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Substance Use over the Military-Veteran Life Course: An Analysis of a Sample of OEF/OIF Veterans Returning to Low-Income Predominately Minority Communities

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Abstract

This paper presents an overview of substance use patterns of recent veterans returning to low-income predominately minority communities over four periods of the military-veteran career. Respondent driven sampling (RDS) was used so that unbiased estimates could be obtained for the characteristics of the target population. The majority of participants had used marijuana but no other illegal drugs. In the military, marijuana use was substantially lower and alcohol was the drug of choice; the majority were binge drinkers and nearly half were heavy drinkers. While deployed, alcohol and marijuana use were both lower, though some participants (6%) initiated the misuse of prescription painkillers. After separating from the military and returning to civilian life, heavy drinking was much lower, marijuana use increased, and some veterans misused prescription painkillers (7%). Further research based on these data will examine these distinct periods of substance use, contexts of use, related substance and mental health problems, treatment use and avoidance, and civilian reintegration.

Keywords

Veterans; prescription opioids; minorities; poverty; marijuana; heavy drinking; respondent driven sampling

1. Introduction

Substance use, excessive use, misuse and its attendant problems have presented health risks for many while serving in the military and after separation as a veteran. Substance misuse while in the military has important implications for combat readiness and for the assurance of clear and reasoned decision making in critical situations where lives are at stake. Substance use as a veteran may be associated with substance use disorders (SUDs) and other possibly related mental health problems including Post-Traumatic Stress Disorder (PTSD) and depression (Bray & Hourani, 2007; Bray et al., 2006; Heltemes, Dougherty, MacGregor, & Galarneau, 2011; Institute of Medicine, 2012; Jacobson et al., 2008). The continued misuse of substances may be associated with reintegration problems such as family distress,

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employment problems, and criminal behavior with legal consequences (Bohnert et al., 2011; NIDA, 2011; U.S. Army, 2012).

This paper examines substance use across the military-veteran career for one group who may be of particularly high risk, formerly enlisted veterans who served in Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF) who returned to low-income predominately minority communities between 2008 and 2012. Presumably many of these veterans came from these communities where the risk of substance misuse is high and therefore may be at the forefront of substance use related problems. The analysis examines this population's substance use during four distinct periods: before entering the military, while in the military but not deployed, while deployed, and since returning to civilian life. An awareness of the substances used and misused at each stage would help support development of appropriately targeted military and veteran substance misuse programs. Variation in substance use over time would suggest how substance use can change with availability and cultural expectations.

The list of substances examined in this study was similar to those included in the National Survey on Drug Use and Health (NSDUH) and included alcohol, cigarettes, marijuana, powder cocaine, MDMA, heroin, opium, methamphetamine and the use of several classes of drugs for non-medical purposes including any hallucinogens, stimulants, sedatives, tranquilizers, and prescription painkillers. These represent some of the most common drugs and categories of drugs that are used recreationally without a doctor's prescription. The intent was to see which substances emerged as the most commonly used in each period and the prevalence of use within the high risk population studied. For this analysis, use before entering the military was included as a baseline to identify the extent of any substance use prior to entering the military and whether there was a shift upon entering the military.

We first hypothesized that before entering the military, marijuana use would be widespread. Prior research has documented that the popularity of various drugs rise and then fall over time forming distinct drug epidemics (Bennett & Golub, 2012). The timing of these epidemics can vary across locations. In New York City, the Heroin Injection Epidemic peaked in the 1960s and early 1970s. The Crack Epidemic peaked in the late 1980s and early 1990s. Marijuana has been the drug of choice among youths and young adults since 1992 who constitute the majority of the current veteran study sample (Golub & Johnson, 2001; Golub, Johnson, Dunlap, & Sifaneck, 2004).

