

Drug Use Among Military Men and Women: A Longitudinal Fixed-Effects Approach

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Abstract

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Very little research has been conducted on the effects of military service on drug use. Of the studies that do exist, few conduct analyses to include comparisons of active duty enlistees, veterans, and civilians. In addition, the effects of combat status and gender are often overlooked. Using data from the 1997 National Longitudinal Survey of Youth I analyze patterns of drug use across current enlistees in the military, veterans, and civilians, and determine whether differences exist according to gender and combat status. Overall I find that enlisted members of the military are less likely to use drugs than their civilian counterparts, but this pattern does not occur for veterans. Subsequently I find that these relationships do not differ by gender or combat status. I do find, however, that despite there being no decrease in drug use after exiting the service, there is no increase in drug use either, even after controlling for combat status. This is important for helping us better understand the military's effects on the life-course outcomes of our nation's young people, as well as furthering our understanding of the military as a near total institution. Additionally, the results of this study could be useful to policy-makers who seek to better understand the effects of military service in order to more accurately address how to provide help and resources to our nation's veterans.

DRUG USE AMONG MILITARY MEN AND WOMEN:
A LONGITUDINAL FIXED-EFFECTS APPROACH

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INTRODUCTION

Very little research has been conducted on the effects of military service on drug use. Of the studies that do exist, few conduct analyses to include comparisons of active duty enlistees, veterans, and civilians. In addition, the effects of combat status and gender are often overlooked. Using data from the 1997 National Longitudinal Survey of Youth I analyze patterns of drug use across current enlistees in the military, veterans, and civilians, and determine whether differences exist according to gender and combat status. Overall I find that enlisted members of the military are less likely to use drugs than their civilian counterparts, but this pattern does not occur for veterans. Subsequently I find that these relationships do not differ by gender or combat status. I do find, however, that despite there being no decrease in drug use after exiting the service, it is interesting to note that there is no increase in drug use either, even after controlling for combat status. This is important for helping us better understand the military's effects on the life-course outcomes of our nation's young people, as well as furthering our understanding of the military as a near total institution. Additionally, the results of this study could be useful to policy-makers who seek to better understand the effects of military service in order to more accurately address how to provide help and resources to our nation's veterans. The more fully informed civilian healthcare providers, therapists, policymakers, and social workers, the smoother and more empathetic the transitional process will be for veterans.

PREVIOUS LITERATURE

Literature focusing on drug use in the military exists but is largely limited to active duty military service and Vietnam-era veterans. For example, research by Robins and Slobodyan found that Vietnam veterans who were known to have used heroin during service decreased or stopped use altogether after returning back from deployment (Robins & Slobodyan, 2003). Similar findings were observed by a different study which found that half of their sample of enlisted Army Vietnam servicemen had tried heroin or opium while deployed, however only 10% continued some use after returning home and less than 1% had symptoms of dependence. They compared these findings to a similar sample of enlisted Army servicemen who had tested positive on a urine sample before leaving Vietnam. Of these “confirmed drug users while deployed” veterans, only 7% showed symptoms of dependence upon return to the US. This was found despite 75% of them feeling they had a dependence on the drug while deployed (Robins, Davis, & Goodwin, 1974).

Despite the obvious importance of focusing on veterans, these studies may lead to incomplete tests of key theoretical arguments. For example, by focusing solely on the effects of service after exiting the military, studies may be neglecting to control for selectivity (in that riskier civilians may join the military, and that riskiness is linked with higher rates of drug and alcohol use in the first place). In addition, focusing only on the tail end of service may overlook the overall effects of service on the life-course. The Robins and Slobodyan study did look into some of these possibilities, noting that those veterans who had used heroin after returning from Vietnam tended to have partaken in deviant or risky behaviors, such as having friends who were drug users, prior to deployment (2003).

In general, since 1980 there has been a decrease in drug use in the military, consistent with increasingly strong penalties and stringent testing (Bachman, 1999; Bray, Kroutil, & Marsden, 1995; Bray, Spira, Olmsted, & Hout, 2010). Overall, there was a decrease in drug use while in the military from 37% in 1980 to 6% in 1998 (Ames, Cunradi, & Moore, 2002). Despite decreases in overall drug use, however, there is evidence of increased prescription drug misuse while serving on active duty service and after exiting the service (Bray et al., 2010; Miech et al., 2013; Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013).

