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Wellbeing among U.S. Veterans: Results from the 2010 National Survey of Veterans

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Abstract: Our research focuses on self-rated general health and access to healthcare among veterans. We used data collected by the 2010 National Survey of Veterans, a nationally representative survey of veterans in the U.S. The purpose is to identify and assess aspects of military experiences which could be responsible for differences in veterans' health and their access to healthcare. Specifically, we investigate how exposure to combat, as well as exposure to specific traumas, can have a lasting impact on the health of veterans. We utilized two nested regression models around our focal variables; a logistic regression model was used to assess the access to mental healthcare, while an ordinal regression model was used to assess self-rated general health. We were also able to infer that a structural change in policies for veterans' healthcare might have provided significant benefits among the population. Findings show unique effects on health patterns for combat and trauma in the field. Paradoxically, we also observe that many of the socio-economic indicators operated quite differently than they do for the general population in the United States in terms of their links to health differences.

Keywords: Health advocacy; Health care reform; Health services; Individuals: mental health; Deployment: military; Veterans; Admissions; Outpatient; Veterans Administration (VA); Welfare; Tricare; Exposure to death

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Introduction

Increasing scholarly attention has focused on the social determinates of health and wellbeing, particularly among groups disproportionately susceptible to distress. In 2010, the U.S. Veterans Administration published the National Survey of Veterans, a nationally representative sample of 8,710 U.S. military veterans. Using this dataset, our study will analyze the variation among socioeconomic indicators, demographic characteristics, and specific events throughout their military service characterize the health profiles of U.S. Veterans after their military careers. Specifically, we focus on perceived health and usage of mental health services. Further, we will also investigate the impacts of structural changes to the veteran healthcare system, and any resulting changes in the level of usage of healthcare due to the change in the healthcare plan offered by the U.S. veterans Administration. This analysis contributes to the literature on the social impacts of health on a group historically at high risk for health trauma, both mental and physical. Thus, the research will offer insights to the unique issues related to healthcare usage and patterns among U.S. Veterans.

Background

The long term physical and mental health impacts of war on combatants is a topic long studied, and one that has received renewed attention. While observations have been more methodical since World War I, early studies are rather limited. Ultimately, it took until the Vietnam War to create a "turning point in defining the psychological costs of war" and the later addition of Post-Traumatic Stress Disorder (PTSD) to the DSM-III in 1980 (McFarlane, 2015: 351). These early studies focused on the link between war, distress, and suicide, which continues to disproportionately affect this group. U.S. Veterans had a suicide rate of more than 27 per 100,000 for veterans in 2017, while the general population of the United States had a suicide rate of about 18 per 100,000 that same year. A handful of explanations have been advanced by the Veterans Affairs Administration to account for the difference in suicide rates including economic differences, high rates of homelessness and unemployment, service-connected disabilities, and personal health behaviors (Office of Mental Health and Suicide Prevention, 2019).

Beyond suicides, the impact of wartime experiences on the physical health and the interplay of physical and psychological distress of veterans remained vastly understudied until more recently (Levy and Sidel, 2009). Specifically, more scholarship has focused on the effect of war on veterans in other health domains. Recent studies have indicated that veterans suffered from increased levels of chronic pain, general pain, and general experiences with trauma (Sachs-Ericsson et al., 2009; Sheffler et al., 2016). Indeed, a great deal of literature has investigated the psychological impact of war on combatants related to witnessing suffering and death. Scholarship has also focused on the lasting longitudinal impacts of these events and later life outcomes for soldiers after their military careers have concluded (Purcell et al., 2016).

Other findings show the potential effects of war on the social arrangements related to the well-being of veterans. In terms of familial/marriage arrangements, the literature has shown inconsistencies, with some studies indicating more problematic marriages among veterans of the Vietnam War (Savarese et al., 2001). Conversely, Call and Teachman (1996) found very little evidence for a higher number of divorces among veterans of the same war. Further, studies have focused on socioeconomic status, and found mixed results as combat may not always have a lasting negative impact on socioeconomic status in terms of personal earnings and employment rates compared to civilians (Sheffler et al., 2016). Focusing on other aspects of socioeconomic status, Armey and Lipow (2016) found that deployment may affect a veteran's likelihood of pursuing higher education later in life. There is also a potential correlation with a decrease in educational pursuits if the individual was exposed to intense engagements with hostile forces and death. Specifically, "unit deaths had a large and statistically significant negative impact on combat soldiers' interest in higher education (Armey and Lipow, 2016: 771)."

Risky behaviors have also been studied, with military veterans having higher levels of alcohol abuse among both males and females and across ranks (Brown et al., 2010; Battles et al., 2019). Indeed, combat may also have a lasting effect on the physical, economic, and social health of veterans, specifically relating combat exposure and physical health problems (Prigerson et al., 2002; Schnurr and Spiro, 1999), poorer interpersonal and marital functioning, and worse economic outcomes (MacLean and Elder, 2007; Shellfer et al., 2016).