Next we hypothesized that alcohol use would predominate while in the military, but not when deployed. During the 1970s, the Department of Defense (DoD) embarked on a series of programs to eliminate illegal drug use in the military in response to widespread use during the Vietnam War Era (Bray, Marsden, Herbold, & Peterson, 1992; Department of Defense, 2013). These policies have included drug testing of potential recruits and existing service members. According to the DoD Worldwide Surveys of Health Related Behaviors, illegal drug use in the military declined to negligible levels since the levels identified in 1980 when the survey started (Bray & Hourani, 2007). However, alcohol use is still widespread. Heavy alcohol use (defined as five or more drinks per occasion on five or more occasions in the past 30 days) in the military declined modestly from 21% in 1980 to 15% in 1998, but increased back to 18% by 2007 which Bray and Hourani (2007) attributed in part to experiences of war and combat in Afghanistan and Iraq. Rates of binge drinking, heavy alcohol use, and alcohol-related problems have been shown to be higher among those exposed to combat (Jacobson, et al., 2008).

In our third hypothesis, we anticipated that while deployed, prescription painkiller misuse would be widespread. While on deployment access to alcohol can be limited. Many of the

prescription drugs available as medical supplies while on deployment such as painkillers have psychoactive properties and could be potentially used for recreational purposes. Accordingly, we hypothesized that prescription painkillers such as OxyContin and Vicodin would be misused regularly. The 2008 Department of Defense Health Behavior Survey reported that between 2002 and 2005, prescription drug misuse (especially painkillers) doubled among U.S. military personnel and almost tripled between 2005 and 2008 (Bray et al., 2009; Institute of Medicine, 2012; NIDA, 2011). These rising rates of prescription drug misuse among OEF/OIF veterans have been implicated in adverse health consequences (Institute of Medicine, 2012; U.S. Army, 2010; Wu, Lang, Hasson, Linder, & Clark, 2010).

Lastly, we hypothesized that after returning to civilian life, alcohol use would be widespread, marijuana use would be widespread, prescription painkiller use would continue, and heroin and possibly injection drug use would also be common. It was hypothesized that civilian reintegration in urban low-income predominately minority neighborhoods would be associated with extensive substance use and misuse given widespread availability of drugs, established habits and a less regulated lifestyle than in the military. It was hypothesized that veterans would use marijuana which is commonplace in the community while continuing their use of alcohol and painkillers as were common in the military. Historically, the challenges of military service have led many returning veterans to heavy use of alcohol and illegal drugs (Bennett & Golub, 2012; Bergen-Cico, 2011; Courtwright, 2001). It was further hypothesized that many OEF/OIF veterans would become heroin users because heroin provides a similar effect as prescription painkillers and is cheaper and widely available on the streets, while prescription painkillers are becoming increasingly harder to obtain due to more restrictive protocols regarding prescriptions and refills. This creates the potential for some veterans to turn to diverted prescription drugs or heroin to maintain their pain management regimen, particularly those individuals who were prescribed strong opioids while in the military (Harocopos, Goldsamt, Kobrak, Jost, & Clatts, 2009; Neaigus et al., 2006; Sherman, Smith, Laney, & Strathdee, 2002). Facing restricted access and elevated prices for prescription painkillers on the street could lead some veterans to shift to heroin and possibly injecting heroin as a more cost-effective way to reduce pain and/or obtain a psychoactive effect (Inciardi, Surratt, Cicero, & Beard, 2009).

2. Methods

2.1. Study Design and Participants

Data for this study came from the *Veteran Reintegration, Mental Health, and Substance Abuse in the Inner-City Project* sponsored by the National Institute on Alcohol Abuse and Alcoholism. This study is examining the experiences of 269 OEF/OIF veterans recruited between February 2011 and April 2012 in low-income predominately minority sections of New York City. All participants had been enlisted, and were required to have been discharged within the past two years although a few had been discharged for a few months beyond a strict two-year cutoff. Participants had separated from the military between August 2008 and March 2012. Potential participants completed an informed consent procedure in which the benefits and possible risks of participation were discussed prior to an interview. Potential participants were asked to show their DD214 to verify their military service. This unique identifier was also used to assure that participants were not included in the study more than once. Interviews were held in person in a mutually convenient private location. All recruitment, interview and data management procedures were approved by the project's Institutional Review Board.

