From the Vietnam War to Retirement: Are Veterans Healthy Enough to Enjoy Their "Golden Years"?

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Introduction

Our aim in this paper is to demonstrate the impact of Vietnam era active duty service on the later-life health of American veterans. Using the statistical technique of instrumental variables, we show that estimates of this impact from a simple evaluation do not accurately capture the causal impact. Simple estimates are biased down by the selection effects of recruitment into military service; no veterans were disabled at the time of their induction or they would not have qualified for service. We show that accounting for selection by recruits (who volunteer) and by the military (who enforce standards for enlistment) substantially increases estimates of the negative health effects of military service. We also find that service has different effects for Caucasian-American and African-American veterans.

This paper contributes to a debate among economists over changes in the U.S. veterans disability system[1-3]. Some have argued that an over-generous system may have led to spurious claims of service-related disability. Our findings, particularly the different impact on different racial groups, do not provide support for this view, but are consistent with the notion that the earlier disability system was under-generous, and the changes may represent a move towards greater equity.

While economists worry about the efficient level of support for veterans, health sciences researchers have found evidence for simultaneous over-use and under-use of support programs for veterans[5-10]. That is, there may be some evidence for spurious claims of disability, but there are also populations that do not use benefits to which they have legitimate claims.

Behind the conflicting empirical claims lie some issues of philosophy. If a person, veteran or otherwise, has no financial alternative, that person may continue to work despite substantial physical impairment. If this person is offered public support, that person may well take it. This imposes a cost on society but may radically improve the quality of life for the beneficiary of the new policy. Was the old policy appropriate or cruel? Is the new policy appropriate or wasteful? A recent review by government researchers concluded that decisions had to be made without perfect scientific knowledge, and appropriately had to blend scientific and policy considerations[6].

This policy debate has arisen because large numbers of recent disability claims stem from Post-Traumatic Stress or chemical exposure. Also, levels of claims are higher from recent cohorts than from earlier cohorts, World War Two veterans for example. Economists typically work with secondary data. Clinicians see patients suffering from a variety of symptoms, and develop procedures to detect malingering[5,7,8,11-14]. The economist sees a response to financial incentives; the clinician sees symptoms of premature wearing out.

Our approach has been to avoid the legal claim of disability, but to focus on self-reported disability in confidential surveys conducted by the U.S. Census. In particular, we examine how Caucasian and African-American U.S. males estimated level of disability changes as we correct for selection bias, which we define in the next section. During the period in which these men served, the military, while far from perfect, offered opportunities for African-Americans to progress which they could not obtain in the civilian labor market[15,16.] We hypothesise, therefore, that correcting for selection should have a larger effect in the African American population because their likely health in the absence of service would have been relatively good.

Previous economic studies of veterans have looked at earnings, education levels, and mortality as outcomes of service, but until recently have not focused on disability. Contributions to this literature include Angrist (1990)[17], Angrist (1993)[18], Angrist and Chen (2007)[19], Dobkin and Shabani (2006)[20], Dohrenwend et al. (2006)[8], Hearst, Newman, and Hulley (1986)[21].

The Bedard and Deschênes (2006) paper on the mortality rates of World War II and Korean War veterans provides a basic framework for eliminating selection bias associated with military service.[22] They were unable to fully implement their approach due to

data limitations. However, more recent U.S. Census Bureau surveys contain richer data sets for labour market participation and health. We use this more recent data to estimate the effect of military service on a variety of self-reported disabilities.

Methods

This paper uses data from the 2000 decennial census and the more recent American Community Surveys for 2001 to 2006 conducted by the United States Census Bureau which we extract from the Integrated Public Use Micro Samples (IPUMS), publicly available data fully representative of the non-institutionalised U.S. population.[23] We include all males reporting a year of birth between 1940 and 1957 and race of either White or Black. We restrict analysis to men because recruitment, military experience and labour market experience for women are all so different from men in the era under study. Also, our method for removing bias from our estimates depends on draft eligibility and U.S. women were not subject to the draft. The effect of military service on women deserves attention, but requires a completely different approach and a separate paper. Because we observe the same cohort in multiple years, we are able to include both age and year-of-survey effects. The data are then divided into two samples – one white and one black - because we expect systematic differences by race given the different labour market opportunities in the United States; previous research on veteran earnings has found this to be the case.[17,24] We exclude other racial groups only because sample sizes for the non-white, non-black populations are too small to make separate analysis useful.