Little information is available regarding drug use and the transition from an active duty service member to a veteran. It has been found that men who served in the Vietnam War report higher rates of marijuana use compared to those of the same era who did not serve in Vietnam or were civilians at this time (MacLean & Elder, 2007). Despite these findings, few studies have followed the same respondents from civilian status through military service and later after becoming a veteran. This is crucial, because if you only look at use after service you may not be controlling for selectivity (in that riskier people may join the military, and riskier people are more prone to drug use in the first place). If you only look at active duty, you aren't seeing the full picture in terms of whether or not drug use has changed as a result of military service. It's important to include the civilian component as a control for assisting in revealing whether or not it was the military that lead to these changes rather than something else (such as aging, for example).

Although two studies do track these transitions, they are limited in their focus to respondents who, after exiting the military, returned home to inner city New York neighborhoods (Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013). According to these studies, marijuana use after military service decreases compared to before military service,

although the effect is not statistically significant, and marijuana use while in the military was found to be lower than after exiting the service (Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013). Furthermore, similar patterns were observed for cocaine use, but the results were again not statistically significant (Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013). Overall heroin use was not common at any point in the life course, while prescription drug use did increase after exiting the service (Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013).

In addition to few comparisons of active duty drug use to veteran drug use, there are even fewer comparisons with civilians. According to the National Institute on Drug Abuse, among 18-25 year-olds, 3.9% of active duty service members had used an illicit drug in the past month compared to 17.2% of civilians (National Institute on Drug Abuse, 2013). Despite the lower levels for illicit drugs in the military, prescription drug use was higher in the military than in the civilian population (National Institute on Drug Abuse, 2013).

Though little research exists on gender differences in drug use in the military, it has been shown that connections between substance use and military service vary by sex (Bray, Fairbank, & Marsden, 1999). Even though women in the military tend to consume alcohol at lower rates than men (Teachman, Anderson, & Tedrow, 2015), their rates of illicit drug and cigarette use are comparable (Bray, Kroutil, & Marsden, 1995). It is unfortunate, though, that all the literature focuses on active duty men and women and provides no information for veteran men and women, especially considering the significant proportion of society that veterans make up. Veterans are increasingly becoming an important subject in policy development as well, making their lives a crucial area to be researched. In order to truly understand the effects of military service, it is important to see whether people have or have not changed after exiting the service,

thus studying veterans is the key to tracking this change (or lack thereof). Additionally there is no information available from recent decades.

There appears to be little research comparing combat veterans with active-duty service members who have been exposed to combat, especially for service after the Vietnam era. It was found that prescription drug use and heavy alcohol use, among other components, were found to have increased among combat veterans (Bray et al., 2010); however little other information exists, including a direct comparison with veterans who have not seen combat. Even sparser is information comparing illegal drug use for veteran and active duty members who have seen combat. One study does compare drug use over the life course from pre-enlistment to veteran status, including deployment, yet it is again limited to veterans returning to predominately minority neighborhoods in New York. This study found that overall illegal drug use decreased during deployment, while prescription drug use increased during deployment, and further increased after exiting the service (Golub & Bennett, 2014; Vazan, Golub, & Bennett, 2013).

In sum, although there is research available about the degree of drug use in the military, the majority of these studies are limited to comparisons across active duty military service and civilians, with little or no reference to veteran trends. In addition, there is little information pertaining to veteran differences according to gender or exposure to combat. Finally, the majority of analyses look primarily at marijuana use or solely at prescription drug misuse rather than hard drug use. In this analysis I elaborate previous research by first comparing veterans to active duty service members and civilians using current data from the National Longitudinal Survey of Youth 1997, focusing on hard drug use and excluding marijuana use. By using longitudinal data I will be able to look at individuals as they transition across service statuses by comparing them against themselves. This is aided by the fixed-effect regression model, which is

able to control for any time-invariant variables that may contribute to selectivity into the service. Finally, I analyze active duty service, veterans, and civilians by gender and deployment to a combat/war zone.

EXPECTATIONS

The military is an institution where consumption of alcohol and binge drinking is condoned and even encouraged (unofficially) as a part of its culture (Ames et al., 2007; Bohnert et al., 2012; Bray et al., 2005; Teachman, 2013). The military's approach on illicit and prescription drug abuse is the opposite (Bray, 1999, Bray et al., 2010, Bray, Spira, Olmsted & Hout, 2010). Drug screening before enlistment and harsh consequences for positive drug tests once enlisted (including immediate discharge) discourage use of drugs once in the service (Bray, Kroutil, & Marsden, 1995; Bray, Spira, Olmsted, & Hout, 2010; Miech et al., 2013). The military can thus act as a means to address a drug problem, acting as a form of rehabilitation for deviant behavior (MacLean & Elder, 2007; Miech et al., 2013). In addition, the military removes many recruits from an environment in which they are surrounded by drug use and places them in a drug-free atmosphere (Sampson & Laub, 1995). Therefore,

Hypothesis 1: I expect that while enlisted in the military drug use will be lower than for comparable civilians.

