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Substance Use and Other Mental Health Disorders Among Veterans Returning to the Inner City: Prevalence, Correlates, and Rates of Unmet Treatment Need

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Abstract

Estimates of substance use and other mental health disorders of veterans ($N = 269$) who returned to predominantly low-income minority New York City neighborhoods between 2009 and 2012 are presented. Although prevalences of posttraumatic stress disorder, traumatic brain injury, and depression clustered around 20%, the estimated prevalence rates of alcohol use disorder, drug use disorder, and substance use disorder were 28%, 18%, and 32%, respectively. Only about 40% of veterans with any diagnosed disorder received some form of treatment. For alcohol use disorder, the estimate of unmet treatment need was 84%, which is particularly worrisome given that excessive alcohol use was the greatest substance use problem.

Keywords

veterans' reintegration; substance use and mental health disorders; prevalence estimates; unmet treatment need; respondent-driven sampling (RDS)

INTRODUCTION

This article analyzes the prevalence and covariates of substance use and mental health disorders as well as the rates of unmet treatment need among veterans who returned to predominantly low-income minority New York City neighborhoods between 2009 and 2012. A number of recently published reports documented the psychological toll of the two longest wars in US history—Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF)—on troops (IOM [Institute of Medicine], 2012a, 2012b; Tanielian & Jaycox, 2008; US Army, 2010). Repeated deployments (with short dwell time between them), combat exposure, and dealing with death, injuries, and chronic pain as well as separation from loved ones have been associated with ever increasing rates of post-traumatic stress disorder (PTSD), traumatic brain injury (TBI), and depression (Bass & Golding, 2012; Finley, 2011; SAMHSA [Substance Abuse and Mental Health Services Administration], 2008; Wells et al., 2010; Yano et al., 2012). In addition, large numbers of service members engage in heavy drinking, misuse of substances (primarily prescription drugs), smoking of tobacco, and in many cases, develop substance use disorders (SUDs).

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

A recent report on SUDs in the US Armed Forces (IOM, 2012a) described the present situation as a public health crisis potentially undermining the armed force readiness and psychological fitness. The 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (Bray et al., 2009) established that almost a half of all Active Duty service members (47%) engaged in binge drinking and 20% in heavy drinking in the past 30 days. Misuse of prescription drugs affected 11% of respondents, 30% reported smoking cigarettes, and 10% were heavy cigarette smokers (one pack or more daily). These alcohol and drug-use-related behaviors continue after the discharge from military, especially among those veterans who are having difficulties with successful reintegration into civilian life.

As documented in the recent analysis of young veterans' substance use based on the National Survey on Drug Use and Health (NSDUH) data from 2004 to 2010 (Golub, Vazan, Bennett, & Liberty, 2013), 44% of veterans engaged in binge drinking, 14% in heavy drinking, 11% in marijuana use, and almost 4% misused prescription drugs. The rates of substance-related disorders were as follows: alcohol use disorder (AUD; that is defined as either dependence or abuse following DSM-4 criteria) 15%, drug use disorder (DUD) 5%, and substance use disorder (SUD, which is AUD or DUD or both) 18%.

Importantly, these estimates are two to three times higher than those based on the NSDUH data from 2000–2003 (Wagner et al., 2007), that is, from the time period just before or at the start of the wars in Afghanistan and Iraq. In addition, the prevalence rates of AUD 6%, DUD 1.5%, and SUD 7% are based on veterans of all ages, whereas Golub and colleagues included only veterans aged 21–34 in order to maximize the chance of excluding non-OEF/OIF veterans (since the NSDUH does not collect information about deployments). In both studies, however, these rates underestimate the total number of veterans who are experiencing SUDs and their associated problems because they do not include veterans living in institutions including Veterans Affairs (VA) hospitals, substance abuse treatment programs, and homeless shelters.

Prevalence of Mental Health Disorders Among OEF/OIF Veterans

Compared to the general US civilian population, rates of PTSD, major depression, and probable TBI among OEF/OIF veterans are relatively high. A telephone study of 1,965 previously deployed individuals (Schell & Marshall, 2008) sampled from 24 geographic areas found substantial rates of mental health problems in the past 30 days, with 14% screening positive for PTSD and 14% for major depression. Although a substantial proportion of respondents had reported experiencing a TBI (19%), the authors state that it is not possible to know from the survey the severity of the injury or whether the injury caused functional impairment (Schell & Marshall, 2008).

A more recent report on New York State's returning veterans (Schell & Tanielian, 2011) found a relatively high percentage of veterans (22%) with a probable mental health diagnosis based on symptoms over the prior 30 days, with approximately equal numbers screening positive for major depression and for PTSD (16% for each). Ten percent of the sample met criteria for both PTSD and depression. Other published estimates of PTSD vary widely because the assessment tools used to identify the conditions, the criteria used to identify cases, and the subgroup of service members and/or veterans sampled differ between studies (Bass & Golding, 2012). Among previously deployed personnel not seeking treatment, most prevalence estimates for PTSD range from 5% to 20%. Prevalence estimates are generally higher among those seeking treatment, though not all who seek treatment receive a PTSD diagnosis (Ramchand et al., 2010).

There were almost half a million OEF/OIF veterans treated by Veterans Health Administration (VHA) between 2004 and 2009, of which 26% were diagnosed with PTSD and 7% were diagnosed with a TBI; 5% of veterans were diagnosed with both PTSD and TBI. Thus, about three out of four OEF/OIF veterans with a diagnosis of TBI had a concurrent PTSD diagnosis (Bass & Golding, 2012). Many researchers have estimated TBI prevalence among different groups of service members and veterans, but there is no consensus as to the prevalence rate among the entire OEF/OIF population. For instance, researchers have found that the proportion of service members who experienced a TBI, including those who no longer had symptoms, ranged from 15% to 23% and that the proportion of service members who had symptomatic TBI after returning from deployment ranged from 4% to 9% (Carlson et al., 2010, 2011).

Besides PTSD and TBI, 21% of veterans using VHA's services from October 2001 through June 2011 were diagnosed with a depressive disorder. Other mental health conditions commonly diagnosed among veterans were anxiety and drug or alcohol abuse (Bass & Golding, 2012).