Additional research has focused on less obvious aspects of well-being including potentially morally injurious experiences (PMIEs) and spiritual injuries that veterans may incur in wartime. These are injuries to the system of belief and morality of individuals through the exposure to events that strongly go against their worldview and norms. Examples of PMIEs include exposure to killing, human remains, wounded children or women, debilitating wounds to peers, war crimes, etc. The effects of PMIEs should be conceptualized differently than PTSD as "...veterans with high combat exposure are more likely to seek VA services due to guilt and loss of faith than PTSD or lack of social support (Litz et al., 2009: 705)." Purcell et al. (2016) eloquently

describe the psycho-social effects of which induce moral injury and critical elements:

> "...the profound stigma that produces silence about killing; even between veterans and the mental health professionals who serve them, the broad range of potentially confusing and conflicting feelings that can follow killing in combat, the complex ways that killing can rupture one's identity and faith, the unique challenges that those who have killed can face in relating to and connecting with others, and, finally, the ways that many veterans struggle to cope with memories (Purcell et al., 2016: 1087-1088)."

However, PMIEs may not affect combatants the same way and is contingent upon the specific form/style of combat. Naturally, all wars will bring their share of atrocities and challenges to one's morality and system of belief. However, certain modes of combat, specifically "counter-insurgency and guerilla warfare, especially in an urban environment" pose greater threats (Litz et al., 2009: 696). This is particularly relevant considering recent U.S. conflicts in Iraq, Afghanistan, and the Levant against ISIS take place in the context of guerilla and urban warfare. Additionally, the "tempo" and "mobility" of the conflict can have an impact on psychological stress, the environmental conditions of the battlefield have impacts on the metal well-being of combatants (Helmus and Glenn, 2004: 34). The known impacts of the static warfare style of World War I on soldier moral is a prime example (Sheffield, 2000).

Contrasting the style of warfare in Vietnam and recently in Iraq, Afghanistan, and the Levant provides vital insights. Most battles in Vietnam were fought sporadically during patrol missions and followed by a return to a home base instead of staying in the field. "Intermittent but brief contact with the enemy; fairly large permanent base camps..." were pretty much the norm for combat in Vietnam (Lang, 1980: 272). Recently, many engagements are fought sporadically either in the open field, and more frequently in an urban environment where "soldiers and Marines interviewed...testify that urban combat is inordinately stressful." The form of warfare undoubtedly has an impact akin to a cohort effect on combatants with potentially long-lasting consequences on the behavior of veterans. Understanding these effects has become paramount as more conflicts are presently fought in more psychologically stressful environments, therefore assessing "CSR [Combat Stress Reaction]" in urban operations is vital (Helmus and Glenn, 2004: 6).

Potentially mediating this relationship between combat exposure and well-being late in life is "positive appraisal", again illustrating the fluid nature of this relationship between combat and health. Individual levels of optimism seem to be a critical factor to predict well-being as time passes for veterans as this result has been replicated repeatedly (Achat et al., 2000; Lee et al.: 676, 2017; Segovia et al., 2015). Undoubtedly, combat and the possible exposure to violence, death, and PMIEs has deleterious effects on military personnel, but these events may affect them differently during and after their period of service. It is vital to understand how these events impact the lives of armed forces personnel as they pursue their careers, and ultimately go back to civilian life. It is also important to investigate how other socio-demographic factors may impact interpersonal differences among military personnel.

It is imperative to explore the interplay among socio-demographic and experiential factors related to combat and trauma which shape veterans' health patterns and perceptions later in life. This study will investigate a variety of interconnected socio-demographic aspects that impact how U.S. Veterans fare later in life in terms of their health. Specifically, we will focus on the differences among veterans in terms of demographic characteristics, educational achievement, economic indicators, and their marital status in their perceived health and mental health resources usage. Further, we will look at the impact of combat and exposure to death on veterans' health, as well as systemic adjustments to the veterans' healthcare system. We also consider generational differences, and how newer veterans from the post 9/11 era compare and contrast them with their older peers. This research aims to untangle the individual impacts of war experience and socio-

demographic variation in terms of mental health usage and health perceptions among U.S. veterans allowing policy makers to better address the unique health issues U.S. Veterans are facing today.

Methodology
Data Source

The 2010 National Survey of Veterans was the sixth, and most recent iteration of the survey administered by the research corporation, Westat on behalf of the Veterans Administration which collects a variety of information from the U.S. Veteran and active-duty population and their families. The sampling method used to reach participants was address-based sampling (for veterans and spouses) or list-based sampling (for active-duty members and their spouses, the National Guard, and Reserve component) by mail. The questionnaire was designed to encompass a larger population by adding up the family members of veterans, active-duty service members, or surviving spouses, making it a total of six target populations. A total of 19 questionnaire sections were developed for this survey based on measurement instruments used in prior iterations, and the addition of new instruments based on the expansion of the scope of this survey. These questionnaire sections were not given to all six target populations but instead, were assigned on a need-based on its relevancy to that population (Westat, 2010).

The survey was mailed to 14,163 recipients and data was collected between October 16, 2009, and March 19, 2010; the response rate was 61%. Respondents were then divided into three strata based on the status of the respondents. Westat purchased a "first-phase random sample of 1.8 million U.S. addresses for the 50 states and the District of Columbia from a licensed DSF commercial vendor." This was crossed over with the U.S. Postal Service Delivery Sequence File [D.S.F.], the V.A. Health Care Enrollment file, and the Compensation and Pension beneficiaries file to build the address frame (Westat, 2010: 14). The Strata were as follows:

"Stratum 1: those addresses that matched an address from VA or PSMAF retiree files. These addresses are likely to be home to one or more Veterans using, or familiar with, VA services.

