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CHS 766

Term Project

Mental and Physical Health Among US Veterans: Behavioral Risk Factor Surveillance System

2020

Abstract

Background

The department of Veteran Affairs has requested \$269.9 billion in funds from the United States government for fiscal year 2022 (Office of Budget). With this much money being handled by the VA, is the money being properly used to help veterans struggling with their mental and physical health? Thus, this research will look to see if veteran status has a significant impact on an individual's mental and physical health.

Method

The 2020 BRFSS survey had 401,958 respondents. Of these people, 111,321 participants reported "no" to having poor health in the last 30 days, and 50,027 said "yes". As for veteran status, 351,210 non-veterans took the survey and 48,221 veterans took the survey.

Results

Table 2 shows that 8,930 (44%) veterans reported having poor health in the last 30 days, whereas a larger portion of non-veterans, 11,236 (56%), said that they had not struggled with poor health in the last 30 days. This is the opposite of what I was expecting, as it shows that veterans reported poor health less often. However, this distribution had a Chi-Square p-value

above 0.05. Table 3 shows an adjusted odds ratio 1.0720 for veteran status, but the p-value is above 0.05.

Conclusion

After looking at Table 2, Table 3, and Table 4, it can be seen that the veteran variable does not have a p-value below 0.05 for any type of test. Thus, veteran status does not have a significant impact on an individual's combination of mental and physical health in this data.

Introduction

On August 30, 2021, the United States military was completely removed from Afghanistan, effectively ending the longest war in American history (Zucchini). This recent piece of world history is what stimulated my research question: does veteran status have a significant impact on an individual's mental and physical health? Surely, it seems obvious that someone who has been thrust into war could possibly come back with PTSD and could struggle with their mental health. While this research will focus on issues like this, a more general case will be studied in whole. Not all veterans serve in a combat or war zone. However, these veterans still face difficulties after being overseas where their life is filled with orders and duties every hour of the day. Thus, retirees from the military need to adapt to a different lifestyle when they come back, regardless of having served in a combat or war zone. This also seems like a case that could result in a struggle with mental health. Thus I decided to investigate the effect that veteran status has on mental and physical health, regardless of having served in combat zones or not.

The Department of Veterans Affairs (VA) spends the fifth most of all federal agencies, accounting for 5% of federal spending (USAFacts). However, I wanted to study if this is working or not. While it is implied that this funding covers physical injuries, it is hard to tell how

much this helps those dealing with the mental side effects of serving in the military. Also according to USAFacts.org, the VA spends money on veterans through two programs, the Disability Compensation program and the Veterans Health Administration (VHA). The Disability Compensation program provides monthly benefits to veterans with service-related disabilities, and the VHA oversees all medical care for the VA. The VHA is the largest integrated health care system in the US. This shows that the US takes veteran healthcare very seriously. However, is it working?

Since it has been an important focus of the United States to make sure that veterans have proper health care coverage, it is no surprise that similar research has already been done. In a paper titled “Health-Related Quality of Life Among US Veterans and Civilians by Race and Ethnicity”, a study was produced that focused on the estimation of demographic characteristics and self-related health based on veteran status and race. However, this study only discussed prevalence, as no regression was done to analyze an adjusted odds ratio. The study found that American Indian/Alaska Native veterans reported more physically unhealthy days than other racial/ethnic groups, and that black and white veterans reported more unhealthy days than their civilian counterparts (Luncheon, C., & Zack, M). Another study, “Mental Health in Deployed and Nondeployed Veteran Men and Women in Comparison With Their Civilian Counterparts”, used the dependent variable MENTHLTH and focused on deployment status and sex as the exposure variables. This study used odds ratio as its primary method of analysis, and found that a greater proportion of women than men were college educated (especially among deployed and non-deployed veterans) and reported poor mental health (Mark W. Hoglund, EdD, Rebecca M. Schwartz, PhD). One other paper that I have based my research off of is “Perceived Insufficient Rest or Sleep among Veterans: Behavioral Risk Factor Surveillance System 2009”, which

investigated whether self-reported insufficient rest or sleep varies in relation to veteran status and identified high-risk groups of veterans. The study used multivariable logistic regression to estimate odds ratios of insufficient sleep or rest in subgroups of veterans, and found that insufficient rest or sleep and short sleep duration were more common among veterans than non-veterans. In addition to the analysis done by the literature mentioned, my study will also look to analyze causes on both mental and physical health, use regression to get specific measurements on the impact of each exposure variable, and analyze a larger combination of exposure variables.

