



History of Military Service and the Risk of Suicidal Ideation: Findings From the 2008 National Survey on Drug Use and Health

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Studies of completed suicide by history of military service have produced inconsistent findings; no representative population-based study has compared the risk of nonfatal suicidal behavior among veterans with risk among nonveterans. The objective of this study was to examine whether male veterans of the U.S. military are at heightened risk of suicidal ideation, compared with males who never served in the U.S. military. A total of 17,641 adult men completed the 2008 National Survey on Drug Use and Health (NSDUH). Subjects provided information about history of ever having served in the U.S. armed forces, past suicidal ideation, alcohol and drug abuse and dependence, measures of psychological distress, and sociodemographic data. Overall, men who had ever served in the armed forces were no more likely than men who had never served to report having seriously considered suicide over the prior 12 months. Military status was not differentially associated with other known suicide risk factors assessed by NSDUH, including psychiatric disorders. Our findings suggest that evidence-based suicide prevention strategies applicable to the general population should be employed to reduce suicide risk among the veteran population as well.

Whether veteran status *per se* is a risk factor for completed suicide has been, for most of the last decade, a contested issue. (U.S. Department of Veterans Affairs, 2008). Most military cohort studies that have addressed this question find similar rates of suicide among veterans and in the general U.S. population, (Bullman & Kang, 1996; Kang &

Bullman, 2001, 2008), although the largest of these cohort studies found lower rates among veterans [Standardized Mortality Ratio (SMR) = 0.7; Kang & Bullman, 1996]. Military cohort studies ascertain veteran status through records maintained by the Department of Defense, the gold standard for exposure assessment, but use SMRs to estimate

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suicide risk, thereby biasing veteran risk toward the null (because this measure of risk compares veterans to the general population, which includes both nonveterans *and* veterans), especially for older cohorts of veterans. Although some subgroups of veterans appear to be at higher risk of suicide than the general age/sex-matched general population, such as those who receive care in the Veterans Health Administration (McCarthy et al., 2009), these subgroups are not representative of veterans in the general population.

Two large survey-based cohort studies have directly compared suicide incidence among (self-reported) veterans to incidence among (self-reported) nonveterans, thereby avoiding the bias to the null inherent in SMRs. One study found a greater-than-two-fold increase in suicide among veterans (Kaplan, Huguet, McFarland, & Newsom, 2007); the other study found veterans and nonveterans to have similar suicide risk (Miller et al., 2009). In light of the recent unprecedented increase in suicides among active duty U.S. soldiers, it is notable that no nationally representative peer-reviewed study of veterans has included suicides that occurred after 2005 (the first year of dramatic increases in suicide among active duty soldiers).

Although some risk factors for nonfatal suicide attempts are protective factors for completed suicide (e.g., female sex, younger age; Kessler, Borges, & Walters, 1999), most are also risk factors for completed suicide, among the strongest of which are major psychiatric illnesses and suicidal ideation (Cavanagh, Carson, Sharpe, & Lawrie, 2003; Gutierrez, Brenner, & Huggins, 2008; Harris & Barraclough, 1998; Kessler et al., 1999; Petronis, Samuels, Moscicki, & Anthony, 1990). We are aware of only two studies that examined *nonfatal* suicidal behavior among active military personnel (Bray et al., 2010) or veterans (Pietrzak et al., 2010), neither of which directly compared risk among people who had served in the military with those who had not. The current paper addresses this gap in the literature by examining whether men who have served in the military are at elevated risk of suicidal ideation com-

pared with men who have not, while adjusting for several potential confounding factors in a large, nationally representative sample. Because the current survey was conducted in 2008, most respondents in the youngest age group served during the Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) era, making stratified findings particularly relevant to current policy concerns over suicides among recent OIF/OEF veterans, reserve personnel, and current military personnel, even though it is not known what proportion of these individuals had been deployed to combat zones.

METHOD

Study Subjects

Subjects were respondents to the 2008 National Survey on Drug Use and Health (NSDUH). The sample frame was the civilian, noninstitutionalized population of the United States aged 12 and older, including residents of noninstitutional group quarters such as shelters and civilians living on military installations. Data come from the NSDUH public use data files ($n = 55,739$; SAMHSA, 2009). The survey employs a 50-state design with an independent multistage area probability sample for each of the 50 states and the District of Columbia. African Americans and Hispanics were oversampled to increase the precision of estimates for these groups. The response rate was 74%. Detailed information about the sampling and survey methodology in the NSDUH is found elsewhere (SAMHSA, 2009).