Stratum 2: those addresses matching the PSMAF for recent separations but not in VA or PSMAF retiree files. These addresses are likely to be home to one or more Veterans who are not currently enrolled in any VA services.

Stratum 3: those addresses that were unmatched to either of the files. The addresses in this stratum are least likely to contain a Veteran; however, overall, they represent Veterans not enrolled for receiving VA or DoD benefits and therefore must also be adequately represented in the NSV sample (Westat, 2010: 14)."

As with any surveys, there is a risk of bias. In particular, there is a risk of nonresponse bias which was accounted for after data collection. Westat adjusted the sample using weights so that completed surveys were representative of the general population (Westat, 2010). To conduct our analysis, we drew data this nationally representative sample of U.S. veterans using the veteran population only.

Variables

Participation in Operation Enduring Freedom (OEF/OIF), presence in a combat zone, exposure to death/dying/injury, and healthcare plan changes are the focal experiential variables in this study. Each of these variables was dummy coded with a binary variable indicating a positive/yes (1) or negative/no (0) response to each indicator. The purpose was to analyze how these four independent variables impact the perceived general health of our population, and whether these factors impacted their likelihood of utilizing mental health care (our two dependent outcomes). Perceived health was coded using a five-level Likert scale. Categories were listed as: excellent (5), very good (4), good (3), fair (2), and poor (1). To measure mental health treatment seeking behavior, we used a binary variable which compared those who reported receiving out-patient care to those who did not.

To account for socio-demographic differences among the veteran population and known correlations from the literature, we used a large array of control variables. Age was used as a continuous measure to account for obvious differences in health patterns by age. We coded income into four categories corresponding roughly with quartiles from the sample distribution: from $0 to $29,999, $30,000 to $49,999, $50,000 to $99,999, and 100,000 and above.[1] We also included binary variables distinguishing between four different types of housing situations including renting, owning a house with mortgage, owning a house without mortgage, and other living arrangements. Binary variables indicating educational attainment using eight different variables ranging from having less than a high school education to having a professional or doctorate degree were included. We also included binary variables for whether the subjects were employed, not employed but looking, or if not employed and not looking for a job. Finally, we used typical demographic variables such as race, marital status, and sex. Race was recoded and broken into four categories: White, Black, American Indian and Alaskan Natives, and other race.

Statistical Models

Inferential results were derived from two nested regression models corresponding to the two focal dependent variables: general perception of one's health and use of mental health counseling services in the last six months. To assess the five-category Likert scale for self-rated health, we utilized an ordinal regression model, a non-linear latent-variable model where differences in categories are unknown. Ordinal regression models are superior to ordinary least squares (OLS) models when the dependent variable is ordinal as the function yields estimated log odds using autogenous cut-points as opposed to OLS which estimates coefficients using a linear function (Long and Freese, 2006).

To investigate veteran mental health, we assessed a binary variable indicating whether the veteran had used mental health counseling services in the past six months. For mental health usage, we utilized a logistic regression model, a non-linear latent-variable model where differences in categories are unknown. Binary logit models utilize a transformation function to ensure that the predicted probabilities will fall in the 0 to 1 interval using Maximum Likelihood Estimation (MLE). For binary dependent variables logistic regression models are superior to OLS models as coefficients are constrained by upper (1) and lower (0) bounds. To aid in the interpretation of the findings, all results were converted from log odds to odds ratios, and reported using odds ratios (Long and Freese, 2006).

Results

To begin, descriptive statistics for all pertinent variables used in the analysis are displayed in Table 1. Nominal and ordinal variables (as described in the previous section) are reported using frequencies, while the lone interval variable age, is reported using the standard five-number summary (minimum, 25th percentile, median, 75th percentile, maximum).

Shown in Table 1, self-rated health is relatively normally distributed, with the "good" category representing the middle of the distribution. Looking at mental health counseling in the last six months, only of 7% of U.S. Veterans indicated that they had received treatment which is considerably lower than the national average. The CDC reported that in 2019, about 19% of all Americans used some sort of mental health counseling in the last year (Terlizzi and Zablotsky, 2020). This gap could be explained by many reasons not accounted for by the scope of the survey itself including more stigma around mental illness for this particular group, less knowledge/information, less access to providers, etc. Further, the distribution by sex, while being slightly skewed for the demographics of the military today (where women are much more commonplace), is as expected when we consider the

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[1] Analysis performed using different income groupings had no significant effects on the final results displayed. Results available per request.

Table 1. Descriptive Statistics for Focal Independent and Dependent Variables

Variable	Frequency	Variable	Frequency
Self-Rated Health		**Income**	
Excellent	8%	Income quartile 1	23%
Very good	27%	Income quartile 2	24%
Good	36%	Income quartile 3	35%
Fair	21%	Income quartile 4	18%
Poor	8%	**Employment status**	
Mental Health Counseling (Last 6 mo.)		Working	43%
Yes	7%	Not working, looking	8%
No	93%	Not working, not looking	49%
Sex		**Educational Attainment**	
Male	93%	Less than high school	4%
Females	7%	High school	24%
Race/Ethnicity		Less than 1 year college	12%
Native American	3%	Some college	18%
Black	6%	Associates degree	9%
White	89%	College degree	19%
Other/multiple Race	2%	Master's degree	8%
Marital Status		Professional degree	5%
Married	74%	Used VA education benefits	41%
Widowed	6%	**Military Experience**	
Divorced/separated	14%	Served in OEF/OIF	7%
Never married	6%	Did not serve in OEF/OIF	93%
Children		Combat zone experience	64%
No children	80%	No combat zone experience	36%
One child	8%	Exposed to death	37%
Two or more children	12%	Not exposed to death	63%
Living situation		Tricare only	6%
Renter	12%		