We determined in a preliminary analysis of the IPUMS data that males born between 1940 and 1957 represent 90% of those men who served in the Vietnam War. To capture this large a share of the cohort we necessarily include some who served prior to the Vietnam War and some who served after the war ended. Overall the data encompass people aged 43 (the youngest cohort in 2000) to people aged 66 (the oldest cohort in 2006) at the time they were surveyed.[1]

For this entire period the U.S. military was staffed by a combination of those who were drafted and those who volunteered for service. Regulations determining eligibility for service, the likelihood of being drafted, and eligibility for deferment from the draft changed substantially over this period.[24] The share of each annual cohort reporting veteran status is summarised by race in Figures 1 and 2. Both populations show a peak population share of veterans for those born in the late 1940's. In our estimation those with a high likelihood of service are compared to both older and younger cohorts; this means our estimates are not confounded by the secular improvement in cohort health over the study period.

We wish to estimate the impact of military service on veterans' self-reported disability to gain insight into the long-term impact of military service on health, but cannot simply compare disability rates between veterans and non-veterans because of the selection issues outlined above. Simple comparisons are biased by the unobserved selection process. Even when we control for observable differences in the two groups, we may be omitting important, systematic differences. Fortunately a regression procedure exists which can correct for selection issues—instrumental variables. It requires a researcher to find a variable which is correlated with the explanatory variable of interest, but is not correlated with the selection process. Figures 1 and 2 show that the share of each annual cohort which served in the military varied

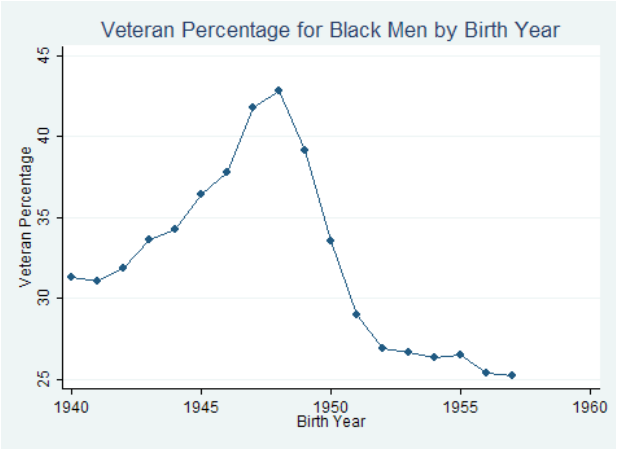

Figure 1: Veteran Percentage: the percentage of men who, according to the Census and American Community Survey, served active duty in the US military.

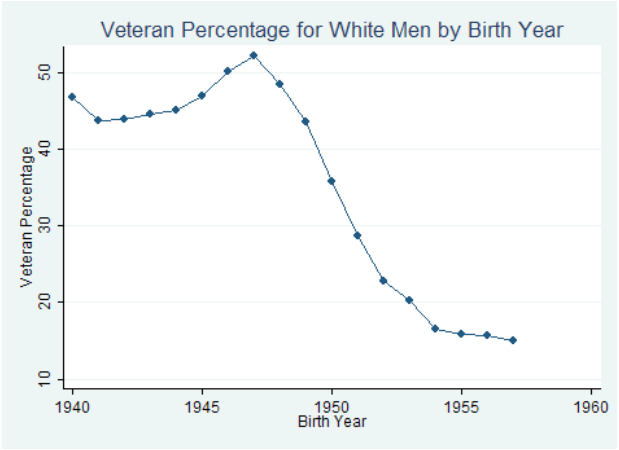

Figure 2: Veteran Percentage: the percentage of men who, according to the Census and American Community Survey, served active duty in the US military.

substantially over the cohorts in our analysis. We use this variation in "draft pressure" as an instrument to eliminate the bias from selection. Even those who volunteer for the military may do so because the alternative is the draft; how likely they are to be drafted affects the likelihood that marginal recruits choose to enlist. We implement our instrumental variables approach in a linear probability model, a modified version of least squares regression.[2]