Rates of Met and Unmet Treatment Needs of OEF/OIF Veterans

As opposed to the prevalence estimates of mental health disorders based on treatment-seeking population (that tend to be higher than estimates based on nonseeking population), the prevalence estimates for SUDs tend to be lower. This is most likely due to the perception of stigma attached to SUD diagnoses as well as due to the lack of universal screening the consequence of which is that clinicians may detect substance-related problems only when veterans present for other mental health issues.

Seal and colleagues (2011) analyzing health records of 456,502 Iraq and Afghanistan US veterans who were first-time users of VA healthcare between October 2001 and September 2009 found that over 11% received SUD diagnoses, out of which 10% received AUD diagnoses, 5% received DUD diagnoses, and 3% received both. Even though the rate of DUD is the same as the above NSDUH estimate, the AUD rate was estimated about 5% higher in the NSDUH data (Golub et al., 2013). Clearly, the results based on a treatment-seeking population of OEF and OIF veterans enrolled in VA health care may not generalize to all separated OEF and OIF veterans (Seal et al., 2011). The additional reason is that veterans may be seeking treatment outside of the VHA system.

According to the Treatment Episode Data Set data for 2010, there were 17,641 admissions to primarily publicly funded treatment facilities (excluding VHA) of veterans aged 21–39. Fifty-one percent of these admissions reported alcohol as their primary substance of abuse compared to just 34% of nonveteran admissions. In contrast, veterans were less likely to report heroin as the primary substance of abuse (9% vs. 17%), marijuana (12% vs. 18%), methamphetamine (6% vs. 8%), and cocaine/crack (6% vs. 7%). The proportion of admissions for other opiates was 12% for both groups (SAMHSA, 2012b). The fact that half of all treatment admissions involved alcohol as the primary substance of abuse clearly indicates the direction for needed prevention and intervention strategies.

Other studies have also found high rate of alcohol use among veterans, but in addition, they also noted high rates of unmet treatment needs for SUD and mental health problems. In a study of 120 OEF/OIF returnees, about 33% experienced alcohol misuse but only 18% of those screening positive for alcohol abuse reported using any health and support services (Erbes, Westermeyer, Engdahl, & Johnsen, 2007). In contrast, from the 12% who screened positive for PTSD, 56% reported using mental health services. Similarly, a special report on the needs of some 900 New York State's returning veterans documented that approximately half of the sample had a probable need for treatment defined by either a current probable

diagnosis (see above) or a self-indicated need for treatment. About a third of those with a need for treatment had sought mental health services in the prior 12 months but just slightly more than half of those who sought help received treatment (Schell & Tanielian, 2011). In other words, of the approximately 450 veterans with a treatment need, only about 18% received treatment.

Finally, the SAMHSA has used the NSDUH to produce a series of articles examining mental health concerns and unmet treatment need among veterans in the general population. They found that 60% of veterans (aged 21–39) with a major depressive episode (MDE) received treatment (SAMHSA, 2008), but—in another analysis—only 15% of veterans of all ages who were dependent on alcohol or drugs were treated in the past year (SAMHSA, 2005). A more recent analysis of the NSDUH data from 2004 to 2010 focusing on young veterans' (aged 21–34) unmet treatment needs (Golub et al., 2013) yielded comparable estimates. Of those who screened positive for serious psychological distress, which is a nonspecific diagnosis of serious mental health concerns, 43% received treatment whereas of veterans with SUD, only 11% had their treatment need met.

This article replicates the NSDUH analyses of unmet treatment needs of veterans using recently collected data in low-income, predominantly minority New York City neighborhoods and presents estimated prevalences and covariates of SUD, PTSD, TBI, and major depressive disorder (MDD) in a veteran population that faces specific challenges in the process of reintegration into civilian life.

Study of Minority Veterans Returning to the Inner City

Despite the vast and still growing literature on mental health concerns and well-being of the returning troops, little work has assessed the distinct role that urban poverty and minority status might play—both upon the prevalence rates of mental health concerns and as a potential (institutionalized) barrier to treatment. Historically, poorer, inner-city minority communities have had high rates of drug use and misuse and numerous associated problems including drug-related crime, blood-borne disease (HIV/HCV), and other public safety and health consequences (Bourgois, 2003; Golub, Johnson, & Dunlap, 2007). In New York City, these marginalized communities endure high rates of incarceration, joblessness, and homelessness; as an alternative, many young men and women join the military seeking a better life. Indeed, military recruiters tend to target low-income residents who are searching for a way out of poverty (Anderson, 2009).

The present analysis is part of a larger 5-year panel study of veterans reintegrating to civilian life in the inner city. Given the potentially graver life circumstances of this subpopulation, we expect to see higher prevalence of substance use and mental health disorders compared to estimates established in studies examining nationally representative samples of veterans. Participants were recruited using respondent-driven sampling (RDS), an innovative sampling procedure that allows researchers to calculate unbiased estimates of the characteristics of a target population (described further in the Methods section). Since this analysis focuses primarily on veterans returning to low-income, predominantly minority neighborhoods in New York City, the estimates in this article are not representative of all recent veterans. However, they are representative of a subpopulation that is of particular interest due to the vulnerabilities and potential risks that make their reintegration harder than that of other veterans.

METHODS

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. Following a recruitment criterion that veterans have been discharged from the military within the past 2 years, 269 veterans were recruited between February 2011 and September 2012. Potential participants completed informed consent and were paid \$40 for completing an interview. All recruitment, interview, and data management procedures were approved by the Institutional Review Board at the National Development and Research Institutes.

The project used RDS so that unbiased estimates for the target population could be obtained. RDS is similar to but represents a major advancement over snowball sampling (Heckathorn, 1997, 2002). Both RDS and snowball sampling are network-based approaches that start with a few members of the target population called *seeds*. The *seeds* are then asked to recruit other members of the target population that are called *referrals*. In this study, participants were provided with a \$20 incentive payment for each referral they provided who completed an interview. The referrals of the initial seeds are referred to as *wave 1*. The wave 1 referrals were then asked to recruit more respondents (wave 2) and so forth. Through this process, the researcher uses the respondents' own networks to efficiently access members of the target population. The approach is particularly useful when a complete enumeration of a sampling frame is not readily available. To date, RDS has mostly been used to study specific sex 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) as well as to study jazz musicians (Jeffri, 2003) and Cornell University undergraduate students (Wejnert & Heckathorn, 2008). To the best of our knowledge, this is the first study to use RDS to study a veteran subpopulation.