Recent veterans living in low-income neighborhoods, including many who use illegal drugs, are often underrepresented in studies that use conventional survey methodology because they may lack a stable address or phone number or may be less likely to present at

mainstream institutions such as the Veterans Administration (VA) whose enrollment registers are often used in studies as a sampling frame. To circumvent this problem, we employed Respondent Driven Sampling (RDS). RDS is a network-based sampling approach that advances the convenience of snowball sampling by using a mathematical correction procedure that can correct for the bias inherent in the snowball sampling method (Heckathorn, 1997, 2011). The snowball sampling method starts with a few members of the target population, known as seeds, who are then asked to recruit other members of the target population in their social networks that are called referrals. The referrals provided by the initial seeds are referred to as wave 1. The wave 1 referrals then recruit more respondents (wave 2) and so forth. As the process continues, the number of recruits can potentially snowball, i.e., increase exponentially. Through this process, the researcher uses the respondents' own networks to efficiently access members of the target population. In this study, participants were paid $40 for completing the interview and an additional $20 incentive for each referral they provided who completed an interview.

Heckathorn (2011) provides a concise chronology of the development and advances in RDS estimation procedures. Snowball sampling had been introduced as a convenience method for studying hard-to-reach populations around 1960. It was understood that statistical inference with samples obtained in this manner was highly limited because the samples were likely biased and the direction and magnitude of any bias was unknown. Heckathorn (1997) showed that under suitable circumstances that RDS, a more systematic sampling procedure, eventually resulted in an unbiased sample. The characteristics of the seeds will not necessarily match those of the target population of interest. However, Heckathorn showed that under suitable circumstances that the characteristics of each successive wave of referrals get closer to those of the target population and reflect the composition of the seeds less and less, regardless of the characteristics of the seeds. Moreover, as the number of waves increase the characteristics of the complete sample eventually reflect the underlying proportions of the target population. A major problem with this original RDS estimation procedure was that it makes assumptions about the nature of “homophily” among segments of the target population, the propensity of a subpopulation to recruit other members that are similar to themselves (Heckathorn, 2011). Since then, more advanced procedures to correct for homophily and other potential threats to validity have been developed and have been made available online at the RDS web site (Heckathorn, 2012).

The RDS procedure is particularly appropriate when the target population is highly networked and social. Thus, RDS could not be used to study every topic. Ideally, the characteristics for the target population should be broadly known at least among members of the target population and serve as a basis for social interaction. To date, RDS has mostly been used to research specific sexual and drug-use behaviors (Abdul-Quadar et al., 2006; Heckathorn, 1997; Iguchi et al., 2009; Johnson et al., 2009; Lansky et al., 2007; Rusch et al., 2009; Shahmanesh et al., 2009; Wang, Falck, Li, Rahman, & Carlson, 2007; Wattana et al., 2007). To the best of our knowledge, this is the first project to use RDS to study a veteran population.

2.2. Measures

In general, questions were patterned after those appearing in the NSDUH (SAMHSA, 2010). Participants were asked “have you ever used …” each of various legal and illegal substances during four periods across the military-veteran life course: just before entering the military; while in the military but not on the most recent deployment; during the last deployment; and in the past 30 days-i.e., after separation from the military. The length of each period varied across participants depending on the extent of each participant's military career. Substances included alcohol, marijuana, powder cocaine, crack, MDMA, heroin, opium, methamphetamine, and other hallucinogens. Participants were also asked about the “use of

prescription drugs that were not prescribed for you or that you took only for the experience or feeling it caused," with respect to the following categories of prescription drugs: painkillers, stimulants, sedatives, and tranquilizers. We refer to this recreational use as "misuse" to distinguish it from authorized use of prescription drugs for medical purposes. Participants were asked if they "ever smoked cigarettes daily, or on most days." Binge drinking was assessed by asking participants, "Have you ever had 5 or more drinks on the same occasion?" if they were male, and "4 or more" if they were female. Heavy drinking was assessed by first asking participants, "On average, how many days per month did you drink an alcoholic beverage? If your drinking fluctuated, think about periods during which you were drinking." Then participants were asked, "On how many of those days did you have 5 or more drinks (4 for females) on the same occasion?" Binge and heavy drinking were assessed for each of the four time periods studied. Alcohol use disorder (AUD) and drug use disorder (DUD) since returning to civilian life were assessed using questions from the NSDUH which are based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition or DSM-IV (SAMHSA, 2010).

