of the Health and Retirement Study, a sample of 5,800 men was analyzed to determine the relationship between the length of time spent on active military duty and net worth. Multiple regressions suggest that factors commonly associated with wealth accumulation significantly affect net worth. More important, the total number of years served was very significant in that additional years of service decreased net worth. The results were insignificant for respondents who served more than 20 years but suggest that extended military service may positively affect net worth. Overall, the results show that there is an economic disincentive to serve in the military, which may affect the ability of veterans to accumulate wealth and future military recruitment.

London, A. S., & Wilmoth, J. M. (2006). Military Service and (Dis) Continuity in the Life Course Evidence on Disadvantage and Mortality From the Health and Retirement Study and the Study of Assets and Health Dynamics Among the Oldest-Old. *Research on Aging*, *28*(1), 135-159.

This study uses a life-course framework and data from the Health and Retirement Study and the Study of Assets and Health Dynamics Among the Oldest-Old to examine three hypotheses related to (dis)continuity in the effects of early-life disadvantage (African American race and low paternal education) and military service on later-life mortality. Specifically, the authors consider whether military service (and age at enlistment) mediates or moderates the effects of early-life disadvantage on later-life mortality and

whether mid- to late-life marital status, socioeconomic status, health status, and health behaviors mediate the effects of military service on mortality. The authors find very little evidence to support the notion that any mortality benefits accrue to men as a consequence of military service overall or enlistment at any particular age. Most of the evidence is consistent with life-course disruption and continuity of disadvantage interpretations.

Wolf, D., Wilmoth, J., & London, A. (2007). Military service and mortality: A re-appraisal based on frailty models. Paper presented at the Annual Meeting of the Population Association of America.
paa2007.princeton.edu/papers/71324

Edwards, R. D., & MacLean, A. (2010). *Military service, combat exposure, and health in retirement*. Working Paper, Queens College. qcpages.qc.cuny.edu/~redwards/Papers/edwards-maclean-combathealth-110210.pdf

Military service has traditionally been the domain of healthy, robust males, but service can also reflect risk preference and socioeconomic status. Service also raises the probability of exposure to violence through combat, a significant stressor, and it may represent other types of treatments as well, both positive and negative. We might expect to find an ambiguous relationship between military service and later-life health, and several recent studies support this. In this paper, we explore the relationship between combat exposure and health past age 50 in the Health and Retirement Study, a rich longitudinal panel including many male veterans that now asks about combat exposure in its core survey. Using regression analysis and an instrumental variables approach, we show that combat exposure harms mental health and emotional well-being and raises a biomarker of stress at older ages, but it appears often to have negligible effects on a wide array of physical health metrics.

Wilmoth, J. M., London, A. S., & Parker, W. M. (2010). Military service and men's health trajectories in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 65B(6), 744-755.

**Objectives.** This study examines differences in the relationship between veteran status and men's trajectories of health conditions, activities of daily living limitations, and self-rated health.

**Methods.** We use data on 12,631 men drawn from the 1992–2006 waves of the Health and Retirement Study to estimate growth curve models that examine differences in health trajectories between nonveterans and veterans, veterans with and without wartime service, and war service veterans who served during World War II, Korea, Vietnam, and multiple wars.

**Results.** The results indicate that veterans have better health at the mean age of 66.2 years, but experience greater age-related changes in health than nonveterans. Similarly, men who served during wartime have better health at the mean age, but more age-related changes in health than men who did not serve during wartime. Among war

veterans, Vietnam veterans are in poorer health at the mean age, but they experience less substantial age-related health changes than men who served during previous wars. **Discussion.** Although veterans experience better health relative to nonveterans around retirement age, they have poorer health than nonveterans among the oldest old. These findings inform our understanding of the veteran–nonveteran health-mortality paradox found in previous research and suggest a health crossover among veterans and nonveterans in later life.