Measures

Participants were asked about legal and illegal substance use during several periods across the military-veterans life course: before entering the military, while in the military but not on the most recent deployment, during the last deployment, since returning to civilian life, and in the past 30 days. Binge drinking was defined as having five or more drinks on a single occasion for a male and four or more for a female. Heavy drinking was defined as binge drinking on 5 or more out of 30 days (SAMHSA, 2010a). Other set of questions asked about illegal drugs and the illicit use of prescription drugs. These questions were patterned after the NSDUH, which defines SUD as abuse of or dependence on alcohol or illicit drugs. Accordingly, SUD is based on the combination of AUD and DUD. Both AUD and DUD questions from the NSDUH are based on the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, or DSM-IV (SAMHSA, 2010b).

PTSD was assessed by the 17-item PTSD Checklist designed for use in the military using a standard cut point of 50 and including at least one intrusion, three avoidance, and two hyperarousal items (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Karney, Ramchand, Osilla, Caldarone, & Burns, 2008). TBI was assessed with a screener used by the US Military in the Post-Deployment Health Assessment that identifies traumatic events and related consequences (US Department of Defense, 2008). If at least one listed injury event and at least one type of alteration of consciousness is endorsed, then the individual is considered likely to have sustained a TBI (Schwab et al., 2007). MDD was assessed using the nine-item Patient Health Questionnaire screener or PHQ-9 (Kroenke, Spitzer, &

Williams, 2001) and was identified as having at least five of the nine symptoms occurring on at least half of the past 30 days and one of the symptoms so identified was either anhedonia or depressed mood. In addition, functional impairment was also required to classify a person as having MDD (Hoge et al., 2004). The variable, any mental health (AMH), was created as a combination of PTSD, TBI, and MDD and identified all veterans who screened positive for at least one of these three disorders. Finally, unmet need for SUD and other mental health treatment was estimated for those respondents with the condition that did not receive treatment since return to civilian life.

Analyses

RDS assumes that the referral probabilities within a population form a Markov chain (Heckathorn, 1997). The Markov property requires that the probability of referral depends solely on the characteristics of the referring participant and not on any other characteristics of the referral chain leading up to that point. Presuming the Markov property holds and that the network is irreducible, the referral probability data can be used to estimate the prevalence of persons with a given characteristic within the target population. The referral probability data reach a steady state (or equilibrium) after several rounds of referral and after the equilibrium is achieved, there is a steady probability that a participant with one characteristic (e.g., male) will refer a participant with another characteristic (e.g., female).

This study used the RDS Analysis Tool or RDSAT version 6.0.1 available from the RDS website (Heckathorn, 2007, 2012). RDSAT estimates the prevalence of characteristics and uses a bootstrap procedure to estimate standard errors (SEs). However, since RDSAT currently does not provide an option to conduct regression analyses, we used SPSS for evaluating covariates. In the logistic regressions presented, the data are treated as a convenience sample. Thus, instead of transitional (or referral) probabilities, the analyses are based on conventional sample characteristics.

Logistic regression was used to estimate how the prevalence of AUD, DUD, and SUD, as well as PTSD, TBI, MDD, and AMH varied across participant characteristics. Logistic regression has the highly desirable property of deriving adjusted odds ratios that estimate the partial association of each factor with the dependent variable net of all other covariates included in the model (Hosmer & Lemeshow, 1989). The Wald statistic was used to test whether the variation associated with each variable was statistically significant. The analyses included three groups of covariates: demographics (gender, race/ethnicity, age, education); variables assessing military experience (military branch, component, country of last deployment, and number of deployments); and the reintegration experience variables (current school attendance, employment, family income, marital status). The relatively small sample size imposed restrictions on the number of covariates in the logistic regression models. Other variables of interest that could be included if larger sample were available are proxy variables for combat exposure, type of discharge from military, extent of disability, homelessness, criminal justice history, treatment history, and parenting status.

RESULTS

Sample Characteristics and RDS Estimates of the Target Population

Table 1 presents both the sample characteristics and the target population estimates calculated using RDSAT. The two sets of estimates quite often differed. High school graduates were underrepresented by 13% and unemployed and currently not in school veterans were under-represented by 18%. On the other hand, veterans who are currently enrolled in a degree program are overrepresented by 13% and those with higher income are over-represented by 11%. There are also differences between the two sets among items

describing military experience: members of the reserves/guards were overrepresented by 12% (at the expense of Active Duty service members) and veterans who received General discharge were underrepresented by 8%.

Most of the target population were male (88%), Black (70%), aged 19–29 (51%), only 5% were college graduates, more than half (53%) were unemployed and were not attending school, and only 20% had higher income. Most veterans were not living with a partner (87%), only 8% of them were married, and another 6% were cohabiting with an intimate partner, even though overall 26% of veterans were having an intimate relationship. Twenty-five percent of the target population was homeless after their return to civilian life.

With regard to the military history and experience, the majority served in the army (64%), were in Active Duty (90%), last served in Iraq (75%), and deployed only once (59%). Forty-five percent received honorable discharge. Six percent received other than honorable discharge (which included Bad Conduct and Dishonorable Discharge). Table 1 also describes a range of combat experiences: feeling danger of being killed (62%), being under attack (68%), shooting at enemy (39%), killing enemy combatant (34%), and killing a noncombatant (8%). Nine percent were injured in combat and 20% were on disability at the time of the interview.