	Five Number Summary
Age	20, 57, 65, 75, 101

Variable	Frequency
Owns home, mortgage	46%
Owns home, full	35%
Other living arrangement	7%

N = 4,793

timeframe during which the bulk of our respondents served. The racial distribution of our sample, however, is not quite as expected. We would have expected to see a higher percentage of Black respondents in the sample than 6%, as about 13% of the U.S. population identifies as Black (Census, 2010).[2] Looking at the income categories, these are not perfectly in line with standard quartiles (25th ,50th ,75th ,100th percentiles). However, because the original income data was coded at the ordinal level (using $10,000 increments), these categories are as close to exact quartiles as the data will allow.[3]

[2] The percent of the sample identifying as Black was not impacted by attrition due to missing values on other variables used in the analysis.

[3] Note that results using different categorization of income quartiles had no significant effects on the final results displayed. Results available per request.

Regression results are reported for the sample of U.S. Veterans using nested regression whereby variables groups were added sequentially to the model. The first set of inferential results in Table 2 (Model 1) displays the ordinal regression results of the Likert scale variable measuring self-assessed general health on a series of demographic, socioeconomic, and veteran experience variables. Unsurprisingly, age was negatively associated with perceiving one's health status more positively holding all other demographic indicators constant (p<0.001). Male veterans were marginally less likely to report better health than females (p<0.10). Significant findings for marital status differences in predicting self-rated health were also found; specifically widowed and divorced/separated veterans were less likely to be in a higher self-assessed health category compared to married veterans with 34.8% and 35.6% lower odds respectively (p<0.001). The dummy variables indicating categorical race differences show results in line with the general population where Non-white's report their self-rated health as lower compared to White veterans (p<0.01).

Model 2 adds the socioeconomic variables to the regression. The addition of the socioeconomic variables has some major effects on the demographic predictors. Specifically, the gap between male and female veterans in self-reported health disappears, as does the difference in perceived health by marital status. The race dummy variables indicating categorical differences by race remain significant with non-white veterans having higher odds of reporting better general health; for instance, Black Veterans have over 50% lower odds of reporting good general health compared to their White counterparts (p< 0.001). Focusing on the socioeconomic variables, income is strongly related to self-rated health; higher income quartiles are associated with greater odds of veterans reporting higher levels of general health. Using the lower 25% of the distribution (quartile one) as the reference category, the $30,000 to $49,999 category (income quartile two) has 48.6% higher odds of reporting greater levels of self-rated health than veterans earning less than $29,999 a year (income quartile one) when controlling for demographic and other socioeconomic covariates

(p<0.001). The beneficial effects of income on self-assessed health grow as income increases as income quartile three ($50,000 to $99,999) has 112.5% higher odds and income quartile four ($100,000 and above) has 204.2% higher odds of better perceived general health compared to those in income quartile one (p<0.001).

The additional educational indicators added in Model 2 follow a general trend similar to income where higher levels of education correspond to superior perceived general health. The reference category for this series of binary variables indicating the different ordered categories of educational attainment are veterans who obtained a college degree. Compared to those with a college degree, veterans with less than high school education, with a high education, with one year of college, with some college, or with an associate's degree are all more likely to report worse self-rated (the odds of reporting higher levels of perceived health are 74%, 46%, 43%, 38%, and 41% lower than veteran college graduates, respectively) (p<0.001). Again, in line with previous work on socioeconomic status and general health, those who own their own home (the reference category of the dummy categorical variables for homeownership in the models) report higher self-assessed general health compared to those who do not.

Overall, the associations for the demographic and socioeconomic results are robust to the addition of the military experience variables in Model 3. More pertinently, the focal military experience variables significantly predict general health status, controlling for the socioeconomic and demographic differences. Specifically, the odds of being in a higher self-rated health category are 26.6% lower for pre-OEF/OIF veterans than veterans post-OEF/OIF, indicating that newer veterans have higher perceived health even when controlling for age differences (p<0.05). Deployment in a combat zone also decreases perceptions of overall health with non-combatants having significantly more positive perceptions of their heath (p<0.05). By far the strongest of the military experience variables is exposure to death, dying, and suffering. Veterans who were exposed to this type of