Whether these severe mandates during active duty service decrease drug use in the long term is not evident, however. According to the "gateway theory", the use of drugs as an adolescent or young adult increases the likelihood of continued use throughout adulthood; thus, eliminating drug use in adolescence and the young adult years should decrease the likelihood of

usage in adulthood (Miech et al., 2013). It is also the case that young men and women entering the military are at the age where peer pressure is great and components of one's permanent identity are being formed (Donovan, 2004; Mundt, 2011; Kroger, 1999). In this instance the military's anti-drug policies would be a deterrent from drug use in adolescence and subsequently (Miech et al., 2013). With many employers using drug testing as a way to prevent and control drug use among employees, the military's strict stance may not be too different from adult civilian life; therefore veterans would be familiar with and accepting of such formal processes (Silverman, 1999). Additionally, according to the 2012 Bureau of Labor Statistics Gulf War-era II veterans are more likely to be employed in the civilian labor force than civilians (80.7% and 66.6% respectively). As a result, employment (through the military or in civilian life) can deter drug use by providing individuals with a productive way to occupy their time, thus decreasing drug use (Silverman, 1999). Based on these ideas,

Hypothesis 2a: I expect that drug use among veterans will be lower than among comparable civilians.

There is another possible outcome for veterans that is worth considering. Veterans, regardless of having seen combat or not, may suffer from difficulties after having been removed from the tightly knit institution that is the military. The transition from military life back to civilian (and now veteran) life may be difficult, and veterans may experience issues with readjusting to normal life (Coll, 2011). This may lead to the use of coping mechanisms, such as drug use, in order to ease the conversion. Based on this idea, the following contrasting hypothesis may be possible:

Hypothesis 2b: I expect that drug use among veterans will be higher than among comparable civilians

With these considerations in mind, the military differs from civilian employment in one critical way; combat. Exposure to combat may encourage drug use as a coping mechanism to manage the trauma or stress experienced due to war (Bray, 1999; Bray, Spira, Olmsted, & Hout, 2010; Cook, 1976; Coll, 2011; Shen 2012). In addition, drugs could be used as a defense mechanism to help ease the transition from active duty service to civilian life (Coll, 2011). Bray et al., (2010), using data from the Department of Defense Health Related Behavior Surveys, found increases in prescription drug use, stress, heavy alcohol use, PTSD, and suicidal attempts among combat veterans. Therefore,

Hypothesis 3: I expect that enlistees with combat experience and veterans who have combat experience will be more likely to use drugs, compared to veterans and enlisted personnel with no combat exposure.

Previous research has found that women tend to drink less than men, including women in the military (veterans and currently enlisted personnel) (Eisen et al., 2012, Lehavot et al., 2012; Wallace, Sheehan, & Young-Xu, 2009; Nolen-Hoeksema, 2004). On the contrary, research has also shown that in the military illegal drug use is similar for men and women, which is different from civilian drug use in which women are less likely to use drugs than men (Bray, 1999). Women's use of illicit drugs in the military may be stimulated to the level of use by men due to the disadvantage of being a woman in the military (Bray, 1999). Although both men and women in the military experience pressures associated with military life (including combat, distance from family, and general stress associated with work) women have other stressors specific to their gender (Bray, 1999). These stresses may include sexual aggression/assault, pressure to fit into a male-dominant military culture, and feelings of anxiety resulting from the small number of women enlisted alongside them. I argue, therefore,

Hypothesis 4: *Female enlistees will be more likely to use drugs than female civilians*

After exiting the service women veterans are removed from the added stressors associated with being a woman in the military. Accordingly,

Hypothesis 5: *I expect that female veterans will be no more likely to use drugs than male veterans.*

DATA AND METHODS

In order to address my hypotheses I analyze data from the 1997 National Longitudinal Survey of Youth, which is sponsored by the Bureau of Labor Statistics. The database contains information on 8,984 respondents with follow-ups each year through 2011. Interviews were obtained starting with adolescents aged 12-16 as of December 31st, 1996 and have continued each year since then, with a maximum of 14 observations per person and a minimum of one. From these data I formed a long database consisting of person-year intervals. All individuals were included each year until data collection ended or they were lost to follow-up. Overall the database contains 98,509 person years.