RDS Estimated Prevalence of Substance Use Across the Military-Veteran Life Course

Table 2 shows the RDS estimated rates of substance use over the military/veteran life course, that is, before joining the military, in the military (excluding the last deployment), during the last deployment, and in the past 30 days. All three measures related to alcohol use (i.e., any alcohol, binge drinking, and heavy drinking) reveal the same pattern over time: compared to the time before joining the military, alcohol consumption increased in the military, then substantially decreased during the last deployment, and returned to the premilitary service levels after the separation from military. Cigarette smoking also substantially increased after joining the military, but in contrast to alcohol, the upward trend of smoking continued also during the last deployment and reached the peak in the past 30 days. The trajectory of marijuana use declined sharply on entering the military and continued the decline further while deployed. After separation, marijuana use increased but not to the level prior to military service. A similar, though much flatter, profile can be seen in the use of powder cocaine. Finally, whereas heroin use was uncommon over the life course, the illicit use of painkillers increased in every period.

Estimated Prevalence Rates of Substance Use and Mental Health Problems

Table 3 describes the prevalence of substance use and mental health problems in the target population. As shown in the table, the rate of AUD was 10% higher than the rate of DUD (28% vs. 18%). But since the rate of SUD (i.e., AUD or DUD or both) is only about 4% higher than the rate of AUD, it indicates that the majority of veterans with DUD (15%) also had AUD. The prevalence of PTSD, TBI, and MDD were each about 20%. However, not the same people were affected by these disorders: in fact, just 5% were affected by all three. The largest comorbidity group was between PTSD and MDD (11%), followed by PTSD and TBI (9%), and TBI and MDD (8%). Thirty-six percent of the sample suffered from any combination of these three mental disorders. The prevalence of the co-occurring SUD and mental health disorders was 18%. Finally, 48% of veterans met the criteria for either SUD or some other mental health disorder.

Covariates of Substance Use and Mental Health Disorders Among Veterans

Table 4 presents results of seven logistic regression analyses with individual as well as combined substance use or mental health disorders as dependent variables. The three groups

of covariates that were tested included four demographic, three reintegration, and four military variables. Starting with AUD, the table shows that White veterans were six times more likely and Hispanics were four times more likely to have AUD than Black veterans. Higher level of education was related to lower prevalence of AUD: compared to veterans who did not continue studies after high school, those who had some college were only 30% as likely to have an AUD and those with the college degree were just 10% as likely to have an alcohol disorder.

With regard to DUD, none of the covariates emerged as being significantly related to this disorder. This may be related to the fact that only a small number of veterans had DUD. However, when DUD was combined with AUD (see the SUD column), in addition to race/ethnicity and education that show a very similar pattern of results as discussed above in connection with AUD, a robust relationship with marital status was found. As opposed to married veterans, single veterans were 3.5 times more likely to have substance-use-related problems, whereas divorced, separated, and widowed veterans were up to six times more likely to have substance-use-related problems. Surprisingly, in contrast to marriage, cohabitation does not appear to be a protective factor against substance abuse. Cohabiting veterans were almost eight times more likely to have substance-use-related problems than married veterans.

The only gender difference observed was in the likelihood of meeting the PTSD criteria: women were almost three times more likely than men to screen positive for PTSD. Another significant covariate of PTSD is the number of deployments: whereas being deployed twice increased the risk of developing PTSD only slightly, veterans with three and more deployments had five times higher likelihood of having PTSD compared to those who deployed just once.

The largest number of significant covariates emerged for TBI. Compared to Black veterans, all other racial categories were more likely to meet criteria for TBI; specifically, Hispanic veterans were almost twice as likely to sustain TBI, followed by veterans of “other” race/ethnicity (OR=2.6), and White veterans who were over three times more likely to meet the TBI screening criteria. Veterans with a college degree had 10 times smaller likelihood of having TBI, which perhaps suggests that these veterans did not have as much combat exposure as those with lower educational status. As shown in the table, TBI was also related to employment—veterans with a job had only 10% likelihood of meeting TBI criteria. Clearly, in this case, a reverse causation can be inferred, since those who did not sustain brain injury are much more likely to be employed. On the other hand, we are unsure how to interpret the finding that veterans enrolled in a degree program were 2.4 times more likely to have TBI than those not currently in school or holding a job.

In the group of military-service-related variables, members of the Army from among all military branches had the highest likelihood of a probable TBI. Marines were only half as likely to meet TBI criteria, and the Navy and Air Force (combined with Coast Guard) had even smaller odds of sustaining a TBI. Similarly to what was seen for PTSD, veterans with three or more deployments were four times more likely to meet criteria for TBI.

With regard to MDD, Black veterans were the least likely to be depressed; in contrast, Hispanics appeared to have more than four times higher likelihood of meeting the screening criteria for MDD. Depression was also related to age—with higher age the likelihood for being depressed grew larger—and to education; the lower the education, the higher the odds of being depressed.

Finally, AMH disorder was significantly related to race/ethnicity, employment and/or study, and military component. As before, Black veterans were the least likely to develop a

disorder, whereas veterans of other race/ethnicity (a group consisting of just 11 respondents) were the most susceptible to having some type of mental health issue. Following the pattern seen in the analysis of TBI, employed veterans were only 30% as likely to have any type of mental health concern, while those who were studying and not working appear to be more susceptible. Reservists and members of the National Guard were only half as likely to be diagnosed with a mental health disorder.

Estimated Prevalence of Met and Unmet Treatment Needs

Figure 1 depicts the RDS estimated rates of met and unmet treatment needs for SUDs and other mental health conditions among veterans. Note that in addition to the RDS percentage values shown within the bars in the figure, relative percentages of unmet treatment need are placed under each category label. These numbers are the subgroup percentages expressing the proportion of unmet treatment need among all those with a specific condition (the estimated prevalence rate of each condition is shown by the height of each bar).

The figure shows that 4% of all veterans received treatment for AUD, while 24% of veterans had their AUD treatment need unmet. In other words, 84% of all veterans with AUD did not receive treatment they needed. In contrast, the estimated rate of treated DUD amounts to more than a half of all veterans with DUD. The third bar shows that 13% of veterans received treatment for at least one of their alcohol/drug disorders and 19% of veterans had none of their treatment needs met. This latter group represents 60% of veterans with an SUD.