Because relatively few female respondents served in the military, analyses were restricted to the 17,641 male respondents aged 18 years or older. All subjects provided information about history of ever having served in the U.S. armed forces, past suicidal ideation, plans and attempts, measures of psychological distress, diagnoses of psychiatric conditions, and sociodemographic characteristics. Because age is a well-established correlate of suicidal ideation and of veteran

status, the data set was stratified into three age groups (18–25, 26–35, 36+) and separate analyses were performed on each stratum.

Measures

Suicidal thoughts in the 12 months prior to the survey were assessed for all respondents with the following question: “At any time in the past 12 months, that is from (datefill) up to and including today, did you seriously think about trying to kill yourself?” Suicidal plans and attempts in the past 12 months were assessed with analogous questions and were not conditioned on the previous item.

Respondents were classified as experiencing a major depressive episode (MDE) in the past year if they endorsed five or more of the nine standard *DSM-IV* criteria for depression in the past 12 months (American Psychiatric Association, 2000).

Alcohol and drug abuse and dependence were assessed with questions that elicited responses to the *DSM-IV* criteria for abuse and dependence. Respondents were classified as *dependent* on marijuana, inhalants, hallucinogens, or tranquilizers if they endorsed three or more of the six dependence criteria, and dependent on alcohol, pain relievers, cocaine, heroin, sedatives, or stimulants if they endorsed three or more of seven criteria. A diagnosis of *abuse* of any of these substances was made if the respondent endorsed one or more of the four *DSM-IV* abuse criteria.

Serious psychological distress (SPD) in the past year is a composite indicator based on six questions asking respondents how frequently they experienced symptoms of psychological distress during their worst month in the past year, including feeling “nervous,” “hopeless,” “restless or fidgety,” “so sad or depressed that nothing could cheer you up,” “everything was an effort,” and “down on yourself, no good, or worthless.” Responses of *none of the time*, *a little of the time*, *some of the time*, *most of the time*, and *all of the time* were coded on a 0–4 scale. A cumulative score of 13 or above qualified as SPD.

Cigarette smoking was classified into never smokers, former smokers, and, among current smokers, the average number of cigarettes smoked per day in the past month. Health status was assessed in one item: “This question is about your overall health. Would you say your health in general is excellent, very good, good, fair, or poor?”

Geographic comparisons were based on county type, according to definitions issued by the Office of Management and Budget (OMB) in June 2003 (OMB, 2003). Large metropolitan areas have a population of one million or more. Small metropolitan areas have a population of fewer than one million but greater than 250,000. Nonmetropolitan counties have fewer than 250,000 people. Educational status was based on the highest grade or year of school completed (less than high school, high school, some college, college).

Having received a formal diagnosis of anxiety disorder or depression in the past year by a medical professional was assessed by having respondents read a list of health conditions and indicate which conditions a doctor or other medical professional, in the past year, had told them that they had.

The key independent variable, military service status, was determined by respondents’ answers to the following question: “Have you ever been in the United States’ armed forces?” If the respondent answered *yes*, they were asked the following question: “Are you currently on active duty in the armed forces, in a reserves component, or now separated or retired from either reserves or active duty?” Respondents on current active duty did not qualify for inclusion in NSDUH and were not interviewed. Respondents who indicated they fell in one of the other two categories, current reserves ($n = 138$ males) or former military/reserves ($n = 1,852$ males), were coded in this study as “ever served in military,” and all others were coded as “never served.”

Statistical Analyses

Descriptive statistics as well as logistic regression analyses use sample weights

provided by NSDUH to account for the complex sampling design. All analyses were carried out using the R 2.11.1 software package (Free Software Foundation, 2011). For binary categorical variables, age-adjusted logistic regressions were fit, and then Wald (chi-square) tests were performed on the coefficients representing either veteran status (in Table 1) or suicidal ideation status (in Table 2) to see whether they significantly differed from zero. For continuous variables, age-adjusted linear regressions were fit, and the same tests performed. For health status, rurality, education, marital status, race, alcohol use, and cigarette use, baseline-categorical logit models, adjusted by age, were fit and the same tests performed.

We performed weighted logistic regressions on each of the age strata separately (18–25, 26–35, 36+). Our main outcome in multivariate analyses was suicidal ideation. (There were too few suicide attempts and plans to support adjusted analyses.) Age was further controlled for in the stratum-specific analyses. For each age stratum, three models were fit to the data. The first model adjusts for age and race; the second adds controls for marital status, rurality, and education; the third additionally adjusts for past-year SPD, drug/alcohol abuse or dependence, and cigarette use.