Table 2. Nested Ordinal Regression of Self-Reported General Heath

	Model 1	Model 2	Model 3	Model 4
	O.R. (*S.E.*)	O.R. (*S.E.*)	O.R. (*S.E.*)	O.R. (*S.E.*)
Male	0.82 (0.90)	0.90 (0.10)	0.97 (0.11)	0.98 (0.11)
Age	0.98 (0.00)***	0.99 (0.00)***	0.99 (0.00)**	0.99 (0.00)
Native American	0.61 (0.10)**	0.61 (0.11)**	0.65 (0.11)*	0.64 (0.11)*
Black	0.41 (0.05)***	0.49 (0.06)***	0.49 (0.06)***	0.50 (0.06)***
Other/multiple Race	0.66 (0.13)*	0.63 (0.13)*	0.61 (0.13)*	0.63 (0.13)*
Widowed	0.65 (0.08)***	1.09 (0.13)	1.10 (0.13)	1.05 (0.13)
Divorced/separated	0.64 (0.05)***	0.96 (0.08)	0.98 (0.08)	1.02 (0.09)
Never married	0.82 (0.10)	1.21 (0.15)	1.19 (0.15)	1.32 (0.14)
One child	1.01 (0.10)	0.88 (0.09)	0.87 (0.09)	0.89 (0.09)
Two or more children	1.24 (0.12)*	1.06 (0.10)	1.05 (0.10)	1.11 (0.11)
Renter		0.68 (0.07)***	0.70 (0.07)**	0.70 (0.07)**
Owns home, mortgage		0.74 (0.05)***	0.76 (0.05)***	0.79 (0.05)***
Other living arrangement		0.76 (0.09)*	0.77 (0.09)*	0.74 (0.09)*
Income quartile 2		1.49 (0.12)***	1.51 (0.12)***	1.50 (0.12)***
Income quartile 3		2.13 (0.18)***	2.14 (0.18)***	2.16 (0.18)***
Income quartile 4		3.04 (0.32)***	3.07 (0.33)***	3.14 (0.33)***
Not working, looking		0.77 (0.08)*	0.78 (0.08)*	0.76 (0.08)*
Not working, not looking		0.53 (0.04)***	0.53 (0.04)***	0.51 (0.04)***
Less than high school		0.26 (0.04)***	0.28 (0.04)***	0.27 (0.04)***
High school		0.54 (0.05)***	0.53 (0.05)***	0.54 (0.05)***
Less than 1 year college		0.57 (0.06)***	0.57 (0.06)***	0.58 (0.06)***
Some college		0.62 (0.05)***	0.62 (0.06)***	0.63 (0.06)***
Associates degree		0.59 (0.06)***	0.60 (0.06)***	0.61 (0.06)***
Master's degree		1.30 (0.14)*	1.35 (0.15)**	1.34 (0.15)**
Professional degree		1.59 (0.22)**	1.60 (0.22)**	1.58 (0.22)**
Used VA education benefits		1.00 (0.06)	1.03 (0.06)	1.02 (0.06)
OEF/OIF			1.27 (0.09)*	1.09 (0.12)
Combat zone			0.84 (0.08)*	0.84 (0.08)*
Exposed to death			0.45 (0.10)***	0.45 (0.10)***
Tricare only				2.10 (0.33)***

N = 4,793
Pseudo R^2 = 0.08 for fully specified model (Model 4)
Note: * p<0.05, ** p<0.01, *** p<0.001
Note: OR = odds ratios; S.E. = Standard Error

trauma have 55.4% lower odds of being in a higher self-rated health category than veterans who did not (p<0.001). The strength of this variable is substantial. Indeed, for veterans, a singular traumatic event in time has comparable deleterious effects on perceived health as living in poverty and having lower levels of educational attainment (based on comparable Z scores).

Model 4 introduces the Tricare variable, which completely swamps the effect of age and the difference between pre- and post- OEF/OIF veterans.[4] Veterans who left active duty after the introduction of Tricare have over twice the odds of reporting good general health levels compared to veterans who experienced veteran care pre-Tricare (p<0.001). The impact of Tricare on self-reported health is large with a (Z-score = 4.75), though not as strong as the effect of exposure to death/suffering (Z-score = 6.51). These results suggest no differences in the perceived health of older and more recent veterans, as the significant temporal variable is the structural change in the health care plan of the VA. Nonetheless, the indicators for race, education, income, and living arrangements remain largely significant in their impacts on self-assessed health as do the key military experience variables of combat zone experience, and witnessing of death/suffering.

However, one must keep in mind that this analysis focuses on a more nebulous and subjective aspect of health—perceived health. The next set of analyses focus on a more exact indicator of health, an actual consultation with a mental health professional within the last six months. This allows us to compare/contrasts a more subjective measure of health with a more objective one. To assess this more specific/exact aspect of veteran health, we investigate use vs. non-use of regular/semiregular outpatient counseling for veterans. Table 3 shows the logistic regression[5] results for use, vs.

non-use of mental health counseling in the previous six months reported in odds ratios, with standard deviations.

In Table 3, Model 1 regresses usage of mental health counseling on the same demographic predictors in Model 1 of Table 2. The odds of a male veteran seeking mental health counseling is 40.5% lower than the odds for female veterans (p<0.01). Unsurprisingly, veterans that are either divorced or separated are more likely to seek mental health counseling as opposed to married veterans, and older veterans are less likely to use counseling services than younger veterans (p<0.001). The remaining demographic variables are not significant in this model as they account for about 5% of the variation in the model.