We demonstrate the concept of an instrumental variable using an example: suppose there were 2 possible levels of service for an annual cohort, either a low level, 20%, or a high level, 50%. Then there is a 30% share of the population that serves in high years but not in low years. We assume these 30% shares would have the same expected health in the absence of military service, and we have some ability to test the validity of this assumption by looking at the 20% of the population that consistently served and the 50% which consistently did not. Conceptually, the 30% shares in the low years are the control group, the 30% shares in the high years are the treatment group; the difference between them is the corrected estimate for the average impact of service in the U.S. military during the Vietnam era.[27] We assess our instrument quality using standard tests, but the ultimate validity of this procedure rests on the assumption that in the absence of service the health of the different cohorts would be similar except for random variation, which we account for by taking a large number of cohorts, and trend, which we eliminate through controls on age. The non-monotone shape of Figures 1 and 2 allows us to implement this strategy and yet have sufficient variation for our estimates.

Instrumental variables procedures control for bias, but the price researchers pay is loss of efficiency.[26-28] Large samples are essential for successful implementation.

For dependent variables the study uses 6 disability variables that come directly from the IPUMS data, and 1 composite variable. Four of the 6 variables are available for all 7 years of data: DISABWRK, DISABMOB, PERSCARE, and DIFFPHYS. DISABWRK indicates a long-term physical or mental health condition that limits or prevents work; long-term is not defined. DISABMOB specifies whether a respondent has a disability lasting 6 months or more that restricts or eliminates leaving the home. PERSCARE indicates a condition lasting longer than 6 months which limits the ability to bathe, dress, or move around inside the home. DIFFPHYS indicates a long-term health problem that limits walking, lifting, or carrying. Two variables, DIFFEYE and DIFFREM, are not available for 2003 and 2004, reducing sample sizes in their analysis. DIFFEYE is for long-lasting severe vision or hearing impairment including deafness and blindness. DIFFREM is defined as a difficulty in learning, remembering, or concentrating lasting 6 months or longer, and represents our only measure of cognitive function. The final dependent variable is a composite, Any Disability. A respondent who reports positively to any of the six specific conditions is included in this category.

We present data on mean levels of disability in the cohorts under analysis (Table 1), the results corrected for selection bias (Table 2) and some alternative specifications (Table 3). All statistical analysis was conducted using STATA version 11.2. All estimates use person-level weights and regression standard errors are clustered on birth year.

Results

Table 1 compares mean levels of disability by veteran status in the U.S. population born between 1940 and 1957 and surveyed between 2000 and 2006. For the composite measure of disability, black veterans and non- veterans are indistinguishable statistically while white veterans have a disability rate which is higher and statistically distinct from non-veterans at the 1% level. For whites 21.1% of veterans report some disability while 17.3% of non-veterans do. Blacks report higher levels of disability than whites in almost all categories. White veterans generally report statistically higher levels of disability than non-veterans, but in Table 1 this pattern is reversed for blacks.

Table 2 reports the results of regression analysis corrected for selection bias. All rows report results controlling for age when surveyed and year of census data. Compared to Table 1 we see fewer statistically significant results largely because the instrumental variable procedure entails a loss of efficiency. Nevertheless, for both blacks and whites the effect on "disability that causes difficulty working" (DISABWRK) is statistically significant and positive. That is, military service raises this disability rate for both study groups. Additionally, the estimated effects are statistically significant for blacks in the composite disability measure and the physical disability measure. The results for whites marginally fail to achieve statistical significance for these measures, but are suggestive. Whites show a statistically significant effect for difficulties with hearing or vision and difficulties with memory. For blacks, difficulties with memory just fail a test of statistical significance. All significant or near-significant results are positive, that is, all evidence points to an increased risk of disability for U.S. veterans from the Vietnam era.