Sensitivity analyses were performed to assess whether our results changed (1) when current military reserves were excluded from the analysis, (2) when NSDUH's scales of psychological distress (SPD in the past year and MDE in the past year) were replaced with psychiatric diagnoses reported by the respondent to have been given to them by a physician, and (3) when drug or alcohol abuse or dependence was replaced with categorical measures of drinking quantity and frequency.

RESULTS

In all three age groups, men who had ever served in the armed forces were no more likely than men who had never served to report having seriously considered suicide

over the prior 12 months (Table 1). Military status was also not differentially associated with recent suicide plans or attempts, psychiatric disorders (i.e., MDE in past year, drug or alcohol abuse, or dependence in past year), or a summary measure of SPD in the last 12 months. Higher rates of self-reported physician-diagnosed depression and anxiety disorders were observed among men with a history of military service, especially among younger men recently.

In age- and race-adjusted analyses, military status was not significantly associated with suicidal ideation in any of our age cohorts (Table 2). Additional adjustment for well-established psychiatric and behavioral factors for suicidal ideation did not materially affect our null finding (Table 2, models 2 and 3).

Findings from sensitivity analyses were similar to those from our primary analysis. Replacing calculated indicators of psychological distress with physician diagnoses of depression and anxiety did not materially change results, nor did replacing substance abuse and dependence with a categorical indicator of alcohol use. Analyses that excluded current reserves also found that suicidal ideation was not significantly related to having served in the military (i.e., when analyses were restricted to men who were retired or separated from the military or reserves).

DISCUSSION

This is the first study to directly compare the risk of nonfatal suicidal behavior among men who have served in the military with those who have not. Our finding that military status is not significantly associated with suicidal ideation is consistent with (though not corroborative of) prior null findings from most (Kang & Bullman, 1996, 2001, 2008; Miller et al., 2009), but not all (Kaplan et al., 2007), large-scale peer-reviewed studies on veteran status and the risk of completed suicide, as well as with findings from the current study that psychi-

TABLE 1
Selected Characteristics of Male Respondents by History of Military Service and Age Group

	Age 18-25		Age 26-35		Age 36+		All Ages	
	Ever served (n = 241)	Never served (n = 8,921)	Ever served (n = 203)	Never served (n = 2,341)	Ever served (n = 1,541)	Never served (n = 4,392)	Ever served (n = 1,985)	Never served (n = 15,654)
Suicide ideation past year (%)	4.6	5.7	2.7	4.0	3.0	2.9	3.0	3.7
Suicide plans past year (%)	0.3	1.6	0.7	1.1	0.8	0.7	0.8	1.0
Suicide attempts past year (%)	0.9	1.0	0.3	0.9	0.1	0.3	0.1	0.5
Major depressive episode past year (%)	6.9	5.5	7.2	5.7	3.9	4.4	4.2	4.9
Drug or alcohol abuse or dependence in past year (%)	26.8	25.2	15.2	19.2	5.5	8.4	6.5	13.7
Serious psychological distress in past year (%)	17.2	12.9	6.8	9.9	5.5	6.6	5.8	8.5
Diagnosed with anxiety disorder in past year (%)	6.5	2.3*	2.6	3.4	4.1	2.6*	4.0	2.7*
Diagnosed with depression in past year (%)	6.9	3.2*	4.1	3.7	5.2	4.5*	5.1	4.1*
Health status (%)								
Poor	0.0	*	0.4	*	5.2	*	4.8	*
Fair	5.0	4.6	6.0	6.0	16.8	10.9	15.9	8.7
Good	15.3	22.4	20.2	25.4	29.8	29.5	28.9	27.4
Very Good	40.4	40.6	42.0	39.6	32.9	34.6	33.6	36.7
Excellent	39.3	32.2	31.4	28.2	15.3	20.8	16.7	24.4
Rurality (%)								
Nonmetro	19.4	15.4	11.3	14.8	18.8	16.5	18.4	16.0
Small metro	40.4	30.6	31.3	27.5	34.0	29.9	33.9	29.6
Large metro	40.2	53.9	57.5	57.7	47.2	53.6	47.7	54.5
Education (%)								
Less than high school	8.4	20.5	3.5	15.7	10.6	17.6	10.2	17.8
High school	49.2	36.3	34.8	28.7	34.3	27.8	34.6	29.6
Some college	32.6	30.9	36.7	22.8	26.9	20.8	27.6	23.1
College	9.8	12.3	25.0	32.7	28.1	33.8	27.6	29.5