2.3. Analyses

The RDS Analysis Tool or RDSAT version 6.0.1 available from the RDS website was used to obtain unbiased prevalence estimates for the target population, except where noted (see Heckathorn, 2007; Heckathorn, 2012). In order to examine and highlight the ability of RDS to correct for bias inherent in the snowballing method of sampling, the sample characteristics were calculated twice: first using conventional procedures in SPSS (without the RDS corrections) and then using RDSAT (which controls for sampling bias). Both SPSS and RDSAT provided standard errors for prevalence rate estimates that were then incorporated into conventional z-tests in order to identify whether differences between the conventional and RDSAT estimates were statistically significant.

The paper examines the prevalence in use of various substances during each of the four distinct time periods identified above. RDSAT was used to obtain unbiased estimates for the target population in each period. The prevalence rate in each period was compared to the previous period using the conventional z-test based on the standard errors provided by RDSAT. This represents a less powerful test than the paired t-test commonly used for this purpose with conventional sample data as opposed to RDSAT. While version 6.0.1 of RDSAT does not support the more powerful paired t-test, the failure to account for recruitment bias that would arise using a conventional statistical product like SPSS was considered to pose a greater threat to the statistical validity of the findings.

3. Results

3.1. Participant Demographics

Table 1 presents both the sample characteristics calculated using conventional statistics in SPSS and the target population estimates calculated using RDSAT. The two sets of estimates often differed. Blacks were underrepresented in the sample by 13% ($1 - [61.0 \div 70.2]$), veterans age 19-29 were overrepresented by 14%, members of the reserves/guards were overrepresented by 115%, and veterans with 3 or more deployments were overrepresented by 54%. However, the only statistically significant difference was associated with military component. So, it is possible that with a larger sample that the differences between the sample characteristics and the target population would be smaller. Most of the target population were male (88%), Black (70%), age 19-29 (51%), had served in the army (64%), deployed only once (59%) and last served in Iraq (75%).

3.2. Substance Use across the Military-Veteran Life Course

Table 2 presents the variation in use of substances across the military-veteran career. The prevalence of alcohol use presents a striking pattern, increasing in the military, decreasing dramatically while on deployment, and then returning to pre-military levels after separation. While in the military, the majority of the target population engaged in binge drinking (62%) and almost half were heavy drinkers (43%). Daily cigarette use increased from 30% prior to entering the military up to nearly half (48%) after separation. At the time of the interview (after separation), nearly a third of the respondents screened positive for SUD (32%). AUD (28%) was more common than DUD (18%). Indeed, most veterans that screened positive for DUD (79%) were identified as having co-occurring AUD.

Marijuana (55%) was by far the most common illegal drug used prior to entering the military. The next most common illegal drug was powder cocaine (10%) followed by hallucinogens other than MDMA (4%) and MDMA (3%). Unlike alcohol use, the rate of marijuana use decreased substantially while in the military (20%) and further on deployment (9%). After separation, the rate of marijuana use (34%) was higher than in the military but lower than it had been prior to entering the military.

The misuse of prescription painkillers increased over the military-veteran career. Less than one percent of the target population misused prescription painkillers prior to entering the military. Few used them in the military (2%) in general, except on deployment (6%). The rate of use was slightly higher after separation (7%). Heroin and injection drug use were uncommon during each time period (less than 1% each).

4. Discussion

These findings partially support the hypotheses presented, provide an estimate of the extent of various substance use behaviors among a high risk population, and are consistent with social phenomena identified in other studies. Consistent with our first hypothesis, marijuana was the illegal drug most common among recruits from low-income predominately minority neighborhoods. More than half had used marijuana prior to entering the military. The findings provide partial good news for military drug policy efforts; use of marijuana as well as powder cocaine is much less prevalent within the military and even less prevalent while deployed. This is consistent with the possibility that various anti-drug efforts including the following are effective at greatly reducing, but not completely eliminating, marijuana use in the military: personnel taking military regulations and their military responsibilities seriously; increased drug testing and fear of repercussions; and lack of availability.