Method

This study was done using the 2020 Behavioral Risk Factor Surveillance System, a state based national telephone survey. The dependent variable in this research is POORHLTH. The question was asked to respondents as follows: “During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?” Thus, if a subject said that poor physical or mental health kept them from regular activities for at least one day in the last 30 days, it was coded as a general “yes”, and “no” if no they were effected for zero days. In total, 401,958 people in the United States completed the survey. Of those, 85,027 (43.3%) reported that poor mental or physical health kept them from normal activities. Unfortunately, 205,610 respondents did not respond to this question, which is hurts the research. The first independent variable we will discuss, and the main focus of this research, is the VETERAN3 variable. This was the variable that documented if a respondent was a veteran or not. For this 48,211 (12.07%) respondents classified themselves as a veteran (2,537 answers were missing). Another important independent variable that was looked at is the _TOTINDA variable. This research computed the variable into a “yes” or “no” variable that marked whether or not the respondent had done physical exercise in the last 30

days. In total, 305,883 (76.23%) subjects said yes with 682 missing answers for the question.

The variable EMPLOY1 was also used as a “yes” or “no” variable that represents if the subject is currently employed at the time of the survey. Of the respondents, 228,603 (57.89%) were employed with 7,076 answers missing. Finally, variables _Sex (Sex), _IMPRACE (Race), and _AGE_G (Age) were used. The resulting occurrences of each value are shown in Table 1 for these variables (no answers were missing for any of these).

Logistic regression was used to analyze the adjusted odds ratio for interactions between levels of an estimator; as well as to evaluate the individual effect that each parameter had on the dependent variable, poor physical and mental health, using maximum likelihood. A confidence interval and p-values are used to evaluate the strength of the adjusted odds ratio and a p-value is used to argue whether the regression parameters are reasonable or not.

Table 1: Descriptive Characteristics of Behavioral Risk Factor Surveillance Survey Participants in the US, 2020

Characteristics		n = 401,958	
		n	%
Poor Health	No	111,321	56.70
	Yes	85,027	43.30
Veteran	No	351,210	87.93
	Yes	48,211	12.07
Sex	Female	218,027	54.24
	Male	183,931	45.76
Race	White	303,886	75.60
	American Indian / Alaskan Native	6,954	1.73
	Asian	10,243	2.55

	Black	30,390	7.56
	Hispanic	36,408	9.06
	Other	14,077	3.50
Age	18 – 34	70,034	17.42
	35 – 64	192,093	47.79
	65+	139,831	34.79
Employed	No	166,279	42.11
	Yes	228,603	57.89
Physically Active	No	95,393	23.77
	Yes	305,883	76.23

Results

The main idea of this research is to look into the effect that veteran status has on health. Thus, we will first look into how frequent those who reported poor health are veterans. From Table 2, we can see that 8,930 veterans reported having poor physical or mental health in the last 30 days, whereas a larger portion, 11,236, said that they had not struggled with poor health in the last 30 days. This 44% compared to 56% is not far from a 50-50 split. As for non-veterans, 75,675 participants who reported that they are a non-veteran also reported that they struggled with poor health in the last 30 days, compared to 99,513. This is 45% to 55%, which is also close to a 50-50 split. Especially when considering that a Chi-Squared test resulted in a p-value of 0.3193, it is easy to see that at first glance, there is no obvious change in frequencies of reporting poor health for veterans compared to non-veterans. However, we will continue to investigate this to see if this is true.

As for the other independent variables sex, race, age, employment status, and physical activity status, all of the Chi-Squared p-values are extremely low. This shows that for each variable, there is at least one category that has enough data to show that the frequency of poor health vs good health is not 50-50. For most categories, the percentage of saying “yes” to having poor health is lower than the percentage who said “no”. However, for the American Indian/Alaskan Native participants, unemployed participants, and physically inactive participants, we can see that their percentages are above 50% for having reported poor mental and physical health.

Table 2: Factors Associated with Reporting Poor Health in the Last 40 Days, Among Adults in the US, 2020

Characteristics		Reported Poor Health		
		n = 401,958		
		Yes (%)	No (%)	p Value
Veteran	No	75,675 (44.7%)	99,513 (55.3%)	0.3193
	Yes	8,930 (43.8%)	11,236 (56.2%)	
Sex	Female	51,738 (46.3%)	65,708 (53.7%)	<0.0001
	Male	33,289 (42.3%)	45,613 (57.6%)	
Race	White	63,249 (43.2%)	86,152 (56.8%)	<0.0001
	American Indian / Alaskan Native	1,958 (52.8%)	1,743 (47.2%)	
	Asian	1,692 (44.3%)	2,217 (55.7%)	
	Black	6,826 (46.1%)	8,306 (53.9%)	
	Hispanic	7,622 (47.6%)	8,961 (52.4%)	
	Other	3,680 (49.9%)	3,942 (50.1%)	
Age	18 – 34	19,065 (46.9%)	22,207 (53.1%)	<0.0001
	35 – 64	42,507 (44.5%)	53,077 (55.5%)	
	65+	23,455 (40.6%)	36,037 (59.4%)	
Employed	No	41,570 (52.6%)	41,581 (47.4%)	<0.0001
	Yes	42,218 (40.3%)	67,766 (59.7%)	