TABLE 1
(Continued)

	Age 18-25 (n = 241)		Age 26-35 (n = 2,341)		Age 36+ (n = 1,541)		All Ages (n = 15,654)	
	Ever served	Never served	Ever served	Never served	Ever served	Never served	Ever served	Never served
Marital status (%)								
Never married	64.1	90.6*	35.8	45.7*	4.9	14.3*	7.9	34.9*
Married	29.6	8.4	49.4	47.4	73.6	68.4	71.3	52.9
Separated, divorced, or widowed	6.2	1.0	14.7	6.8	14.9	14.3	11.3	10.4
Race								
White	75.3	61.9*	66.0	57.9*	84.3	68.1*	83	64.9*
Black	11.7	13.0	14.0	11.5	9.2	10.1	9.5	11.0
Other	13.0	25.1*	19.9	30.6*	6.5	21.8*	7.5	24.1*
Cigarette use (%)								
Never smoked	48.2	62.8	38.3	50.4	35.7	48.6	36.1	51.7
Former smoker	6.6	5.4	20.2	14.2	45.8	26.5	43.6	20.1
≤1 cigarette/day	6.6	4.6	5.2	4.9	1.0	1.8	1.4	2.9
2-15 cigarettes/day	25.1	19.2	19.8	19.0	6.8	10.7	7.9	13.9
16+ cigarettes/day	13.1	7.7	16.5	11.1	10.4	12.3	10.9	11.2
Age (Mean)	22.9	21.3*	29.7	29.7	56.4	47.7*	49.6	30.0
Age (SD)	1.8	2.3	2.3	2.3	11.5	9.0	16.3	12.6

*p-value < .05

TABLE 2

Odds of Suicidal Ideation in the Past Year among Men Who Have Served in the Military Compared with Men Who Have Not (odds ratio and 95% CI), Adjusted for Several Potential Confounders

	Age 18–25	Age 26–35	Age 36+	All Ages
Model 1 adjusted for race and age	0.89 (0.47, 1.71)	0.60 (0.25, 1.41)	1.23 (0.86, 1.76)	1.11 (0.88, 1.39)
Model 2 = Model 1 + marital status, rurality, education	0.83 (0.43, 1.60)	0.59 (0.25, 1.41)	1.16 (0.81, 1.67)	1.03 (0.82, 1.30)
Model 3 = Model 2 + serious psychological distress, drug or alcohol abuse or dependence, cigarette usage, health status	0.64 (0.32, 1.28)	0.65 (0.27, 1.58)	1.11 (0.75, 1.63)	1.04 (0.82, 1.32)

atric disorders are no more common among men with, as compared to men without, military service. It is unclear why higher rates of self-reported physician diagnosed depression and anxiety disorders were observed among men with a history of military service, especially among younger men, even though there were no differences in the incidence of underlying disorder as assessed by our instrument. One possibility is that it reflects veteran's greater access to health care.

Our findings should be interpreted with several limitations in mind. First, we do not have information about deployment during wartime or combat-related injuries, aspects of exposure that may be relevant to suicide risk (Bullman & Kang, 1996). Second, older men who had served in the military were identified at a time remote from military service, and younger men took the survey an indeterminate number of years after military separation. Because the first few years following separation from active military service (vs. later years) have been linked to heightened risk of suicide in some (Boehmer, Flanders, McGeehin, Boyle, &

Barrett, 2004; Kang & Bullman, 2008), but not all (Kang & Bullman, 1996, 2001), prior studies, our results do not directly speak to risk during this potentially important time period. Third, NSDUH excludes current active duty military from their sampling frame and does not differentiate former military personnel (who are, unequivocally, veterans) from former reserve personnel (who are, by definition, not veterans if they were never activated to military duty). Therefore, our comparison of men who ever versus never served in the military should not, strictly speaking, be understood as identical to a comparison of veterans with nonveterans.

Despite these limitations, our finding that military service status is not associated with an increased risk of suicidal ideation suggests that evidence-based suicide prevention strategies applicable to the general population, such as lethal means restriction (Mann, et al., 2005), should be employed to reduce suicide risk among the veteran population as well.

REFERENCES

- AMERICAN PSYCHIATRIC ASSOCIATION. (2000). *Diagnostic and statistical manual of mental disorders* (text revision). Washington, DC: Author.
- BOEHMER, T. K., FLANDERS, W. D., MCGEEHIN, M. A., BOYLE, C., & BARRETT, D. H. (2004). Postservice mortality in Vietnam veterans: 30-year follow-up. *Archives of Internal Medicine*, *164*, 1908–1916.
- BRAY, R. M., PEMBERTON, M. R., LANE, M. E., HOURANI, L. L., MATTIKO, M. J., & BABEU, L.