Wilmoth, J. M., & London, A. S. (2011). Veteran status and men's health trajectories in later life: A synthesis of findings the health and retirement study (HRS). Paper presented at the 2011 Inter-University Seminar on Armed Forces and Society, Chicago, IL.

Assari, S. (2014). Veterans and risk of heart disease in the United States: a cohort with 20 years of follow up. *International journal of preventive medicine*, *5*(6), 703-709

**Background:** The aim of the current study was twofold: To investigate the effect of veteran status on risk of developing heart disease over a period of 20 years in the United States and to test if socio-economic characteristics, chronic conditions, health behaviors, body mass index (BMI) and depressive symptoms explain the association between veteran status and risk of heart disease.
**Methods:** Data came from the Health and Retirement Study, a 20 year national cohort from 1992 to 2012. The study enrolled a representative sample of Americans over the age of 50. We included 8,375 individuals who were older than 50 years at entry, did not have heart disease at baseline and provided data on heart disease over the next 20 years. Veteran status was considered to be the independent variable. Self-reported data on physician diagnosis of heart disease, which was measured on a biannual basis, was the outcome. Baseline socio-economic data (i.e. age, gender, race, marital status and education), chronic conditions (diabetes and hypertension), health behaviors (i.e. drinking, smoking, and exercise), BMI and depressive symptoms (modified Center for Epidemiologic Studies Depression Scale) were entered into logistic regressions. Logistic regression was used for data analysis.
**Results:** Veterans were at higher risk of having a new onset of heart disease (unadjusted relative risk [RR] = 1.996, 95% confidence interval [CI] =1.694-2.351), compared with non-veterans. Logistic regression confirmed the association between veteran status and heart disease (adjusted RR = 1.483, 95% CI = 1.176-1.871) after controlling for all covariates.
**Conclusions:** Veterans may be at higher risk for heart disease over time and this link may be independent of baseline socio-economic characteristics, chronic medical conditions, health behaviors, BMI and depressive symptoms. Veterans may require more rigorous cardiovascular prevention programs.

Brown, M. T., Wilmoth, J. M., & London, A. S. (2014). Veteran Status and Men's Later-Life Cognitive Trajectories Evidence from the Health and Retirement Study. *Journal of aging and health*, *26*(6), 924-951.

**Objective:** The aim of this study is to determine the extent to which men's later-life cognitive trajectories vary by veteran status. **Method:** We use Health and Retirement Study (HRS) data to estimate growth curve models examining men's later-life cognitive trajectories by veteran status, war service status, and period of service. Analyses control for early-life characteristics that influence selection into military service and later-life cognition, and mid- to late-life characteristics that potentially mediate the relationship between military service and later-life cognition. **Results:** Veterans have higher cognition scores relative to nonveterans around retirement age, but their cognition scores decline more rapidly with increasing age, such that cognition scores are similar in both groups among the oldest old. Veterans who served during the Korean War have lower cognition scores around retirement age, but less steep age-related declines, than veterans who served during World War II. **Discussion:** Findings are discussed in relation to the extant literature, future research, potential service needs, and study limitations.

Edwards, R. D., & MacLean, A. (2014). Soldiering On Through Aging? The Subjective and Objective Health of Older US Veterans. *Unpublished paper.* qcpages.qc.cuny.edu/~redwards/Papers/edwards-maclean-hrsbiovets-paa.pdf

Veterans of the Vietnam War, the last large-scale U.S. engagement prior to the All-Volunteer Force era, have now largely reached retirement age, with record high rates of service-connected disability compared with veterans of earlier wars. Understanding the determinants of healthy aging among this cohort is important for assessing current and future needs of veterans, especially now that policies and events have generated another large wartime cohort, and for gaining insights into health dynamics over the life cycle. In this paper, we compare objective and subjective metrics of health across male veterans and nonveterans in a population-based panel survey of Americans over age 50, the Health and Retirement Study, which recently began collecting biomarkers. We revisit earlier results that suggest subjective self-reports by veterans may be overstated, a "soldiering on" effect, relative to objective measures of health. Our findings speak to the lifelong influences of earlier-life conditions and of the lingering challenges posed by exposure to combat.