The substance of choice while in the military was clearly alcohol (consistent with our second hypothesis). Research is emerging that points to several factors during service that may promote the widespread use of alcohol in the military including stress, social isolation and boredom (Poehlman et al., 2011). Such factors may result in alcohol being used socially, recreationally, or for coping or alleviating stress. Prior research also suggests that shared attitudes and norms promote the heavy use of alcohol while in the military, in part as a display of masculine prowess, to shun the appearance of vulnerability, and to “being the best” at everything (Barrett, 1996; Finley, 2011). Poehlman et al. (2011) contend the military tacitly supports this behavior by readily allowing the procurement and consumption of cheap alcohol on some military installations. They also contend that younger and single military personnel are most likely to engage in the consumption of alcohol to the point of intoxication.

The findings of this study are also consistent with the idea that the pressures of and the culture of the military lead many to become daily cigarette smokers. Unlike with alcohol,

increased rates of smoking persisted after separation. This finding is consistent with the possibility that daily cigarette use may be a more difficult habit to break than drinking or even heavy drinking for many. It may also be the case that the stresses of adapting to civilian life after military service lead some to initiate or become more dependent on their cigarette use.

Prescription painkiller misuse has emerged as a serious and widespread problem. Government agencies report that prescription drug abuse and its consequences have reached epidemic proportions in the general population (Centers for Disease Control and Prevention, 2012; ONDCP, 2011) as well as among military personnel and veterans (Institute of Medicine, 2012; NIDA, 2011; U.S. Army, 2010, 2012; Wu, et al., 2010). Among veterans, this behavior may be rooted in using painkillers while deployed (our third hypothesis). The findings indicate that painkiller misuse while deployed was not widespread among the target population. This finding is consistent with two possibilities: either that recreational use of prescription painkillers is limited to some but not all sub-groups of military personnel or that the origin of painkiller misuse is primarily iatrogenic.

In contrast to our fourth Hypothesis, veterans returning to low-income predominately minority areas did not continue use of all of the substances that they had used during previous periods at the same rates, nor were heroin and injection drug use common. Marijuana use after separation was high but not as high as before entering the military. This lower level of use is consistent with the maturation theory that holds that people tend to reduce or desist from use of illegal drugs with age because their use is inconsistent with adult roles in mainstream society (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Golub, et al., 2004; Winick, 1962). Alcohol use and especially heavy use declined after separation which is consistent with the possibility that some participants had participated in a drinking culture while in the military and then left it behind after separation. The prevalence of painkiller misuse was substantial but not widespread indicating that this was an area of possible risk for a limited portion of the target population. Overall, heroin and injection drug use were uncommon. However, these practices could have been much more common among veterans who had used prescription painkillers. Additionally, given the prevalence of prescription painkiller misuse it is possible that heroin and injection use could still emerge in the future. Therefore, further analysis and monitoring of these drug use behaviors would be appropriate.

There are several important limitations to the generalization of findings from this study. The estimates provided are for a delimited population from one city. Caution should be taken with regard to generalizing these very specific findings to military personnel and veterans populations that differ by city or demographic attributes. This study is the first to use RDS to study veterans. Although RDS is intended to reduce the statistical impact of sampling bias, it may not have completely done so. RDS depends on subjects referring others within their social network and could therefore have failed to recruit and assess the experiences of the most socially isolated veterans. Further research is needed to study the extent of any such bias and how to improve estimation procedures if necessary.

5. Conclusion

The findings regarding which substances are most common at different points during the military-veteran career suggest various potentially appropriate interventions. As noted in the discussion, the findings support those of other studies that indicate that the military has been able to greatly reduce illegal drug use in the military, even among the high risk population in this study. On the other hand, heavy use of alcohol was quite common and many service members became involved with heavy use who had not been doing so prior to entering the

military. Thus, alcohol use would appear to be one of the military's primary substance use concerns for which increased intervention efforts may help promote health and help assure combat readiness. Cigarette use was also common both in the military and after separation suggesting a need for intervention at both times to reduce this health risk. The data support prior research that indicates that painkiller misuse on deployment and after separation needs to be addressed. However, the finding that painkiller misuse is substantial but not that widespread (6%-7%) suggests that changes in pain management services and associated mental health services may be the more appropriate domain for any intervention aimed at reducing prescription painkiller misuse than a broader effort aimed at preventing unauthorized use of prescription painkillers for recreational purposes.