Table 1: Means and Sample Size

	Black Men		White Men	
	Veterans	Non-vets	Veterans	Non-vets
1. Any Disability1	0.294	0.296	0.211	0.173***
Specific Disabilities2				
2. Disability that causes difficulty working	0.197	0.201**	0.129	0.108***
DISABWRK				
3. Long-term difficulty with mobility	0.085	0.091***	0.045	0.042***
DISABMOB				
4. Long-term difficulty with personal care	0.049	0.053***	0.030	0.026***
PERSCARE				
5. Physical Disability	0.182	0.181	0.135	0.105***
DIFFPHYS				
6. Long-term difficulty with vision or hearing	0.057	0.061***	0.062	0.048***
DIFFEYE				
7. Difficulty with memory	0.074	0.084***	0.052	0.047***
DIFFREM				
8. Average number of disabilities reported (max=6)3	0.622	0.646***	0.433	0.359***
Observations (N)4	36,154	78,353	422,555	829,823

Notes:

1. This variable equals 1 if an observation reports having one or more of the 6 specific disabilities listed in the table.
2. See chapter or usa.IPUMS.org for a detailed description of each disability. In italics on the line below each disability is the IPUMS variable name for each.
3. This variable is the total number of disabilities reported for each observation.
4. N refers to data from 2000 to 2006. N is smaller for disabilities 6 and 7, as they are not reported in the 2003 and 2004 ACS. N=94,882 for Black Men and N=1,020,339 for White Men.

- *, **, *** indicate 10, 5 and 1 percent statistically significant difference in means between veterans and non-veterans (listed in non-veteran column), respectively.
- Standard deviations are reported in parentheses.
- Numbers in italics are the percentage of all disabilities attributable to each disability type. Disabilities 6 and 7 are not available in years 2003 and 2004 and percentages are weighted accordingly.

Table 2: Results from Instrumental Variable Regressions, Coefficients on Veteran

	Black Results	White Results
1. Any Disability	0.167***	0.077*
	[0.047]	[0.046]
Specific Disabilities		
2. Disability that causes difficulty working	0.181***	0.042**
DISABWRK	[0.048]	[0.021]
3. Long-term difficulty with mobility	-0.022	0.008
DISABMOB	[0.026]	[0.009]
4. Long-term difficulty with personal care	0.027	0.010*
PERSCARE	[0.021]	[0.006]
5. Physical Disability	0.115***	0.062*
DIFFPHYS	[0.037]	[0.035]
6. Long-term difficulty with vision or hearing	0.036	0.054***
DIFFEYE	[0.028]	[0.018]
7. Difficulty with memory	0.061*	0.025***
DIFFREM	[0.032]	[0.005]
Observations (N)1	114,507	1,252,378

- N refers to data from 2000 to 2006. N is smaller for disabilities 6 and 7, as they are not reported in the 2003 and 2004 ACS. N=94,882 for Black Men and N=1,020,339 for White Men.
- *, **, *** indicate 10, 5 and 1 percent statistical significance, respectively.
- Standard errors are reported in brackets.

The reported coefficients for veterans are uniformly larger in Table 2 than the differences reported in Table 1. For DISABWRK, the coefficient for whites in Table 2 is 0.042, while the difference in Table 1 is only 0.021 (0.129 – 0.108). That is, correcting for the generally better health of those eligible to serve roughly doubles the estimated impact of military service on disability. These estimates are percentage point differences, and we discuss their interpretation in the next section. We further note that while in Table 1 black veterans have a slightly lower rate of disability as measured by DISABWRK than non-veterans, after correction for the selection process the impact of military service is very large and positive. Military service increases the risk of work-limiting disability for both races.

Discussion

In this section we discuss how to interpret our percentage point differences as increases in the relative risk of disability, offer some working hypothesis as to why military service raises disability rates, and discuss the limitations of the present study.

Table 1 shows blacks suffer higher rates of disability. Instrumental variables do not alter this basic finding; it changes estimates of the cause-and-effect impact of military service on health. We conclude that in the absence of service, their disability rates would be substantially below that of non-veterans. The magnitude of this selection effect is quite large, but should not be surprising. Every veteran was able to pass a physical exam in early adulthood, not every civilian could. Later-life health status is correlated with health status in youth, so we should expect veterans to report fewer disabilities in their fifties in the absence of a negative impact from military service. We attempt to bound the magnitude of the projected increase in disability below, but ask readers to remember: we are not comparing veterans to the actual civilian population, but to their own later-life health status in the absence of service. The military population was healthier in their youth; this is no longer true.