Fang, C., Langa, K., Levy, H., & Weir, D. (2015). Racial differences in the use of VA health services. Working paper 2015-334, Michigan Retirement Research Center, Ann Arbor. http://www.mrrc.isr.umich.edu/publications/papers/pdf/wp334.pdf

We study the factors that affect the utilization of health care services administered by the Department of Veterans Affairs (VA) and its racial differences. Due to data limitation, previous research in this regard mostly only focuses on veterans who are VA users or at least eligible for VA services. We fill in the gap in literature with a random sample of veterans 51 and older from the Health and Retirement Study. We find that, among all veterans, those who are black and less healthy are more likely to use VA health services. These factors, nevertheless, are no longer statistically significant after the sample is restricted to veterans who are eligible for VA services. We also find that VA health services and services provided through other channels are at least partial substitutes: VA usage drops when a veteran becomes age eligible for Medicare or when

a veteran has health insurance coverage through employment. This drop in usage holds not only among all veterans, but also among veterans eligible for VA services. Finally, perception about the quality of services delivered in VA versus non-VA facilities strongly predicts VA services usage. Those who have favorable views toward VA use VA services more, and the results from variance decomposition suggests a majority part of the racial difference in VA usage can be attributed to the racial difference in such perception.

Gould, C. E., Rideaux, T., Spira, A. P., & Beaudreau, S. A. (2015). Depression and anxiety symptoms in male veterans and non-veterans: the Health and Retirement Study. *International journal of geriatric psychiatry*, *30*(6), 623-630.

***Objectives***

We examined whether veteran status was associated with elevated depression and anxiety symptoms in men aged 50 and older after adjusting for sociodemographic factors.

***Methods***

Participants were 6577 men aged 50 years and older who completed the 2006 wave of the Health and Retirement Study (HRS). Forty-nine percent of participants were veterans. A randomly selected subset of participants completed the HRS Psychosocial Questionnaire (*N* = 2957), which contained the anxiety items. Elevated depression and anxiety symptoms were determined based on brief versions of Center for Epidemiologic Studies—Depression Scale (CES-D total score ≥ 4) and Beck Anxiety Inventory (BAI total score ≥ 12).

***Results***

Elevated depression and anxiety symptoms were found in 11.0 and 9.9% of veterans, respectively, compared with 12.8 and 12.3% of non-veterans. Veteran status was not associated with increased odds of anxiety or depression symptoms in the multivariable-adjusted logistic regression analyses. Additional analyses indicated that Vietnam War veterans were more than twice as likely as World War II or Korean War veterans to have elevated depression symptoms (OR = 2.15, 95% CI: 1.54–3.00) or anxiety symptoms (OR = 2.12, 95% CI: 1.28–3.51).

***Conclusions.***

In a community-based sample of men aged 50 and older, veteran status was not associated with the presence of elevated depression and anxiety symptoms. Rather, these symptoms were associated with age, ethnicity, education, and medical conditions. Among veterans, cohort effects accounted for differences in psychiatric symptoms. Including younger cohorts from the Global War on Terror may yield different results in future studies

Gustman, A. L., Steinmeier, T. L., & Tabatabai, N. (2015). *Declining Wealth and Work Among Male Veterans in the Health and Retirement Study* (No. w21736). National Bureau of Economic Research.

The composition, wealth and employment of male veterans and nonveterans are analyzed for four cohorts from the Health and Retirement Study, ages 51 to 56 in 1992, 1998, 2004 and 2010. Half of the men in the two oldest cohorts served in the military.