For my dependent variable I created a dummy variable based on the following questions, *“Excluding marijuana and alcohol, since the date of last interview, have you used any drugs like cocaine or crack or heroin, or any other substance not prescribed by a doctor, in order to get high or to achieve an altered state?”*. Separate questions are asked about marijuana use and prescription drugs. From the variable I created a dummy variable indicating whether the respondent (1=yes, 0= no) used any drugs (excluding marijuana and prescription drugs prescribed to them) since the date of last interview. It is possible that the respondent could report

prescription drug use that was not prescribed to them by a doctor, indicating that they were using such a prescription to get high or achieve an altered state. In this case, some prescription drug use may be captured by this question.

To create the activity duty and veteran status variable I chose all variables in the NLSY-97 that monitored employment status by week for each year from 1997-2011. The employment variable contains a code that identifies pay associated with active-duty military service. From this employment variable I created a variable indicating current enlistment in the military (1=yes, 0=no). The veteran variable is constructed from the enlistment variable and indicates whether the respondent ever served in the military but is not currently serving (1=yes, 0=no). In order to measure combat exposure I created a dummy variable based on responses to a question asked in both 2009 and 2010, "*Did you ever serve in a combat or war zone?*" Those who identified that they served in a combat zone were coded 1, and those who did not were coded 0. It is also important to note that this variable refers to combat service at any point prior to 2009/2010 and is not restricted to service during those two years.

In order to control for factors that may affect drug use and are also at least correlated with military service, I include a variety of control variables. This includes a dummy variable indicating current enrollment in school; the highest grade of schooling achieved; two dummy variables indicating whether the respondent was married or cohabiting; a question regarding the respondent's general health (1=excellent, 2=very good, 3=good, 4=fair, 5=poor); a poverty ratio variable measuring household income to poverty level; number of biological children measured as a combination of children either inside or outside the home; a measure of age in months; length of active-duty service measured in weeks; and whether or not the respondent was working. I feel that these variables will sufficiently decrease the likelihood of attaining spurious

results. I also include two time-varying indices measuring delinquency and alcohol use. Because alcohol use and delinquency may be related to drug use, they are valuable control variables to this study. Finally, I include three dummy variables for race measured as Black, Hispanic, or Mixed, with White being the omitted category in the descriptive table only, in order to show the racial makeup of my sample. I do not include race in the fixed-effects model, as it is time-invariant and would simply drop out of the model. I also do not include it as an interaction variable, as the variation of race in the sample is too small to produce significant results.

The delinquency index is valuable to this study as it is an adequate measure of risk-taking for the respondent, which is an important control for selectivity into the military (Hair et al., 2009; Teachman and Tedrow, 2014). This index is an additive, time-varying variable based on the following 10 self-reported questions asked of each respondent every year,

1. *Have you ever run away, that is, left home and stayed away at least overnight without your parent's prior knowledge or permission?*
2. *Have you ever carried a handgun? When we say handgun, we mean any firearm other than a rifle or shotgun.*
3. *Have you ever belonged to a gang?*
4. *Have you ever purposely damaged or destroyed property that did not belong to you?*
5. *Have you ever stolen something from a store or something that did not belong to you worth less than 50 dollars?*
6. *Have you ever stolen something from a store, person or house, or something that did not belong to you worth 50 dollars or more including stealing a car?*

7. *Have you ever committed other property crimes such as fencing, receiving, possessing, or selling stolen property, or cheated someone by selling them something that was worthless or worth much less than what you said it was?*
8. *Have you ever attacked someone with the idea of seriously hurting them or have a situation end up in a serious fight or assault of some kind?*
9. *Have you ever sold or helped sell marijuana (pot, grass), hashish (hash), or other hard drugs such as heroin, cocaine, or LSD?*
10. *Have you ever been arrested by the police or taken into custody for an illegal or delinquent offense (do not include arrests for minor traffic violations)?*

Each answer was summed each year to result in a score of 0-10 per respondent per year. A change in the respondent's score from year to year represents that the respondent participated in one or more of the 10 questions that they had not previously participated in. A score of zero represents the least amount of delinquent behavior, and indicates that the respondent did not participate in any of the above 10 behaviors. A score of 10 indicates the greatest amount of delinquent behavior, and indicates that the respondent participated in all of the 10 listed behaviors. Scores were weighted for respondents who answered yes to 8 or more of the 10 listed questions by adjusting each score to a base of 10, i.e. if a respondent answered yes to 6 of the 8 questions they did choose to answer, their weighted score would be 7.5 ($6/8*10$). Those who answered less than 8 questions were coded as missing.