The predicted level of work-limiting disability in Table 2 is (Xw+0.042) for white veterans and (Xb + 0.181) for black veterans, while the level these populations would have experienced without service is Xw and Xb. Neither of these variables is equal to the non-veteran values from Table 1, since we expect veterans to be healthier at the time they enter service; they passed a physical to enter the military. Also note the larger Xw and Xb are, the lower the increase in relative risk from military service. Therefore, an upper bound for Xw and Xb would be 0.129 and 0.201 respectively, the highest level observed for DISABWRK in each racial group in Table 1. Thus a lower bound for the relative risk for whites is 60% ((0.129+0.077)/0.129) and 83% for blacks ((0.167+0.201)/0.201). The corrected values are substantially higher for both racial groups than what is seen in the simple analysis of Table 1. We further note that although simple means do not show elevated disability rates for black veterans, the corrected effects are larger for blacks than whites. The relative impact of military service goes from being smaller for blacks to being larger. What this implies is that blacks who entered military were a relatively healthy group. The similar levels of reported disability by black veterans and non-veterans in Table 1 represent the deteriorating health of an initially healthy group.

Table 3 offers 2 alternate specifications for each racial group. Columns 1 and 3 show the results for a standard OLS regression, using controls for age and year of Census data but not correcting for selection bias. These results are more like results for Table 1 than Table 2, demonstrating the importance of our instrumental variables approach. Columns 2 and 4 of Table 3 show the corrected results change very little when we add controls for place of birth (state dummies). These controls are plausibly related to unobserved social and economic variables, and the similarity to Table 2 offers reassurance that our baseline results are not caused by omitted variables. Other researchers report a similar impact when including birthplace.[4,14]

People who died before our data were collected could potentially bias our findings. However, researchers with access to Social Security data find the mortality for the relevant cohorts to be inconsequential.[4] Also, mortality by veterans who would otherwise report a disability would reduce our estimated effects rather than increase them.

We test the validity of our chosen instrument using four standard statistical tests. Three supported the validity of the instrument for each measure of disability.[3] The fourth tested whether simple least squares regressions show evidence of bias and confirmed the need to use instruments in 5 of the 14 regressions but generated inconclusive results in the other nine.[4] While the instruments may be valid, the instrumental variable strategy is only feasible for conditions that affect a relatively large share of our study population. Our estimation strategy is of limited value when the disability is relatively rare.

Despite these limitations, the overall message of Table 2 is clear. Veterans suffer increased rates of disability as a result of their service. Black veterans have higher rates of disability than white veterans

and issues of selection appear larger for blacks than for whites in that the differences between Table 1 and Table 2 are greater.

It is a limitation of our methods that we can offer little insight into the pathways by which military service produces disability. We do note that a substantial share of the impact is clearly associated with hearing, vision and memory problems for whites (DIFFEYE, DIFFREM) and, while not statistically significant, was suggestively associated with the same problems for blacks. In neither group do mobility issues approach significance. This is consistent with the emerging literature on the long term effects of repetitive brain trauma,[29] but not consistent with gross battlefield injuries as a source of disability. Clearly, better identification of the specific causes of disabilities is a direction for future research. Our results are consistent with a human capital view in which military service leads to higher depreciation of some veterans' capacity for work and full functioning, an effect which may not manifest itself for many years. It is not clear to us why disability claiming would be related to self-reported health in a census survey, and we find it especially unlikely that black veterans would be no more likely to claim disability than non-veterans in general (Table 1, Table 3 column 1), but would show a large effect when we use "draft pressure" to correct for selection effects (Table 2). Our findings do not support those who feel that recent claims of disability are spurious.

Another significant limitation of this research is our use of self-reported rather than clinical health outcomes. Although we find higher rates of disability for veterans, it is possible that it only captures high rates of reported disabilities. Veterans may differ from non-veterans in how they perceive health or states of disability, a possible source of bias which we are unable to exclude.

We included a relatively sparse set of covariates in our regressions. There are other variables we could potentially have included, but all are tangled in the same selection issues we have sought to eliminate. For example, marital status is likely correlated with both veteran status and disability status. It is not likely to be a cause of disability, and so its omission does not produce bias, but because it is correlated with both the explanatory and outcome variables its inclusion would be likely to bias our findings.

Despite these limitations, we present substantial evidence that U.S. veterans from the Vietnam era bear substantial long- run negative effects from their service. This paper documents this situation using data from the years in which veterans are nearing retirement age and may well show the long-run effects of deficits they have borne. Better estimation of the magnitude of these deficits should assist those concerned with the well-being of veterans.

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