Only 16 percent of the men in the youngest cohort, the only cohort subject to the All-Volunteer Military, served. One fifth to one third of the members of each cohort who served saw combat, mainly in Viet Nam and in the First Gulf War.
Among those 51 to 56 in 1992, veterans were better educated, healthier, wealthier, and more likely to be working than nonveterans. By the 2010 cohort, 51 to 56 year old veterans had lost their educational advantage over nonveterans, were less healthy, less wealthy and less likely to be working.
After standardizing in multiple regressions for the influence of major observable characteristics, for the original 1992 HRS cohort the wealth of veterans is no longer higher than the wealth of nonveterans. In contrast, the wealth of veterans from the youngest cohort, those 51 to 56 in 2010, remains about 10 to 13 percent below the wealth of nonveterans from that cohort.
There also is a decline from older to younger cohorts of veterans compared to nonveterans in the probability of being not retired, of working more than 35 hours per week, and in the likelihood of holding a job for more than 10 years.
Comparisons are made within the group of veterans by years of service, officer rank and other covariates.

Wilmoth, J. M., London, A. S., & Himes, C. L. (2015). Inter-Cohort Variation in the Consequences of US Military Service for Men's Mid-to Late-Life Body Mass Index Trajectories. In *A Life Course Perspective on Health Trajectories and Transitions* (pp. 133-154). Springer International Publishing.

Schmitz, L., & Conley, D. (2016). The Long-Term Consequences of Vietnam-Era Conscription and Genotype on Smoking Behavior and Health. *Behavior genetics*, *46*(1), 43-58.

Research is needed to understand the extent to which environmental factors moderate links between genetic risk and the development of smoking behaviors. The Vietnam-era draft lottery offers a unique opportunity to investigate whether genetic susceptibility to smoking is influenced by risky environments in young adulthood. Access to free or reduced-price cigarettes coupled with the stress of military life meant conscripts were exposed to a large, exogenous shock to smoking behavior at a young age. Using data from the Health and Retirement Study (HRS), we interact a genetic risk score for smoking initiation with instrumented veteran status in an instrumental variables (IV) framework to test for genetic moderation (i.e. heterogeneous treatment effects) of veteran status on smoking behavior and smoking-related morbidities. We find evidence that veterans with a high genetic predisposition for smoking were more likely to have been smokers, smoke heavily, and are at a higher risk of being diagnosed with cancer or hypertension at older ages. Smoking behavior was significantly attenuated for high-risk veterans who attended college after the war, indicating post-service schooling gains from veterans' use of the GI Bill may have reduced tobacco consumption in adulthood.

Taylor, M. G., Ureña, S., & Kail, B. L. (2016). Service-Related Exposures and Physical Health Trajectories Among Aging Veteran Men. *The Gerontologist*, *56*(1), 92-103.

**Purpose of the Study:** We examined the association of military service-related exposures (SREs) with physical health trajectories to establish whether combat and other hazards have lasting connections to health in later life. We also examined potential confounders and mechanisms to further understand the associations.
**Design and Methods:** We used the 2013 HRS Veterans Mail Survey linked to the longitudinal Health and Retirement Study (HRS) to examine military service experiences and health over a decade (2000–2010) among veteran men. We employed latent class analysis to disaggregate trajectories of health in later life.
**Results:** Most veteran men experienced good health over the decade. Although we found a connection between combat and later health, it was driven primarily by hazardous or traumatic exposures. Service-related disability, current health behaviors, and mental health were not likely explanations for these associations.
**Implications:** The measurement of service experiences is primary in understanding health implications of military service and projecting the health service needs of aging veterans. SREs are varied and complex and have differential connections to health. These connections remain unexplained by current behaviors and mental health, suggesting the need to examine earlier life course pathways and mechanisms.

Vable, A. M., Canning, D., Glymour, M. M., Kawachi, I., Jimenez, M. P., & Subramanian, S. V. (2016a). Can social policy influence socioeconomic disparities? Korean War GI Bill eligibility and markers of depression. *Annals of epidemiology*, 26, 129-135.