This paper has examined substance use prevalence but not the larger context or consequences of substance use. The authors are involved with additional research that should help address these topics further. The authors are examining individual pathways through various substances across the military-veteran career as well as the covariates of substance use and changes in use across periods. The project is also analyzing qualitative data to reveal participants' understanding of the basis for their substance use, problems associated with use, and the mechanisms behind various use patterns. Lastly, the project is collecting follow-up data to examine the persistence of substance use behaviors among veterans, the association of substance use with mental health disorders, the association with reintegration problems, veterans' experiences with treatment, and barriers to treatment.

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Highlights

- Substance use varied substantially over the military-veteran career.
- Respondent driven sampling (RDS) was used to obtain unbiased estimates.
- In the military, alcohol was the drug of choice nearly half were heavy drinkers.
- While deployed and after separation 6%-7% misused prescription opioids.
- After separation, many returned to marijuana use, most stopped heavy drinking.

Table 1

A Comparison of Sample Characteristics with RDS Estimates of Prevalence Rates for the Target Population

Demographics	Sample Characteristics as % (conventional)	Target Population Estimates as % (using RDSAT)
Gender		
Male	85.1	87.8
Female	14.9	12.2
Race/Ethnicity		
Black	61.0	70.2
White (non-Hisp)	19.0	13.0
Hispanic (non-AA)	16.0	9.5
Other	4.1	7.3
Age		
19-29	58.4	51.4
30-39	30.5	34.9
40+	11.2	13.6
Military Branch		
Army	62.1	64.4
Marines	17.8	18.9
Navy	15.2	12.6
Air Force/Coast Guard	4.8	4.1
Component		
Active Duty	78.1	89.8**
Reserves/Guard	21.9	10.2**
Last Deployment		
OEF (Afghanistan)	19.0	17.9
OIF (Iraq)	71.0	75.0
Other	10.0	7.1
No. of Deployments		
0	2.2	3.6
1	54.3	58.9
2	28.6	28.2
3+	14.5	9.4

* Difference between sample characteristic and estimate significant at α=.05 level.

** Difference between sample characteristic and estimate significant at α=.01 level.

Table 2
Variation in Use of Various Substances over the Military-Veteran Life Course

	Percent that used during period			
	Before Military	**In Military**	**Last Deployment**	**Past 30 days**
Alcohol	68.4	80.0*	28.3**	60.2**
Binge Drinking	41.9	61.9**	20.2**	35.7**
Heavy Drinking	16.2	42.6**	5.6**	15.7**
Cigarette Use Daily	30.0	38.3	41.7	48.1[c]
Marijuana	54.9	20.0**	8.8*	33.7**
Powder Cocaine	10.0	5.0	1.5[b]	3.8
Crack	0.0†	0.4†	0.0†	0.4†
MDMA	2.8	6.0	1.8	1.2
Other Hallucinogens	3.9	1.5†	0.9†	1.4†
Methamphetamine	0.1	0.0	0.0	0.4
Prescription Stimulants[a]	0.7	1.8	1.6	1.0
Prescription Sedatives[a]	0.4	0.4	0.7†	2.0
Prescription Tranquilizers[a]	2.0	0.4†	1.1†	1.9†
Prescription Painkillers[a]	0.4	1.6*	6.3*	7.3
Heroin	0.2	0.0†*	0.0†	0.7†
Opium	0.4	0.7†	0.1	1.1†
Injected	0.1	0.0†	0.4†	0.7†

*Difference in use from previous time period significant at α=.05 level.

**Difference in use from previous time period significant at α=.01 level.

†RDS could not estimate the proportion due to non-connectivity. The sample percentage is provided instead.

--Data not collected.

[a]For the experience or feeling it caused.

[b]The difference in use before the military and while deployed was significant at α=.01 level.

[c]The difference in use from before the military to past-30-days was significant at α=.01 level.