Next, the figure shows that the prevalence rates for PTSD, TBI, and depression were very similar, around 19%–21%, although the treatment rates for these conditions vastly differed. Almost two thirds of veterans with PTSD received treatment while the remaining 35% did not. This represents the highest treatment rate for any given condition. In sharp contrast, 91% of all those who screened positive for TBI did not have their treatment need met. RDS estimated that of all veterans, only 2% received treatment for TBI, which represents just 9% of veterans with the condition. Even though the RDS estimated prevalence rate of MDD is virtually identical with the rate of PTSD, the proportion of treated to untreated depressed veterans was exactly the opposite of what was seen for PTSD.

Finally, combining all three disorders illustrates that almost 36% of all veterans manifested one or more of these mental health conditions. Almost 15% of all veterans received some treatment but over 20% of veterans received no treatment. This number translates to 58% unmet treatment need rate for any of the three mental health concerns. This proportion of unmet need appears to be almost the same as the one for SUD. Thus, for both groups of disorders, only about 40% of veterans in need received some form of treatment.

DISCUSSION

The traumas associated with serving in a war combined with the challenges of returning to inner-city communities that lack social service resources, jobs, and housing can lead to increased mental health problems for veterans. Because the United States currently has a voluntary military, social inequality may now play a greater role in mental health outcomes as individuals from disadvantaged social locations enlist in the military for the income, skills-training, and educational benefits (Luchins, 2008), only to endure traumatic war-time experiences that can in turn carry over to civilian readjustment, manifesting as SUD. The present data indicate that 48% of veterans returning to the low-income and predominantly minority neighborhoods of New York City meet the criteria for either SUD or other mental health problem and that 18% of veterans have co-occurring substance use and mental health disorder.

The prevalence rates of veterans' substance use, SUDs, and mental health problems presented in this article are not only higher compared to the general population but also higher than rates that were established in other studies of veterans returning from Iraq and Afghanistan. Based on the data collected for the present study and using RDS estimates, the prevalence rate for PTSD was 19%, for major depression (MDD) 20%, and for TBI 21%. In contrast, lifetime prevalence for PTSD in the general US population was estimated at 8% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) and for MDD at 16% (Kessler et al., 2003).

To compare the present results with other studies on veterans, two representative publications by RAND researchers were chosen, Tanielian and Jaycox (2008) and Schell and Tanielian (2011). The prevalence rates of PTSD and depression in both publications are 14% and 16%, which is 3%–5% less than the PTSD estimate and 4%–6% less than the estimate for depression presented here. In addition, Schell and Marshall (2008) assessed the prevalence of probable TBI, which is also somewhat lower than the rate presented here (19% vs. 21%). Compared with the rates based on the clinical data, however, the 26% prevalence of PTSD established in the VHA settings is 7% higher than the current sample estimate, but for depression, the difference is very small—about 1%–2% higher rate for the clinical sample (Bass & Golding, 2012; Seal et al., 2011). Given that the prevalence estimates are usually higher within the treatment-seeking population, it is noteworthy that the extent of mental disorders among inner-city veterans is not so different from the clinical population.

Moreover, the estimates of SUDs presented here are substantially higher than those based on the VHA clinical data from 2001 to 2010 (Seal et al., 2011) and on aggregated NSDUH estimates from 2004 through 2010 for the young veteran population (Golub et al., 2013). The current estimate for AUD is almost three-to-six times higher (28% vs. 10% NSDUH and 5% VHA), while DUD estimated prevalence rate was higher by 13% (18% vs. 5% for both NSDUH and VHA). The differences between the present findings and NSDUH estimates apparently reflect the differences between the nationally representative sample of veterans (aged 21–34) and the inner-city sample of veterans recruited in one location with large minority population. The lower prevalence of SUD in the clinical settings (11% vs. 32%) may be a reflection of the presence of treatment barriers, which can be either psychological (fear of stigma or not believing in mental health treatment) or cultural/institutional (fear of harm to one's career), and/or socio-economic and logistic (financial hardship, transportation issues, etc.; Schell & Tanielian, 2011).

Comparisons of Current Rates of Substance Use, Cigarette Smoking, and Alcohol Use

To continue the comparison between the prevalence rates established in this article with the NSDUH data (Golub et al., 2013), the estimates of substance use in the past 30 days show three times higher prevalence of marijuana use (34% vs. 11%) and two times higher rates of cocaine and painkiller misuse (4% vs. 2% and 7% vs. 3.5%, respectively). Other articles in this issue focus on the problem of prescription drug misuse in the military and in the veteran population (see Golub & Bennett; Bennett, Elliot & Golub, 2013).

The estimated prevalence of cigarette smoking was 18% higher in the past 30 days than before entering the military (48% vs. 30%). Also, the estimate for the prevalence of smoking in the military based on the current data was 38%, which is 6% higher than the smoking rate of military personnel (32.2%) found in 2005 (IOM, 2009). US troops in Iraq and Afghanistan have been reported to smoke at twice the rate of other Americans (Kirby et al., 2008). Given the latest available statistics of smoking in the US civilian population (Schiller, Lucas, Ward, & Peregoy, 2012), the prevalence of smoking during the last deployment reported here is, in fact, 2.2 times higher (42% vs. 19%). Even after leaving the service,

many veterans continue to smoke: the estimate for the past 30 days is 6% higher than the rate from the last deployment (48% vs. 42%). The ever increasing smoking rates suggest that certain aspects of military service may foster smoking. These factors may include peer influence, combat stress, boredom, and easy access to cheap tobacco products (Nelson & Pederson, 2008).

However, by far, the most worrisome trend appears to be drinking behavior both in the military (though not during the last deployment) and at present. The estimate for drinking any alcohol while in the military was 80%, for binge drinking 62%, and for heavy drinking 43%. Even though the estimates from the past 30 days show 20%–25% reduction in drinking (any 60%, binge 36%, heavy 16%), they are still very high compared to the latest 2011 NSDUH general population estimates (any 52%, binge 23%, heavy 6%; SAMHSA, 2012a)—a difference of 8%–13%. Research suggests that alcohol use often escalates following the experience of combat and usually persists as veterans face obstacles in their adjustment to civilian life (Finley, 2011; Jacobson et al., 2008).