The alcohol index is also an additive, time-varying variable based on the following four questions,

1. *During the last 30 days, on how many days did you have one or more drinks of an alcoholic beverage?*

2. *In the past 30 days, on the days that you drank alcohol, about how many drinks did you usually have?*
3. *On how many days did you have five or more drinks on the same occasion during the past 30 days? By occasion we mean at the same time or within hours of each other?*
4. *In the last 30 days, how many days have you had something alcoholic to drink such as beer, wine, or hard liquor right before or during school or work hours?*

Respondents were assigned a value ranging from 0-3 for each answer to the question corresponding with the quartile they scored on that question, with 0 equaling a score in the first quartile, 1 equaling a score in the second quartile, 2 equaling a score in the third quartile, and 3 equaling a score in the fourth quartile. The scores were added across the four questions resulting in a final score for each respondent ranging from 0-12 per year (with 14 years possible), where 0 represents the lowest possible level of alcohol use and 12 represents the highest.

The NLSY-97 is not resistant to missing data problems. In order to address this concern I used a chained equation approach to imputing missing data available in STATA (Royston and White, 2011). All results in this study are based on five imputed databases using STATA's MI process. The dependent variable, drug use, was used in the imputation procedure; however, all instances with missing data on the drug use dummy variable were dropped from the analysis after missing values were imputed for all other variables. The resulting number of intervals is 98,509 person years.

Statistical Model

In order to study the relationship between the covariates and drug use, I use a fixed-effects logistic regression estimator. The fixed-effects model I estimate, using Allison's method (1994), is of the following generalized model: $\text{Ln}(\text{DRUGUSE}_{it}) = u_1\text{Age}_{it} + u_2\text{Age}_{it}^2 +$

$\delta_1 \text{ENLIST}_{it} + \delta_2 \text{VET}_{it} + \delta_3 \text{DURSERVICE}_{it} + \gamma \text{W}_{it} + \alpha_i$ where DRUGUSE_{it} represents an individual i 's answer to the drug use question at time t . DRUGUSE is a singular question in this analysis, not a scale, because it is an answer to one question each year rather than answers to several questions combined into a scale. The 14 possible values of t correspond to the 14 survey rounds that were discussed previously. The value of i for a given t depends upon the number of respondents who report an observation at that value of t . Age_{it} represents the age of the respondent at time t (and is used to address the change in drug use associated with aging); ENLIST_{it} represents a time-varying dummy variable which indicates whether respondent i is enlisted in the military at time t ; VET_{it} is a time-varying dummy variable indicating whether respondent i is a veteran at time t ; DURSERVICE_{it} is a time-varying indicator of the length of time spent in the military at time t ; W_{it} represents a vector of time-varying features of all respondents, that correspond to the control variables selected for analysis; u_1 , u_2 , δ_1 - δ_3 , and γ are coefficients or vectors of coefficients, and α_i represents unobserved and constant person-specific differences across respondents that affect the life-course. This model is estimated using XTLOGIT in STATA with a fixed-effects option (Teachman, Anderson, and Tedrow, 2015).

The model above does not include indicators for any time-invariant attributes. This is because in the fixed-effects model any effects of fixed, individual characteristics (like gender or race, for example) are built into the model in α_i . Therefore, while variables like gender or race are not explicitly included in my model, their effects are. Additionally, I include several interaction terms that do allow some selected time-invariant attributes to be included with specific time-varying variables.

The fixed-effects procedure is particularly useful in this study, in that it attempts to control for all person-specific factors as well as possible (fixed) sources of spuriousness that may

be linked with selectivity into the military, as well as drug use. Despite this advantage, some sources of spuriousness, such as those that are linked with unobserved changes in characteristics related to the military, are not able to be controlled for in this model. In order to compensate for this limitation, I include several time-varying variables that may help lessen these sources of spuriousness (see Table 1).