***Purpose.***
The Korean War GI Bill provided socioeconomic benefits to veterans; however, its association with health is unclear; we hypothesize GI Bill eligibility is associated with fewer depressive symptoms and smaller disparities.
***Methods***
Data from 246 Korean War GI Bill eligible veterans and 240 nonveterans from the Health and Retirement Study were matched on birth year, southern birth, race, height, and childhood health using coarsened exact matching. Number of depressive symptoms in 2010 (average age = 78 years) was assessed using a modified, validated Center for Epidemiologic Studies-Depression Scale, dichotomized to reflect elevated depressive symptoms. Regression analyses were stratified into low (at least one parent < 8 years schooling/missing data, *n* = 167) or high (both parents ≥ 8 years schooling, *n* = 319) childhood socioeconomic status (cSES) groups.
***Results***
Korean War GI Bill eligibility predicted fewer depressive symptoms among individuals from low cSES backgrounds [β = −0.64, 95% confidence interval (CI) = (−1.18, −0.09), *P* = .022]. Socioeconomic disparities were smaller among veterans than nonveterans for number of depressive symptoms [β = −0.76, 95% CI = (−1.33, −0.18), *P* = .010] and elevated depressive symptoms [β = −11.7, 95% CI = (−8.2, −22.6), *P* = .035].
***Conclusions***
Korean War GI Bill eligibility predicted smaller socioeconomic disparities in depression markers.

Vable, A. M., Kawachi, I., Canning, D., Glymour, M. M., Jimenez, M. P., & Subramanian, S. V. (2016b). Are There Spillover Effects from the GI Bill? The Mental Health of Wives of Korean War Veterans. *PLOS ONE*, *11*(5), e0154203.

**Background**

The Korean War GI Bill provided economic benefits for veterans, thereby potentially improving their health outcomes. However potential spillover effects on veteran wives have not been evaluated.

**Methods**

Data from wives of veterans eligible for the Korean War GI Bill (N = 128) and wives of non-veterans (N = 224) from the Health and Retirement Study were matched on race and coarsened birth year and childhood health using coarsened exact matching. Number of depressive symptoms in 2010 (average age = 78) were assessed using a modified, validated Center for Epidemiologic Studies-Depression Scale. Regression analyses were stratified into low (mother < 8 years schooling / missing data, N = 95) or high (mother ≥ 8 years schooling, N = 257) childhood socio-economic status (cSES) groups, and were adjusted for birth year and childhood health, as well as respondent's educational attainment in a subset of analyses.

**Results**

Husband's Korean War GI Bill eligibility did not predict depressive symptoms among veteran wives in pooled analysis or cSES stratified analyses; analyses in the low cSES subgroup were underpowered (N = 95, β = -0.50, 95% Confidence Interval: (-1.35, 0.35), p = 0.248, power = 0.28).

**Conclusions**

We found no evidence of a relationship between husband's Korean War GI Bill eligibility and wives' mental health in these data, however there may be a true effect that our analysis was underpowered to detect.

Yang, M. S., & Burr, J. A. (2016). Combat exposure, social relationships, and subjective well-being among middle-aged and older Veterans. *Aging & mental health*, 20(6), 637-646.

**Objectives:** This study described the association of subjective well-being with combat exposure and social relationships among middle-aged and older Veteran men in the USA. The stress-buffering hypothesis, which predicts social relationships may moderate the association between combat exposure and subjective well-being, was also examined.

**Method:** Data from the 2008 Health and Retirement Study (*N* = 2961) were used to estimate logistic regression models, focusing on three measures of subjective well-being: depression, life satisfaction, and self-reported health.

**Results:** In the fully adjusted models, there were no statistically significant relationships between combat exposure and the three indicators of subjective well-being. However, compared to Veterans who had lower scores on the social relationship index, Veterans who had higher scores were less likely to be depressed and less likely to report poor or fair health. Veterans who had higher scores on the social relationships index reported higher levels of life satisfaction than those Veterans who had lower scores. There was no evidence for a social relationships buffering effect.