The available data from clinical settings confirm the increasing trend of alcohol misuse in the latest military/veteran cohort. Hawkins, Lapham, Kivlahan, and Bradley (2010) analyzed medical records of 12,000 veterans treated in the VA health care system. Examining gender differences between OEF/OIF and non-OEF/OIF veterans, they found that the prevalence of alcohol misuse was twice as high in OEF/OIF men than non-OEF/OIF men (22% vs. 11%) and no reliable difference was found for women (Hawkins et al., 2010). Furthermore, along with the staggering drinking rates in the military, a corresponding increase in hospitalization has been noted. As documented in the IOM (2012a) report on SUDs in the US Armed Forces, the number of bed days attributable to chronic alcohol abuse diagnoses roughly quadrupled over the 10-year period. Collectively, the data indicate that excessive alcohol use is a much greater substance use problem than illicit drug use or prescription drug misuse (IOM, 2012a).

Covariates of Substance Use and Mental Health Problems

The present article focused on veterans returning to predominantly low-income minority neighborhoods of New York City. Seventy percent of this target population was estimated to be Black. Quite unexpectedly, however, Black veterans had lower likelihood of meeting criteria for AUD, SUD, TBI, MDD, and AMH than White and Hispanic veterans from the same neighborhoods. White veterans had the highest rate of AUD, SUD, and TBI, whereas Hispanics were most depressed. Beside race/ethnicity, education emerged as another strong covariate: college graduates were 10 times less likely to have AUD, SUD, TBI, and MDD. Veterans with some college were only 30%–60% as likely as those who did not continue their studies after high school to have substance use and mental health issues.

Older veterans (40+) were almost seven times more likely to be depressed than younger veterans and females were almost three times more likely to meet the criteria for PTSD than males. This finding is somewhat surprising because females are usually less likely to receive PTSD diagnosis than males, though they are often significantly more depressed (Maguen, Ren, Bosch, Marmar, & Seal, 2010; Seal, Bertenthal, Miner, Sen, & Marmar, 2007). However, in a prospective study that used a deployed and nondeployed Millennium Cohort sample, new onset of self-reported PTSD symptoms was proportionally higher in women than in men overall (3.8% and 2.4%, respectively) and significantly higher after stratification by service branch, except for the marines (Smith et al., 2008).

Examining the reintegration-experience-related covariates, we found that family income (expressed as a degree of poverty compared to the poverty threshold) was not significantly related to any of the disorders. In contrast, being married appeared to operate as a protective

factor against SUD but cohabitation was not. Among the covariates related to military experience, the strongest relationship was observed for the number of deployments. Veterans who deployed three times or more had five times higher likelihood of meeting PTSD screening criteria and four times higher likelihood to screen for TBI. Former marines were only half as likely to screen positively for TBI as army soldiers. Other branches had even smaller likelihood of probable TBI. Similarly, reservists and members of the National Guard were only half as likely to develop AMH problems as veterans who were in Active Duty.

Even though earlier reports found worse outcomes among those who returned from Iraq (Karney et al., 2008), the current study does not provide support for this finding. This may be due to the shift of strategy during the Obama administration (i.e., after 2009), which reduced the number of US troops in Iraq about threefold (from approximately 150,000 to 50,000) and at the same time, increased the military presence in Afghanistan also about threefold (from approximately 30,000 to 90,000). Therefore, by 2012—when most of the troops from Iraq withdrew and the military actions were still ongoing in Afghanistan—the differences between mental health outcomes among veterans returning from Iraq and Afghanistan were no longer significant.

Unmet Treatment Needs

This study established that for both SUD and any other mental health concern (combined PTSD, TBI, and MDD), only about 40% of veterans received some form of treatment. The highest treatment rate was estimated for PTSD—65% of those who screened for this disorder. Even though the remaining 35% of untreated veterans with PTSD represents the lowest rate of unmet need from among all seven examined categories, the fact that more than one third of all the veterans with PTSD were not treated is worrisome and should be of concern to relevant policy makers both inside the armed services as well as in federal, state, and local systems. Since the rates of unmet needs in other categories are much higher, the relevance of these concerns is even more apparent.

Specifically, more than 90% of veterans with probable TBI did not receive treatment. One of the reasons for high rate of unmet need for TBI treatment may be related to closed head injuries that may go undetected and hence remain underdiagnosed. As far as the unmet treatment need for depression is concerned, the estimated 65% is very high given the potentially debilitating consequences of untreated depression, especially in times of extremely high rates of suicide in the US military that may continue unabated in postdeployment period without timely and effective interventions (US Army, 2010).

Finally, for AUD, the estimate of unmet treatment need was 84%, which is particularly worrisome given that excessive alcohol use was the greatest substance use problem. One of the possible reasons for the low alcohol misuse treatment rate was described by MaustMavandadi, Klaus, and Oslin (2011). In their analysis of VA medical records, they identified more than 9,000 veterans who were eligible for additional services after VA primary care clinicians found a positive screen for alcohol misuse, depression, or PTSD. They found that primary care-based screening for alcohol misuse is managed differently than for depression or PTSD, resulting in fewer service referrals to alcohol treatment and services (Maust et al., 2011).

Directions for Future Research

There are three areas of research to be developed as part of this project. First, with the high rates of unmet treatment needs, the questions of access to care and treatment barriers need to be addressed. One aspect of this issue is from the standpoint of the client who might benefit

from treatment but who may also grapple with potential risks and fallout from being labeled upon receiving mental health diagnosis. In other words, fear of stigmatization is a potentially strong impediment to treatment seeking and possible ways to mitigate this fear or rendering it unsubstantiated need to be explored. On the other end of the spectrum is the service delivery aspect that may pose significant barriers for veterans needing mental health care. Increases in the allocation of mental health services in primary care clinics, the provision of confidential counseling, integration of PTSD and SUD treatment, and computer-assisted tele-behavioral therapy, which may deliver the expertise of trained therapists to veterans' homes, as well as revamping outdated policies and practices should all help break the barriers to care.

Next, this project will be adding longitudinal component in order to examine changes in substance use behavior/disorders and mental health outcomes over time. Several studies revealed that the prevalence of both PTSD and depression seems to increase as the time since returning from deployment increases (Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Vasterling et al., 2006). This suggests that veterans are at substantially increased risk for mental health problems relative to similar individuals in the general population, which has important implications for the provision of outreach, screening, and treatment programs including their availability as well as accessibility.