When the socioeconomic variables are included in Table 3 Model 2, we note several important relationships. Focusing on the home ownership variables, the odds of using mental health counseling for veterans who rent and homeowners with active mortgages compared to veterans who own their house are 183% and 103% greater respectively (p<0.001). Veterans earning between $30,000 and $49,999 are not significantly different in their mental health counseling usage than veterans making less than $29,999 annually; however, those in the upper half of the income distribution are significantly less likely to use mental health counseling than those in the lowest income quartile (p<0.001 and p<0.05 respectively). Employment also has a strong effect as veterans who are employed are least likely to use counseling services, with those not working but looking more likely, and veterans not working and not looking the most likely.[6] Interestingly, education plays less of a role than previously found/hypothesized. Using college graduates as the reference category, there is a general trend of greater usage among those with more education. Those with a high school education have

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[4] To check for issues with multicollinearity, Pearson correlation coefficients were computed for the correlations among the temporal variables (age, OEF/OIF service, and Tricare exposure). Pearson's coefficients ranged from 0.47 to 0.54 indicating correlation, but no

serious concerns with multicollinearity following the addition of the Tricare exposure variable in Model 4.
[5] Models were run using Probit regression models and yielded similar results. Results available per request.
[6] This is the strongest effect in the model (Z-score = 7.66)

Table 3. Nested Logistic Regression, Use of Mental Health Counseling Services in the last Six Months

	Model 1 O.R. (*S.E.*)	Model 2 O.R. (*S.E.*)	Model 3 O.R. (*S.E.*)	Model 4 O.R. (*S.E.*)
Male	0.60 (0.10)**	0.63 (0.12)*	0.53 (0.10)**	0.52 (0.10)**
Age	0.98 (0.00)***	0.97 (0.01)***	0.96 (0.01)***	0.95 (0.01)***
Native American	1.46 (0.42)	1.37 (0.41)	1.26 (0.38)	1.26 (0.38)
Black	1.45 (0.27)*	1.19 (0.24)	1.17 (0.23)	1.11 (0.22)
Other/multiple Race	0.99 (0.41)	0.91 (0.39)	0.92 (0.41)	0.87 (0.39)
Widowed	1.19 (0.36)	0.86 (0.27)	0.88 (0.28)	0.94 (0.30)
Divorced/separated	2.17 (0.30)***	1.57 (0.25)**	1.53 (0.24)**	1.45 (0.23)*
Never married	1.37 (0.29)	0.95 (0.22)	0.98 (0.23)	1.03 (0.24)
One child	0.88 (0.18)	0.89 (0.19)	0.89 (0.20)	0.86 (0.19)
Two or more children	1.05 (0.19)	1.10 (0.21)	1.15 (0.22)	1.06 (0.20)
Renter		2.84 (0.59)***	2.64 (0.55)***	2.61 (0.55)***
Owns home, mortgage		2.03 (0.34)***	1.88 (0.32)***	1.78 (0.30)**
Other living arrangement		1.42 (0.38)	1.35 (0.36)	1.38 (0.37)
Income quartile 2		0.83 (0.13)	0.82 (0.13)	0.83 (0.13)
Income quartile 3		0.50 (0.09)***	0.49 (0.09)***	0.49 (0.09)***
Income quartile 4		0.57 (0.13)*	0.56 (0.13)*	0.55 (0.13)*
Not working, looking		1.99 (0.41)**	1.93 (0.40)**	2.00 (0.41)**
Not working, not looking		3.26 (0.50)***	3.13 (0.49)***	3.33 (0.52)***
Less than high school		1.45 (0.43)	1.33 (0.40)	1.35 (0.41)
High school		0.67 (0.14)*	0.69 (0.14)	0.69 (0.14)
Less than 1 year college		0.75 (0.17)	0.74 (0.17)	0.73 (0.16)
Some college		0.86 (0.16)	0.86 (0.17)	0.86 (0.17)
Associates degree		0.90 (0.20)	0.87 (0.20)	0.87 (0.20)
Master's degree		0.72 (0.21)	0.71 (0.21)	0.73 (0.21)
Professional degree		1.85 (0.54)*	1.88 (0.56)*	1.99 (0.60)*
Used VA education benefits		1.16 (0.15)	1.14 (0.15)	1.16 (0.15)
OEF/OIF			0.15 (0.45)**	0.53 (0.37)
Combat zone			1.30 (0.11)*	1.31 (0.10)*
Exposed to death			1.50 (0.07)***	1.49 (0.07)***
Tricare only				0.44 (0.13)**

N = 4,793
Pseudo R^2 = 0.14 for fully specified model (Model 4)
Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$
Note: OR = odds ratios; S.E. = Standard Error

lower odds of counseling usage than those with a college degree (p<0.05), those with a professional degree are more likely to use counseling services than college graduates (p<0.05). However, it is worth noting that this is the only socioeconomic variable which is positively related to the use of mental health counseling. Age and sex both remain significant, as does the difference between divorced/separated veterans and married veterans. The socioeconomic predictors explained an additional 6% of the variation in veteran mental health counseling usage (R^2=11%).

When comparing the socioeconomic status indicators and their impacts on self-rated health and mental health counseling, we observe stark differences which suggest unique mechanisms. Specifically, we can see that U.S. Veterans that are not working and not looking for a job are much more likely to predict usage of mental health counseling in our sample than we would expect given the association between lower socioeconomic status and less healthcare usage/access in the general population. To be certain many of the socioeconomic variables are in the opposite direction of the trends in socioeconomic status and health seen in the general population. Again, this speaks to the unique nuances of this group in terms of their mental health usage patterns.