- A. (2010). Substance use and mental health trends among U.S. military active duty personnel: Key findings from the 2008 DoD Health Behavior Survey. *Military Medicine*, *175*, 390–399.
- BULLMAN, T. A., & KANG, H. K. (1996). The risk of suicide among wounded Vietnam veterans. *American Journal of Public Health*, *86*, 662–667.
- CAVANAGH, J., CARSON, A., SHARPE, M., & LAWRIE, S. M. (2003). Psychological autopsy studies of suicide: A systematic review. *Psychological Medicine*, *33*, 395–405.
- FREE SOFTWARE FOUNDATION. (2011). *GNU R language and environment for statistical computing and graphics*. Retrieved August 23, 2011, from <http://directory.fsf.org/project/gnur/>
- GUTIERREZ, P. M., BRENNER, L. A., BRENNER, L. A., & HUGGINS, J. A. (2008). A preliminary investigation of suicidality in psychiatrically hospitalized veterans with traumatic brain injury. *Archives of Suicide Research*, *12*, 336–343.
- HARRIS, E., & BARRACLOUGH, B. (1998). Excess mortality of mental disorder. *British Journal of Psychiatry*, *173*, 11–53.
- KANG, H. K., & BULLMAN, T. A. (1996). Mortality among U.S. veterans of the Persian Gulf War. *New England Journal of Medicine*, *335*, 1498–1504.
- KANG, H. K., & BULLMAN, T. A. (2001). Mortality among US veterans of the Persian Gulf War: 7-year follow-up. *American Journal of Epidemiology*, *154*, 399–405.
- KANG, H. K., & BULLMAN, T. A. (2008). Risk of suicide among US veterans after returning from the Iraq or Afghanistan war zones. *JAMA*, *300*, 652–653.
- KAPLAN, M. S., HUGUET, N., MCFARLAND, B. H., & NEWSOM, J. T. (2007). Suicide among male veterans: A prospective population-based study. *Journal of Epidemiology and Community Health*, *61*, 619–624.
- KESSLER, R., BORGES, G., & WALTERS, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry*, *56*, 617–626.
- MANN, J. J., APTER, A., BERTOLOTE, J., BEAUTRAIS, A., CURRIER, D., HAAS, A., ET AL. (2005). Suicide prevention strategies: A systematic review. *JAMA*, *294*, 2064–2074.
- MCCARTHY, J. F., VALENSTEIN, M., KIM, H. M., ILGEN, M., ZIVIN, K., & BLOW, F. C. (2009). Suicide mortality among patients receiving care in the veterans health administration health system. *American Journal of Epidemiology*, *169*, 1033–1038.
- MILLER, M., BARBER, C., AZRAEL, D., CALLE, E. E., LAWLER, E., & MUKAMAL, K. J. (2009). Suicide among US veterans: A prospective study of 500,000 middle-aged and elderly men. *American Journal of Epidemiology*, *170*, 494–500.
- OFFICE OF MANAGEMENT AND BUDGET. (2003). *Revised definitions of metropolitan statistical areas, new definitions of micropolitan statistical areas and combined statistical areas, and guidance on uses of the statistical definitions of these areas* (OMB Bulletin No. 0304). Washington, DC: Author.
- PETRONIS, K., SAMUELS, J., MOSCICKI, E. K., & ANTHONY, J. C. (1990). An epidemiologic investigation of potential risk factors for suicide attempts. *Social Psychiatry and Psychiatric Epidemiology*, *25*(4), 193–199.
- PIETRZAK, R. H., GOLDSTEIN, M. B., MALLEY, J. C., RIVERS, A. J., JOHNSON, D. C., & SOUTHWICK, S. M. (2010). Risk and protective factors associated with suicidal ideation in veterans of Operations Enduring Freedom and Iraqi Freedom. *Journal of Affective Disorders*, *123*, 102–107.
- SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION. (2009). *Results from the 2008 National Survey on Drug Use and Health: National findings* (NSDUH Series H-36, HHS Publication No. SMA 09-4434). Rockville, MD: Office of Applied Studies.
- U.S. DEPARTMENT OF VETERANS AFFAIRS. (2008). *Report of the Blue Ribbon Work Group on Suicide Prevention in the Veteran Population*. Washington, DC: Author.

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