At the same time, the investigation will be broadened by examining factors that increase resilience in the face of social disadvantage and the experience of war trauma. Specifically, the present finding that Black veterans had lower rates of substance use and mental health concerns may lead to further insights by carefully examining broader spectrum of covariates associated with greater resilience and positive outcomes.

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Biographies

Peter Vazan, Ph.D., is a Senior Research Associate at the National Development and Research Institutes (NDRI) in New York City. He received his doctoral degree in psychology from the New School for Social Research in 2006. His research has examined drug treatment effectiveness, modified therapeutic community aftercare, harm reduction for long-term injection drug users, and substance use and misuse among the Roma population, the largest minority of Europe. Currently, he is involved with two 5-year longitudinal panel studies: Veteran Reintegration, Mental Health, and Substance Abuse in the Inner-City and The Impact of Transient Domesticity Coparenting in Poor African American Families.

Andrew Golub, Ph.D., is a Principal Investigator at the National Development and Research Institutes, Inc. (NDRI). He received his Ph.D. in public policy analysis from Carnegie Mellon University in 1992. His work seeks to improve social policy and programs through research. His studies have examined trends in drug use; the larger context of use, causes and consequences of use; and the efficacy of policies and programs as well as associated issues related to violence, crime, policing, poverty, and families. Dr. Golub is currently the Principal Investigator of the Veteran Reintegration, Mental Health and Substance Abuse in the Inner-City Project funded by the National Institute on Alcohol Abuse and Alcoholism that examines the challenges faced by veterans returning from Afghanistan and Iraq to New York's low-income, predominately minority neighborhoods. This mixed methods study focuses on the significance of substance misuse and its relationship with other mental health problems, and reintegration into family, work, and community life within the complex of problems prevailing in low-income communities.

Alex S. Bennett, Ph.D., is a Principal Investigator at the National Development and Research Institutes (NDRI). He received his Ph.D. in history and policy from Carnegie Mellon University in 2009. His current work focuses on veterans, overdose prevention and response, and drug use and misuse more broadly. He started work on overdose prevention and outreach services in 2002 with Prevention Point Pittsburgh, an early model for many of the overdose prevention programs that came later. Dr. Bennett continued this work on substance misuse and overdose prevention and response both in an academic and community-based setting while doing research, needs assessment, program development, service delivery, and evaluation work. Dr. Bennett currently serves on the Board of Directors of the New York Harm Reduction Educators. In 2012, Dr. Bennett organized a Community Advisory Board (CAB) that includes diverse New York City organizations with a common purpose of addressing veterans substance misuse that includes veterans groups, public health agencies, drug treatment providers, academic researchers, and advocacy groups. This CAB promotes awareness and personal connection between organizations and veterans, facilitates information exchange, and supports collaboration across agencies on local initiatives.

GLOSSARY

Alcohol use disorder (AUD)

AUD is defined as either an alcohol dependence or alcohol abuse as defined by the DSM-IV criteria.

Drug use disorder (DUD)

DUD is conceptually similar but distinct from AUD (see above) as defined by the DSM-IV criteria.

Posttraumatic stress disorder (PTSD)

PTSD is a severe anxiety disorder with characteristic symptoms that can develop after the direct experience of an extremely

Respondent-driven sampling (RDS)	traumatic stressor such as the threat of a violent death or serious injury. RDS combines snowball sampling (i.e., getting individuals to refer those they know, these individuals in turn refer those they know and so on) with a mathematical model that weights the sample to compensate for the fact that the sample was collected in a non-random way.
Substance use disorder (SUD)	SUD is an umbrella term for either an Alcohol Use Disorder (AUD) or Drug Use Disorder (DUD).
Traumatic brain injury (TBI)	TBI occurs when an external mechanical force causes brain dysfunction. Traumatic brain injury usually results from a violent blow or jolt to the head or body.

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FIGURE 1.

Estimates of met and unmet treatment need for SUD and mental health disorders among veterans (numbers below the category labels show the relative percentage of unmet need).

TABLE 1

Sample characteristics ($N = 269$) and RDS estimates of the target population

Demographics	%	RDS (%)	Military experience	%	RDS (%)
Gender					
Males	85.1	87.8	Army	62.1	64.4
Females	14.9	12.2	Marines	17.8	18.9
Race/ethnicity					
Black	61.0	70.2	Navy	15.2	12.6
White (non-Hisp.)	19.0	13.0	Air Force/Coast Guard	4.8	4.1
Hispanic (non-Black)	16.0	9.5	Component		
Other	4.1	7.3	Active Duty	78.1	89.8**
Age					
19–29	58.4	51.4	Reserves/National Guard	21.9	10.2**
30–39	30.5	34.9	Last Deployment		
40+	11.2	13.6	OEF (Afghanistan)	19.0	17.9
Education					
High school	35.7	49.0*	OIF (Iraq)	71.0	75.0
Unfinished college	57.2	46.0	Other	10.0	7.1
College graduates	7.1	5.0	Number of deployments		
Employment/study			0	2.2	3.6
No work & no study	35.3	53.1*	1	54.5	58.9
Study only	37.5	24.7**	2	28.7	28.2
Work only	13.8	10.9	3+	14.6	9.4
Both work & study	13.4	11.3	Type of discharge		
Family income					
Below poverty	49.8	61.3	Honorable	48.0	45.1
Near poverty (100%–200%)	19.7	18.9	General	11.5	19.4*
Higher income (>200%)	30.5	19.8**	Other than honorable	3.7	6.3
Marital status					
Married	13.0	7.7	Still in reserves	36.8	29.2
			Combat experience		
			Felt was in danger	64.7	61.7
			Under attack	68.0	67.7
			Shot at enemy	38.7	37.8
			Killed a combatant	30.5	34.3

Demographics	%	RDS (%)	Military experience	%	RDS (%)
Cohabiting	8.9	5.5	Killed a noncombatant	8.6	8.4
Single	53.9	53.6	Injured	14.1	9.3
Sep./Wid./Divorced	24.2	33.2	On disability	24.9	20.2
In relationship	35.3	25.8			
Homeless	21.2	24.5			

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

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

TABLE 2

RDS estimates of recreational substance use over the military/veteran life course

	Percent of veterans who used during a 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 smoking	30.0	38.3	41.7	48.1 ^b
Marijuana	54.9	20.0 ^{**}	8.8 [*]	33.7 ^{**}
Powder cocaine	10.0	5.0	1.5	3.8
Painkillers	0.4	1.6	6.3 ^a	7.3 ^b
Heroin	0.2	0.0 [†]	0.0 [†]	0.7 [†]
Injection drug use	0.1	0.0 [†]	0.4 [†]	0.7 [†]

^a Estimated difference from before the military to deployment was significant at $\alpha = .05$ level.