The next set of results shown in Table 3 Model 3 adds the focal variables indicating whether a veteran was deployed in a combat zone, was exposed to death and/or suffering during deployment, and whether they were in the service before or after the start of OEF/OIF. As hypothesized, the results for these focal variables were strong. Looking first at the indicator for service in a combat zone, Table 3 Model 3 shows that veterans who were deployed as such had nearly 30% higher odds of seeking mental health counseling in the last six months than their counterparts who were not deployed in a combat zone holding the demographic, socioeconomic and other combat zone indicators constant (p<0.05). Focusing on veterans who have been exposed to death and/or suffering, the binary variable for exposure to death indicates that veterans who did experience death in the field had nearly 50%

higher odds of utilizing counseling services in the last six months compared to their counterparts who did not (p<0.001). Lastly, those who had exited the military before OEF/OIF were more likely to utilize counseling services than those who did not serve in OEF/OIF (p<0.05). The socioeconomic and demographic predictors that were significant in prior models remain so in Model 3.

Finally, Model 4 in Table 3 introduces the binary variable accounting for the structural change in the VA health care system. The strong relationship between age and mental health usage and participation in more recent conflicts (OEF/OIF) indicated some significant variation between long-standing and more recent veterans. To test these findings for robustness we focused on major systemic changes made in the military health care system by introducing a binary variable for the Tricare program, using its debut year as a cutoff point. Including this variable in Model 4, we observed that veterans who retired after the inception of Tricare in 1996 had 55.9% lower odds of using mental health care than those who had access to the previous plan (p<0.05). Model 4 also indicates that the relationship between service in OEF/OIF and mental health usage observed in Model 3 is spuriousness with the gap in health care usage in newer and older veterans explained not by conflict involvement, but by the health care plan adopted by the VA. Many of the key socioeconomic and demographic predictors remained significant and were robust to differences in the veterans' experiences in combat, recency of discharge, and changes to the VA healthcare plan. Female veterans are more likely than male veterans to use mental health services; younger aged veterans have higher usage than older veterans; lower-income veterans use counseling services at a higher rate; more educated veterans use more mental health services; unemployment increases the odds of counseling. The results for mental health usage (Table 3) proved to be much more nuanced compared to the trends in perceived health (Table 2).

Discussion

To begin, our results are in line with Edwards' (2015) study with respect to lower self-reported perceived general health with exposure to death, dying, and wounded people. This variable is one of the strongest predictors of perceived general health in our entire set in Table 2. Additionally, we can see that demographic and socioeconomic variables appear to operate similarly to what is found in the general population of the United States. Sociological research has consistently indicated that race and socioeconomic status combine in complex ways to affect health, "...persons with less income and education do not use health services in the same way that their wealthier, better educated peers do (Williams and Sternthal, 2010: 23; Adler and Newman, 2002: 68)." Exposure to death, dying and wounded people is nearly three times as impactful on perceived general health than being deployed in a combat zone alone, though the experience of combat does have a significant effect on perceived health among veterans independent of exposure to trauma. Interestingly, we found no significant differences in that regard between veterans prior to and post 9/11 which challenges our assumptions about the effects of asymmetrical warfare on mental health. Our findings align with previous studies such as Sheffler et al. (2016) which also found that combat and exposure to traumatic events can result in health problems.

As we analyzed the data, it became clear to us that there was something else that was impacting this self-reported perceived general health that was not readily apparent and unrelated to individual differences among veterans. When looking at perceived health variation, we found that military personnel who transitioned to veterans around the mid-1990s reported better self-reported health even when controlling for age and the socioeconomic and demographic indicators. We researched specific structural events that occurred during that period of time, suspecting that something must have changed at the structural level. We soon made the connection with the passage of what was at the time, the new healthcare program for the armed forces: Tricare. While the restructuration of the military and its health branch in the early 1990s impacted its

population access to medical care, the Department of Defense came up with a new program called Tricare to alleviate the ongoing challenges it was facing (Mulkey et al., 2004). Therefore, it appears that the implementation of this new program had a significant positive impact on the veteran population and their healthcare. To highlight this finding, age is not significantly correlated to a decrease in perceived general health as it would otherwise be expected when including the Tricare indicator. While this could be linked to the strict fitness and readiness programs veterans went through during the service, it would be interesting to further investigate what could make this specific population less likely to experience health decline with aging as in the case general population. Clearly, the change in the healthcare system was a factor, which is a finding not present in the current literature, but other factors could be at play too. Furthermore, it would also be interesting to see if we will still observe such results as younger generations of veterans age. Indeed, age, period and cohort effects could all be at play in framing veteran perceived health; this is a fecund avenue for new research.

When we look at mental health counseling for veterans, it seems that it is operating in a *differently* than what we see in the general population (as shown in Table 3). While we would expect to observe trends similar to what we observed with perceived general health, the results show otherwise. In this case, it appears that veterans of lower socioeconomic status and Black veterans are using mental health counseling available through the V.A. at higher rates than those of higher socioeconomic status and White, respectively. This finding is interesting and should be tested through additional studies and the mechanisms investigated at a theoretical level to better understand the unique nuances and complexities of this population and help improve mental health care access and usage for veterans. In his work, McFarlane (2015: 352) focuses on "increased rates of psychiatric disorder due to combat exposure." Our findings indicate that there is indeed a higher risk of requiring mental health counseling for veterans who were exposed to combat, but more importantly, veterans exposed to death, dying and wounded people. The fact that exposure to death,

dying and wounded people increases the odds of seeking mental health counseling could reflect the concept advanced by Lee et al. (2017: 676) that "combat exposure can lead to positive ad well as negative outcomes," as opposed to combat exposure alone. However, our results indicate a unique significant effect of combat experience beyond the effects of trauma in impacting mental health treatment for veterans. These two experience level variables operate independently. Lastly, as we observe with general health, the implementation of Tricare in the mid-1990s appears to have positively influenced access to mental health care for veterans. This result indicates that the adoption of Tricare did seem to increase the usage of mental health care veterans, an encouraging result. This result should be further investigated in subsequent research.