Physically Active	No	27,775 (53.2%)	25,071 (46.8%)	<0.0001
	Yes	57,091 (41.6%)	86,075 (58.4%)	

The data in Table 3 looks at the adjusted odds ratios for the variables used. To obtain these adjusted odds ratios, one category had to be used as a reference. It was decided that “no” would be used as the reference for yes and no questions, “female” was used as the reference for sex, “white” as a reference for race, and the age range “18 – 34” for age. For our main variable of research, veteran status, an odds ratio of 1.0720 was produced. This implies that it is more likely for a veteran to report poor health than non-veterans, which is contradictory to what we assumed after seeing Table 2. However, with a p-value above 0.05, it is not logical to accept this odds ratio as realistic. The race variable also had odds ratios with p-values above 0.05 when comparing Asian or Black races to White. Thus, we cannot make inferences on these odds ratios either. It should be noted that the American Indian/Alaskan Native race is much more likely to report poor health than white respondents, and this is independent of veteran status. As for age, the older age groups are less likely to report poor health, as compared to the 18 – 34 age group. This seems to agree with the occurrences seen in Table 2.

Table 3: Factors Independently Associated with Poor Health Among Adults in the US, 2020

Characteristics		aOR	Lower CL	Upper CL	p Value
Veteran	No	Reference			
	Yes	1.0720	0.9924	1.1580	0.0773
Sex	Female	Reference			
	Male	0.8365	0.7992	0.8756	<0.0001
Race	White	Reference			
	American Indian / Alaskan Native	1.3965	1.1904	1.6382	<0.0001
	Asian	1.0423	0.8983	1.2094	0.5849
	Black	0.9902	0.9240	1.0612	0.7812
	Hispanic	1.1025	1.0172	1.1950	0.0176

	Other	1.2381	1.1124	1.3781	<0.0001
Age	18 – 34	Reference			
	35 – 64	0.7600	0.7215	0.8004	<0.0001
	65+	0.4175	0.3878	0.4494	<0.0001
Employed	No	Reference			
	Yes	0.4750	0.4497	0.5018	<0.0001
Physically Active	No	Reference			
	Yes	0.6499	0.6178	0.6837	<0.0001

As mentioned in the introduction, something that many research papers have left out is regression estimates to see the individual effect that each parameter has on the outcome. Table 4 summarizes these estimates, and their standard errors and p-values are given as well. Note that different references are used for this table. The intercept does not tell us anything since the p-value is high. Unfortunately, the p-value is above 0.05 for the veteran parameter, so we cannot interpret this estimate as a meaningful number. We can see, though, that the American Indian/Alaskan Native race has an estimate of 0.2211 with a p-value close to 0. This implies that, while holding all other variables fixed, if the respondent is American Indian/Alaskan Native, their odds of reporting poor health *increases* by $e^{0.2211} - 1 = 0.2475 = 24.75\%$, as compared to a white respondent. On the other hand, negative estimates are interpreted differently. For example, the Black category of race has an estimate of -0.1226. This implies that the odds of a black respondent reporting poor health *decreases* by $e^{-0.1226} - 1 = 0.1189 = 11.89\%$, compared to white respondents. A similar interpretation can be done for all estimates shown in Table 4 with a p-value less than 0.05.

Table 4: Analysis of Maximum Likelihood Estimates Using Logistic Regression

Parameter		Estimate	Standard Error	p value
Intercept		0.00768	0.0283	0.7859
Veteran	Yes	Reference		

	No	-0.0348	0.0197	0.0773
Sex	Male	Reference		
	Female	0.0892	0.0116	<.0001
Race	White	Reference		
	American Indian / Alaskan Native	0.2211	0.0695	0.0015
	Asian	-0.0714	0.0651	0.2732
	Black	-0.1226	0.0352	0.0005
	Hispanic	-0.0152	0.039	0.6964
	Other	0.1008	0.0489	0.0393
Age	65+	Reference		
	18 - 34	0.3827	0.0189	<.0001
	35 - 64	0.1082	0.015	<.0001
Employed	Yes	Reference		
	No	0.3722	0.014	<.0001
Physically Active	Yes	Reference		
	No	0.2155	0.0129	<.0001

Discussion

In this research, when analyzing the physically inactive variable, it seems somewhat flawed as it appears to be implied that if one is not physically active, then one will report being in poor physical or mental health. However, this is not always the case. It is possible for one to

not work out, but also be perfectly fine with their mental and physical health. Thus, I believe this is still useful information.