^b Estimated difference from before the military to past 30 days was significant at $\alpha = .01$ level.

^{*} Estimate is significantly different from previous time period at $\alpha = .05$ level.

^{**} Estimate is significantly different from previous time period at $\alpha = .01$ level.

[†] RDS could not estimate the proportion due to nonconnectivity. The sample percentage is provided instead.

TABLE 3

Substance use and mental health problems prevalence rates (RDS estimates)

	RDS (%)
Alcohol use disorder (AUD)	28.3
Drug use disorder (DUD)	18.5
Substance use disorder (SUD; i.e., AUD or DUD or both)	32.1
Comorbid AUD & DUD	14.7
Posttraumatic stress disorder (PTSD)	19.2
Traumatic brain injury (TBI)	20.8
Major depression disorder (MDD)	19.7
Any mental health (AMH) issue (PTSD or TBI or MDD)	35.8
Comorbid PTSD & MDD	11.2
Comorbid PTSD & TBI	9.2
Comorbid MDD & TBI	7.8
All three (PTSD & TBI & MDD)	5.2
Any SUD or MH issues	48.0
Co-occurring SUD & MH issues	18.2
All five (AUD & DUD & PTSD & TBI & MDD)	0.7

TABLE 4

Covariates of substance use and mental health disorders (logistic regression)

Odds ratio (Wald statistic) of a mental health disorder							
	AUD	DUD	SUD	PTSD	TBI	MDD	Any MH
Intercept or base odds	.05	.15	.07	.08	.26	.03	.22
Gender	(0.3)	(0.7)	(0.5)	(5.4)*	(0.6)	(0.7)	(0.3)
Male ^a	–	–	–	1.0	–	–	–
Female	–	–	–	2.9	–	–	–
Race/ethnicity	(21.8)**	(2.3)	(16.1)**	(2.8)	(8.8)*	(7.1) [†]	(8.6)*
Black ^a	1.0	–	1.0	–	1.0	1.0	1.0
White (non-Hispanic)	6.4	–	4.5	–	3.3	1.7	2.2
Hispanic (non-Black)	4.0	–	3.0	–	1.9	4.4	2.4
Other	0.6	–	0.8	–	2.6	1.9	3.3
Age	(0.3)	(0.8)	(0.9)	(1.1)	(0.6)	(10.4)**	(4.1)
19–29 ^a	–	–	–	–	–	1.0	–
30–39	–	–	–	–	–	2.9	–
40+	–	–	–	–	–	6.9	–
Education ^b	(7.2)*	–	–	(2.5)	(4.8) [†]	(6.7)*	(3.1)
H.S. degree ^a	1.0	–	1.0	–	1.0	1.0	–
Some college	0.3	–	0.6	–	0.5	0.3	–
College degree	0.1	–	0.1	–	0.1	0.1	–
Employment/study	(1.9)	(5.3)	(0.2)	(1.8)	(13.4)**	(5.4)	(8.7)**
No work & no study ^a	–	–	–	–	1.0	–	1.0
Study only	–	–	–	–	2.4	–	1.6
Work only	–	–	–	–	0.1	–	0.3
Both work & study	–	–	–	–	2.7	–	1.3
Family income	(0.5)	(2.5)	(0.4)	(1.3)	(0.2)	(2.6)	(0.3)
Below poverty	–	–	–	–	–	–	–
Near poverty (100%–200%)	–	–	–	–	–	–	–
Higher income (>200%) ^a	–	–	–	–	–	–	–

Odds ratio (Wald statistic) of a mental health disorder							
	AUD	DUD	SUD	PTSD	TBI	MDD	Any MH
Marital status ^b	(4.7)	—	(8.8) [*]	(2.2)	(0.6)	(1.9)	(2.0)
Married ^a	—	—	1.0	—	—	—	—
Cohabiting	—	—	7.8	—	—	—	—
Single	—	—	3.5	—	—	—	—
Sep./Div./Wid.	—	—	5.9	—	—	—	—
Military branch	(0.1)	(1.4)	(0.3)	(2.1)	(9.8) [*]	(4.5)	(5.9)
Army ^a	—	—	—	—	1.0	—	—
Marines	—	—	—	—	0.5	—	—
Navy	—	—	—	—	0.2	—	—
Air Force/Coast Guard	—	—	—	—	0.3	—	—
Component	(2.1)	(0.8)	(0.3)	(1.2)	(1.5)	(0.6)	(3.0) [†]
Active duty ^a	—	—	—	—	—	—	1.0
Reserves/guard	—	—	—	—	—	—	0.5
Last deployment	(3.5)	(0.6)	(4.2)	(1.5)	(0.8)	(1.8)	(0.3)
OIF (Iraq)	—	—	—	—	—	—	—
OEF (Afghanistan)	—	—	—	—	—	—	—
Other	—	—	—	—	—	—	—
Number of deployments	(1.0)	(0.5)	(0.8)	(10.0) ^{**}	(9.1) [*]	(0.5)	(3.8)
1 ^a	—	—	—	1.0	1.0	—	—
2	—	—	—	1.4	1.6	—	—
3+	—	—	—	4.9	4.4	—	—

^aReference category.

^bVariable not included as a predictor of DUD due to skewed distribution of responses.

[†]Wald Statistic was significant at the = .1 level.

^{*}Wald statistic was significant at the = .05 level.

^{**}Wald statistic was significant at the = .01 level.