**Conclusion:** The results of this study demonstrated that combat exposure did not have a long-term relationship with subjective well-being. Longitudinal research designs with more comprehensive indicators of combat exposure may help researchers better understand some of the underlying complexity of this relationship. Complementary research with samples of women Veterans, as well as samples of Hispanic, and non-Black, non-White Veterans, is also needed.

Aldwin, C.M., Park, C.L., Choun, S., & Lee, H. (in press). The impact of military service on stress, psychological well-being, and physical health in later life. In A. Spiro III, R.A. Settersten, & C.M. Aldwin (Eds.), Long-term outcomes of military service: Perspectives on health and well-being. Washington DC: American Psychological Association

Using data from the Health and Retirement Study (HRS), we investigated the long-term associations of military service with physical health and psychological well-being in later life, We selected 3,412 men who were 50 and older (M age = 67.7, SD =8.9, range = 50-95) and divided the sample into three groups: civilians (n = 1,537; 45.1%), non-combat veterans (n = 1,152; 33.8%), and combat veterans (n = 723; 21.2%), mainly from the WWII, Korea-era, or Vietnam eras. Combat veterans reported higher levels of stress than the other two groups, poorer self-rated health and health behavior habits, and lower hedonic (e.g., happiness) well-being, while non-combat veterans generally reported higher levels of well-being than civilians or combat veterans. However, there were no differences between the groups in BMI or biomarkers. While combat veterans were clearly more vulnerable in late life, they nonetheless showed resilience in maintaining comparable levels of objective health and eudaimonic (meaning-related) well-being.

Stawski, R.S., Fenn, M.L., Wu, C. & Fisher, G.G. (in press). Military service and changes in memory performance during later life. In A. Spiro III, R.A. Settersten, & C.M. Aldwin (Eds.), Long-term outcomes of military service: Perspectives on health and well-being. Washington DC: American Psychological Association

Although previous research has shown military service to be an important factor impacting later-life physical and mental health outcomes, comparatively little research has examined the impact of military service on later-life cognition. Using data from the Health and Retirement Study, we examined the impact of military service, including veteran status, duration of service, and wartime service on levels and change in episodic memory performance over 14 years among men aged 50 and older. Covariate-adjusted models revealed, when compared to non-veterans, veterans exhibited significantly better levels of immediate and delayed recall performance, but faster decline in immediate recall, particularly among older veterans. Among veterans, duration of service and wartime service were unrelated to memory performance. Results suggest that older veterans are vulnerable to accelerated cognitive aging, but that the impact could be specific to certain dimensions of cognitive function. We discuss the implications of these results and provide recommendations for future research.

Wilmoth, J.M., London, A.S., & Oliver, W.J. (in press). Military service experiences and older men's trajectories of self-rated health. In A. Spiro III, R.A. Settersten, & C.M. Aldwin (Eds.), Long-term outcomes of military service: Perspectives on health and well-being. Washington DC: American Psychological Association

We use data from the biennial 1992-2012 Health and Retirement Study (HRS) to examine whether and how three distinct measures of adverse military service experiences contribute to differences in later-life health among older men. We estimate growth curve models that control for early- and mid-to-late life characteristics to identify the effects of firing a weapon/being fired upon in combat, having a service-related disability, and having a documented VA service-connected disability rating (SCDR) on age-based trajectories of self-rated health. The results indicate that veterans who were exposed to combat fire exhibited better self-rated health than non-veterans from the age of 50 through the end of their 70s, but worse self-rated health thereafter. Military service that caused disabling physical or mental harm is associated with poorer self-rated health throughout later life. Early-life and mid-to-late life characteristics explain some, but not all, of the later-life differences in self-rated health between veterans and non-veterans. Overall, findings suggest military service experiences have enduring effects that carry forward through old age and demonstrate the importance of taking heterogeneous military service experiences into account.