Focusing on the socioeconomic indicators, when we look at the education achieved by veterans and whether they used outpatient mental health counseling, we see that only those with a professional degree have a higher likelihood of taking advantage of such care. If this can be confirmed through other studies, it would be worth researching whether this is affected by the military lifestyle specifically. Indeed, we would expect to see more of a linear increase in usage of mental healthcare as the level of education increase as we do in the general population. But in our case, the likelihood remains at a consistent low through all levels of education. One potential confounding factor is that most military personnel will enlist out of high school and only complete higher education after leaving the service, potentially explaining the observed difference from the expected trend, though it certainly merits more attention.

Limitations and Future Directions

The dataset used in this analysis are now ten years old, and may have changed slightly. Future iterations of the National Survey of Veterans could be compared to see what has changed since 2010, and if the report that stemmed from the original study has been efficiently used to improve V.A. services. It would also help to better assess the potential differences between pre- and post-9/11 veterans, and the different needs they

might require from medical services. We also need to consider the fact that this data reflects a population that uses V.A. services. Similar to the survivorship bias taken into consideration by Wald (2008) during his analysis on bomber survivability of enemy fire, this potentially leaves out a segment of the population that either did not enroll at the V.A. or does not have access to the V.A.

In terms of the variables, perceived general health is not a medical assessment made by a physician, and therefore, it cannot be taken as an absolute measure of the general health of the veteran population. However, it does provide some insights as to how veterans see themselves. Future studies with a comprehensive medical assessment of veterans' specific health issues would be important in better understanding the impact of combat exposure and exposure to trauma. While a few studies have started to do so, there is much that still needs to be explored. Additionally, while the percentage of veterans seeking mental healthcare in this dataset seems small, we must keep in mind that the question was only asking them if they did so in the last six months. It is possible if the question would have allowed for a larger time window (say a year) that the positive response rate would have been higher. Regardless, we are still left with a sufficient number of respondents that regularly utilize mental health counseling in at least six month increments to draw statistically significant conclusions.

Considering our most unique finding, implementation of Tricare seems to have improved the usage of mental health care among veterans, but we urge caution in this result. The impacts of the healthcare system and medical insurance and coverage for the veteran population remains complicated and often depends on multiple coverage types as shown by Landes et al. (2018) in their study on health care coverage and mortality. A more comprehensive study on how medical insurance coverage affect veterans of all demographic or socioeconomic status would be needed to uncover more precise mechanisms and impacts of these structural issues. Nonetheless, this

unique result from this study should help spur future work on this yet undeveloped finding.

While it would seem useful to include individual disability ratings as an independent variable for respondents (these were obtained through the survey), we did not believe that it would add significantly to this analysis. While the respondents were asked to state their disability rating, we do not know if this was due to combat or if it was sustained during more mundane tasks; in other words, we cannot be sure when the disability occurred. Therefore, this variable is not specific enough for the purpose of this research and could potentially obfuscate more significant results.

Lastly, the recent events in Afghanistan (August 2021) and the withdrawal from the country have the potential to influence mental health patterns of post 9/11 (OEF/OIF) U.S. Veterans across the life course. A careful study of the long-term impacts on a range of wellbeing indicators following the fall of Kabul may help uncover oscillations in mental health issues related to the perception of a debacle after 20 years of war. This may mirror the impacts on Vietnam Veterans following the fall of Saigon. Future studies should investigate the interplay between the deleterious impacts on wellbeing from war experience, and portrayal of a lost or forgotten cause after the U.S. has acknowledged defeat on the wellbeing of U.S. Veterans.

Conclusion

This data and the subsequent analysis yielded some interesting results when it comes to the perceived general health of U.S. Veterans and their access to mental health counseling. Overall, we saw that witnessing death, dying, and/or suffering significantly lowered perceived general health and increased the likelihood of using outpatient mental health treatment in the previous six months. This variable is the most significant predictor of both of our dependent variables and trumps most of the socioeconomic and demographic control variables. Exposure to combat alone is also a significant predictor of worse general health and higher odds of seeking mental health counseling, but not to the extent of the impact of exposure to trauma (death, dying, and/or suffering). That these two related factors impact general health and counseling treatment independently is important and illustrates the layered effects of military experience on health. These two results could be seen as positive. Veterans who experience trauma and/or combat— those who may need mental health treatment the most—are most likely to be receiving regular treatment. However, it also underlies the deleterious effects of trauma and combat exposure in wartime and the unique needs of this population.

These findings can help better assist military personnel and veterans, post-deployment as they transition to civilian life in terms of their mental and overall health profiles. Furthermore, as shown in the analysis, the introduction of Tricare as a replacement healthcare provider for service-members for Champus may very well have aided Veteran's healthcare through the V.A. as it seems to positively impact troops increases utilization/access to mental health counseling. While this preliminary result necessitates further research, the results give a clear indication that healthcare for veterans has improved since the introduction of the Tricare plan.

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