RESULTS

Descriptive Statistics

Table 1 shows the descriptive statistics for the sample of 98,509 person years used. Veterans represent about 1.5% of the person years and enlisted personnel represent about 2% of the person years. Approximately 5% of civilian person years reported drug use, compared to 2% for active duty and 4% for veterans. The mean age of the sample of person years is about 22 years (260.06 months). About 26% of the person years are Black and 21% are Hispanic. The person years are about equally split between males and females. The average score on the Delinquency Index is 2.27, with a mean score of 2.25 for civilians, 3.58 for enlisted, and 3.15 for veterans, and on the Alcohol Index is 3.62 with a mean score of 3.57 for civilians, 4.97 for enlisted, and 4.863 for veterans. The mean poverty ratio (the ratio of income to poverty level) is approximately 3.62. About 14% of the intervals include a respondent who is married (13% for civilians and 34% for enlisted and veterans), and 12% who are cohabiting (12% for civilians, 6% for enlisted and 2% for veterans). A mean number of .42 children is reported across all intervals. On average 11.8 years of schooling is the highest grade achieved, and about 44% of intervals include a respondent who is currently enrolled in school. The average number of weeks worked

in the past year is approximately 29.49, and the average self-reported health is 2.1 (“very good”) across all person-years. The average length of service for enlisted respondents is 6.85 years, and .591 years for veterans.

Chart one shows the descriptive statistics for drug use across civilian, enlisted, and veteran status. It appears that military service decreases drug use while in the service (about 5% of civilian person years reported drug use compared to about 2% of enlisted person years), and barely decreases use after service (about 4% of veteran person years reported drug use). This would reveal that military service has little to no effect on drug use, except while on active duty. Interestingly, this may imply that military service doesn’t necessarily aggravate greater drug use after service than was initially being used before enlisting.

Table 1: Descriptive Statistics for the Examination of Drug Use among Military Men and Women

Variable	Civilian Person-Years		Enlisted Person-Years		Veteran Person-Years	
	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>
Drug Use	0.049	--	0.021	--	0.041	--
Enlisted	0.000	--	1.000	--	0.080	--
Veteran	0.000	--	0.057	--	1.000	--
Male	0.494	--	0.797	--	0.772	--
Black	0.266	--	0.244	--	0.250	--
Hispanic	0.212	--	0.217	--	0.230	--
Age in Months	258.694	52.378	281.718	34.568	313.762	28.819
Delinquency Index	2.253	2.407	3.152	2.416	3.580	2.533
Alcohol Index	3.573	3.877	4.972	3.676	4.863	3.691
Poverty Ratio	3.274	3.505	3.480	2.826	3.801	3.208
Married	0.130	--	0.337	--	0.341	--
Cohabiting	0.120	--	0.063	--	0.015	--
Number of Children	0.412	0.844	0.369	0.727	0.695	0.934
Highest Grade	11.762	3.544	12.745	2.837	13.245	5.243
Enrolled in School	0.448	--	0.208	--	0.269	--
Weeks Worked Past Year	29.837	21.619	7.583	13.761	37.625	19.159
Self-Reported Health	2.106	0.949	1.845	0.828	2.131	0.942
Length of Service in Years	--	--	6.851	2.778	0.591	2.119

-- Not applicable

Total Number of Person-Year intervals is 98,509

Drug Use Descriptive Statistics

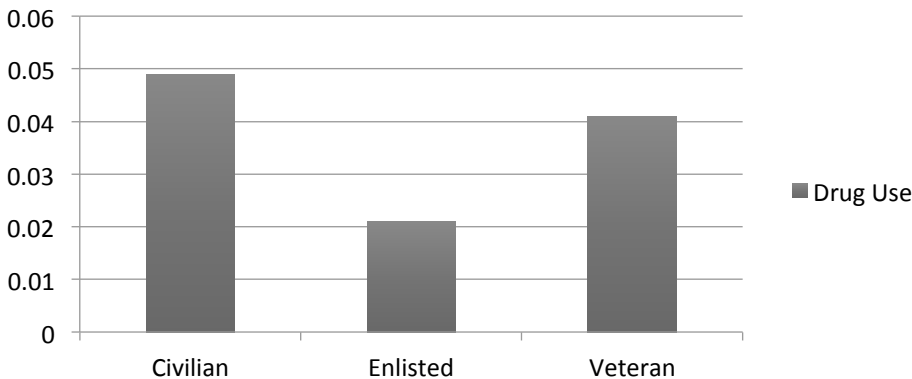


Chart 1: Drug use descriptive statistics

Multivariate Results

Multivariate results are shown in Table 2, in which there are four models. The nature of the fixed effects regression allows for the control of all fixed covariates, including but not limited to race, sex, and time-invariant personality characteristics that may contribute to selectivity in the military. We also control for a number of time-varying covariates.