Unemployed individuals reporting a higher frequency of poor health in Table 2 seems natural, but it is helpful to see it represented with data, rather than just assuming that this is the case. However, there is not enough data to confirm that there is anything extraordinary happening after also checking Table 3 and Table 4. In Table 3, the adjusted odds ratio, similarly to table 2, suggests that veterans are more likely to report poor physical and mental health. The p-value, though, for this adjusted odds ratio suggests that there is not enough evidence to make the conclusion that veterans are more likely to report poor health. Similarly, Table 4 suggests that the odds of having poor mental health for *non-veterans* decreases by $e^{-0.0348} - 1 = 0.0342 = 3.42\%$ compared to veterans, suggesting that veterans are more likely to have poor mental health. However, even though the odds for non-veterans having poor health decreases, it is a very small decrease and the p-value is above 0.05 for this estimation. Thus, with all testing considered, it is impossible to make any inferences on this.

As for American Indian/Alaskan Native subjects, it is not intuitive to me as to why they are reporting higher cases of poor health, as seen in Table 2. Thus, at first look, it seems as though the VA needs to do research as to why this is happening if they wish to decide if this is a group that needs more funding. However, from looking at Table 3, it can be seen that the Native American/Alaskan Native race is much more likely to report poor health independently of other variables. This might explain why “American Indian/Alaska Native veterans reported more physically unhealthy days” (Luncheon). It should be considered that it might be a coincidence that the Native American/Alaskan Native veterans are more frequently reporting poor health than non-veteran Native American/Alaskan Natives.

If this research were to be done again, I would use the variable representing only poor mental health, not the variable representing both poor mental and physical health. One reason is because mental health is harder to recognize amongst individuals. Another reason is the fact that so many responses to the poor health question were missing. In total, 200,343 respondents did not answer this question. This makes the analysis much harder, and is what likely led to issues where the veteran variable, our main variable of interest, had p-values above 0.05 for all estimates.

Conclusions

For variables used besides veteran status, such as sex, race, age, employment status, and physically active status, there are some interesting findings. Native American/Alaskan Native individuals were much more likely to report poor health. Also, in this sample, unemployed individuals and physically inactive individuals reported poor health in the last 30 days more frequently than employed individuals and physically active individuals. When trying to test for statistics, the data provides similar outlook. With an odds ratio of 0.0475, employed individuals are much more likely to not report any unhealthy days. With an odds ratio of 0.6499, physically active individuals are much more likely to not report any unhealthy days either. This implies that activity is key when trying to improve physical and mental health. The VA should be sure to focus on this when trying to work with veterans who are struggling.

The main focus of this research was to study the effect that veteran and non-veteran status has on having poor health, while also considering other factors such as race, age, employment status, and physical activity status. While numbers suggest that there are trends to support this claim, a deeper look into the statistics shows that it is not possible to make a firm

conclusion on this matter. Thus, veteran status does not have a significant impact on an individual's combination of mental and physical health in this data.

All in all, this study shows that there are confounding variables that can increase or decrease one's physical and mental health when considering veteran status as an exposure variable. While a veteran has no increased odds of poor mental and physical health in this study, it was easy to see that variables like race, employment, and physical activity had a quantifiable impact on the reporting of poor physical and mental health. Yes, being a non-veteran decreased the odds of reporting poor health by 3.42% as compared to being a veteran. However, the p-value of 0.0773 means that there's a possibility that this could have happened by chance, and thus there is no logical reason to accept this value of 3.42%. Using the opposite reference, the odds ratio of 1.0720 also implies that it is more likely for veterans to report poor mental and physical health. However, in a similar way, the p-value being above 0.05 implies that this is not an acceptable value, as it could have happened by chance. To add to the confusion, Table 2 shows that, in this sample, a higher percentage of non-veterans reported poor mental and physical health (44.7%), than veterans (43.8%). It was interesting to see that this 2020 survey produced these numbers because it is opposite from what the expectation was. However, once again, the p-value was above 0.05. This p-value is for the Chi-Square test, so it is reasonable for us to assume that the distribution is not any different than a 50-50 split between reporting poor mental and physical health and reporting no issues with mental and physical health for both veterans and non-veterans. In conclusion, it is hard to argue that the Department of Veteran Affairs needs extra money to support veterans with struggling with poor health, when what they are already doing has kept veterans on the same health status as non-veterans.

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