Models 1 and 2 show results testing Hypothesis 1 (I expect that while respondents are enlisted in the military their drug use will be lower than for comparable civilians) and Hypothesis 2 (I expect that drug use among veterans will be lower than among comparable civilians). Model 1 looks at the military variables, as well as age. Consistent with Hypothesis 1, the odds of using drugs are 55.6% ($[e^{-.812}-1]*100$) lower for respondents enlisted in the military than civilian respondents. Not consistent with the hypotheses, veterans do not differ from civilians in drug use. In addition, veterans are more likely to use drugs than enlistees.

Model 2 introduces several time-varying control variables, including the delinquency index, alcohol index, the ratio of poverty level to household income, whether the respondent is

married or cohabiting, the number of biological children, the highest grade level achieved in school, whether the respondent is currently enrolled in school, number of weeks worked in the past year, length of military service measured in years, and a self-reported indicator of health. The results indicate that the odds of using drugs are now 64.62% lower for respondents enlisted in the military. It is also found that veterans continue to be no different than their civilian counterparts in the odds of using drugs, therefore Hypothesis 2a and 2b are not supported.

To test Hypothesis 3, Model 3 adds two interactions between the fixed attribute “combat” with the time-varying attributes “enlistment” and “veteran”. I expect that enlistees with combat experience and veterans who have seen combat will have an increase in drug use. Both of the coefficients involved in combat service are statistically nonsignificant, which is not consistent with my expectations. Based on these results Hypothesis 3 is not supported

Finally, Model 4 tests Hypothesis 4 (female enlistees will be more likely to use drugs than female civilians), as well as Hypothesis 5 (Female veterans will be no more likely to use drugs than male veterans). In order to examine gender differences in the effect of military service on drug use the model adds two interaction terms involving gender, enlistment, and veteran status. It is found that drug use among enlistees and vets does not differ by gender, as the coefficients are not statistically significant. In addition, female enlistees, as well as male enlistees, are less likely to use drugs than their civilian counterparts. Based on these results Hypothesis 4 is not supported, whereas Hypothesis 5 is supported.

Table 2: Fixed Effects Estimates on the Log of the Odds of Drug Use

Variable	Fixed Effects Estimates on the Logits			
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
Enlisted	-0.812**	-1.039*	-1.062*	-1.173*
Veteran	0.105	0.018	0.042	-0.160
Age in Months	0.054**	0.010*	0.010*	0.010*
Age Squared*1000	-0.117**	-0.040**	-0.039**	-0.040**
Delinquency Index	--	0.528**	0.528**	0.528**
Alcohol Index	--	0.128**	0.128**	0.128**
Poverty Ratio	--	-0.003	-0.003	-0.003
Married	--	-0.832**	-0.832**	-0.832**
Cohabiting	--	-0.441**	-0.442**	-0.441**
Biological Children	--	-0.298**	-0.298**	-0.297**
Highest Grade Level Achieved	--	0.022**	0.022**	0.022**
Enrolled in School	--	-0.224**	-0.224**	-0.223**
Weeks Worked in the Past Year	--	-0.003**	-0.003**	-0.003**
Self-Reported Health	--	0.180**	0.180**	0.180**
Length of Service	--	0.010	-0.007	0.009
Enlistment*Combat	--	--	0.275	--
Veteran*Combat	--	--	-0.055	--
Enlistment*Male	--	--	--	0.188
Veteran*Male	--	--	--	0.231

--Not Applicable

**p<.05

*p<.10

DISCUSSION

My research reveals that there is a relationship between military service and drug use that does not differ based on gender or combat status. The results of the fixed effects estimates support Hypothesis 1; while respondents are enlisted in the military drug use is lower than for comparable civilians. Despite this decrease in drug use during active duty, it does not remain stable for servicemen and women exiting the military, therefore Hypothesis 2a and 2b were not supported; veterans are no different than civilians in terms of drug use. This finding was particularly interesting. Although it reveals that service does not decrease drug use from the level

of use in civilian life, it implies that drug use does not increase after service either. This is contrary to previous literature that found that after service drug use increased (Bray et al., 2010, Miech et al., 2013; Golub & Bennett, 2014; Vazan, Golub, & Bennet, 2013). In this case, military service may not act as a deterrent to drug use, but the effects of service do not necessarily harm its participants by instigating greater drug use after service either. I also found that respondents who served in a combat zone were no different in drug use than those who had not served in a combat zone. According to these results Hypothesis 3 was also not supported. Finally, Hypotheses 4 and 5 took into consideration the aspect of gender. According to my results Hypothesis 4 was not supported, in that female enlistees are less likely to use drugs than their civilian counterparts, and female enlistees are not different in terms of drug use compared to male enlistees. In addition, I found that female veterans are no different than male veterans in terms of drug use, thus supporting Hypothesis 5.

Unlike other studies on the military my study provides a longitudinal comparison of active-duty military personnel, veterans, and civilians. Furthermore, I provide results pertaining to differences across gender and combat experience. Finally my study has a built-in control for some aspects of selectivity into the military that could skew our results. First, the fixed-effects regression analysis allows for the control of many non-time-varying personality attributes that could contribute to the propensity of one to join the military. Second, the use of both the alcohol index and the delinquency index helps control for time varying “risky behaviors” that could be related to selectivity into the military as well (Hair et al., 2009; Teachman & Tedrow, 2014).

Although my findings are partially in line with our expectations there is one finding that is worth highlighting. It is interesting that while serving on active-duty in the military drug use decreases, but this decrease does not remain stable for veterans. This finding suggests that that

military service has no lasting effect on drug use in the long-term life-trajectory of respondents despite the 65% decrease in the odds of use while currently serving. These results are in direct contrast to previous findings on alcohol use, which suggest that while men are serving in the military they are more likely to use alcohol than civilians, and this finding remains stable after exiting the service (Teachman, Anderson, & Tedrow, 2015).

Despite the strengths of my study it is worth noting several limitations, most of which are due to the constraints of the limited availability of longitudinal data that tracks all three transitions over the life course (civilian, active duty, and veteran). The first notable weakness is the utility of the combat variable, which is measured in terms of whether a respondent has served in a combat/war zone. Although it addresses the combat question, it does so indirectly; the question does not inform us whether the respondent actually experienced combat, but rather if they served in a zone that was expected to see combat. Therefore some of the respondents that reported being in a combat zone may have never experienced the effects of combat.

Second, the NLSY-97 only tracks respondents until they are around 30 years old, thus the true long term effects of veteran status on drug use might not be evident until respondents are much older. Although no difference in drug use between veterans and civilians was found these results could be altered if the study followed-up on the respondents further into adulthood. On the other side of this argument, there is the possibility that several countervailing forces of selectivity into service are at play, making it difficult to isolate and definitively state which hypotheses and theoretical concepts are the closest to sufficiently describing what was observed in the results. Future research should aim to disentangle these forces so that the results of this study and future studies may be able to be more satisfactorily understood.

A third limitation to our study is the small sample size of those serving or who had served in the military. The small number of respondents makes it impossible to refine our results to account for variations in the nature of military service, such as rank or branch of service. In addition, the variable used to assess drug use is self-reported, so it may include some reports of prescription drug misuse rather than excluding prescription misuse entirely. Furthermore, it is important to consider the role of response bias in answers given to the drug question in the NLSY97, especially for those respondents who were actively serving in the military. These active duty respondents would have a greater propensity to bias their responses than veterans or civilians because of the particularly harsh sanctions of drug use while in the military, including immediate discharge from service (Bray, Kroutil, & Marsden, 1995; Bray, Spira, Olmsted, & Hout, 2010; Miech et al., 2013). Therefore, it is possible that an additional reason for the low levels of drug use reported while serving active duty is not solely due to the increased anti-drug regulations by the military, but also due to response bias, thus consequently resulting in a variation in the reliability of the drug use variable.

Fourth, the alcohol index weights each question equally, assuming that each question in the index is as valuable in understanding alcohol use as the next. This may not be the case, as some tendencies may be more or less indicative of alcohol dependency than others.

Finally, the even smaller number of women enlistees and veterans makes it difficult to assess the true effects of drug use, as well as the dynamics of military service (like serving in a combat zone) for women. It is also possible that the amount of missingness on these variables may also be hampering my results. It is possible that with a larger population of women veterans and enlistees some of the gender differences could be revealed.

CONCLUSION

In conclusion, the results of our fixed-effects analysis indicate that there is a relationship between military service and drug use. Enlisted members of the military use drugs less than comparable civilians, but this difference does not remain stable for veterans. It is also found that this relationship does not vary by gender or combat status. This information is important for increasing our understanding of the military and the effect it has on enlisted men and women as well as veterans. Further research should look with more detail into the effects of military service on drug use in the long term, as well as analyzing drug use across enlistees by branch of service, pay grade, or other important characteristics of service. Overall my research contributes to the literature by providing a longitudinally-based analysis that compares drug use for both veterans and enlistees with civilians, while controlling for some aspects of selectivity and comparing these differences across gender and combat status.

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