

Suicide Among Veterans in 16 States, 2005 to 2008: Comparisons Between Utilizers and Nonutilizers of Veterans Health Administration (VHA) Services Based on Data From the National Death Index, the National Violent Death Reporting System, and VHA Administrative Records

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Since the start of the wars in Afghanistan and Iraq, there has been increasing interest in suicide among American military veterans. This reflects a number of important issues. First, veterans constitute a sizeable population that has been identified as being at increased risk for suicide by some^{1,2} but not all,³ research studies. Second, there is increasing evidence that suicide may be a consequence of the stresses related to the experience of deployment and combat.⁴ Third, there have been concerns about the extent to which the Veterans Health Administration (VHA), the Department of Veterans Affairs (VA) health care system, has addressed the needs of veterans, especially those who have returned from service in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), the wars in Afghanistan and Iraq.

Since the start of OEF and OIF, there have been a number of reports on rates and risk factors for death from suicide among all American veterans, independent of whether they have received VHA health care services,^{1-3,5-9} as well as a greater number of reports on those who utilize VHA services,¹⁰⁻²² and on mixed samples.^{2,3} Currently, the literature is not clear as to whether rates in veterans as a whole are higher than those for other Americans after controlling for demographic variables. However, there is evidence for increased rates in veterans utilizing VHA health care services. To date, there have been no reports of comparisons between veterans who utilize VHA services (utilizers) and those who do not (nonutilizers). This information is critical to advance a population-based approach to suicide prevention in veterans; to evaluate how the burden of suicide is distributed in the total veteran

Objectives. We sought to compare suicide rates among veterans utilizing Veterans Health Administration (VHA) services versus those who did not.

Methods. Suicide rates from 2005 to 2008 were estimated for veterans in the 16 states that fully participated in the National Violent Death Reporting System (NVDRS), using data from the National Death Index, NVDRS, and VHA records.

Results. Between 2005 and 2008, veteran suicide rates differed by age and VHA utilization status. Among men aged 30 years and older, suicide rates were consistently higher among VHA utilizers. However, among men younger than 30 years, rates declined significantly among VHA utilizers while increasing among nonutilizers. Over these years, an increasing proportion of male veterans younger than 30 years received VHA services, and these individuals had a rising prevalence of diagnosed mental health conditions.

Conclusions. The higher rates of suicide for utilizers of VHA among veteran men aged 30 and older were consistent with previous reports about which veterans utilize VHA services. The increasing rates of mental health conditions in utilizers younger than 30 years suggested that the decreasing relative rates in this group were related to the care provided, rather than to selective enrollment of those at lower risk for suicide. (*Am J Public Health.* 2012;102:S105-S110. doi: 10.2105/AJPH.2011.300503)

population; and to assess how completely VHA, the nation's largest integrated health care system, addresses the needs of the population it was established to serve.

Comparisons between suicide rates among veterans who are VHA utilizers versus nonutilizers can also provide information on the impact of recent changes in the VHA and the patients it serves. Toward the end of 2005, VHA began to implement a mental health strategic plan based on recommendations from the President's New Freedom Commission on Mental Health²⁴ as well as recognition of the mental health needs of returning veterans. At the same time, VHA began to increase the budget for mental health services to support this strategy. As a result of these enhancements, systemwide VA mental health staffing increased 26.1%, from 13 667 at the start of 2005 to 17 234 at the end

of 2008. Over this same period, the total number of veterans seen per year in VHA increased 3.6%, from 5.02 million in 2005 to 5.20 million in 2008; the number with diagnosed mental health conditions increased 15.0%, from 1.45 to 1.69 million; and the percentage of veteran patients with mental health conditions increased by 11.1%, from 28.9% to 32.1%.²⁵

Veterans returning from OEF and OIF are all eligible for VHA services during the first 5 years after they return from deployment without additional requirements. For veterans who served in previous eras, VHA eligibility is determined by factors such as service-connected health conditions, disability, age, and income.²⁶ The differences in eligibility requirements, as well as differences in the recency of deployment and the acuity of deployment-related conditions, suggest the importance of

testing for differences between age groups both when comparing suicide rates in veterans who are VHA utilizers versus nonutilizers and when evaluating changes in rates over time.

For our study, we compared rates of suicide and assessed changes over time among veterans who utilized VHA health care services and those who did not, by gender, age group, and year. Given greater morbidity among those veterans who received VHA services, we hypothesized that suicide rates were higher among veterans who were VHA utilizers than those who were nonutilizers. Given the magnitude of VHA mental health enhancements, we hypothesized that rates among VHA utilizers would decrease over time. Finally, given greater acuity of mental health problems in OEF and OIF veterans, we hypothesized that among VHA utilizers decreases in rates would be greater among younger than older veterans.

METHODS

Suicide rates for veterans using VHA health services and for other veterans were estimated using VHA administrative data, vital status, and cause of death records from the National Center for Health Statistics' National Death Index (NDI),²⁷ and state-level information on suicides among veterans, by gender and age, from the Center for Disease Control and Prevention's National Violent Death Reporting System (NVDRS).²⁸ Clinical information from the VHA's electronic health records was not utilized because it was not available for those who did not utilize VHA services.

Suicide rates, expressed as suicide deaths per 100 000 person-years, were estimated for veterans in the 16 states that fully participated in NVDRS from 2005 to 2008 (Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin).

Suicide mortality among individuals receiving VHA services was estimated using VHA administrative data included in the National Patient Care Database and NDI data using previously described methods.^{19,21} Briefly, we identified all patients with VHA inpatient or outpatient encounters from 2005 to 2008 who had no VHA encounters in subsequent years, and we queried the NDI to determine these

individuals' vital status, and, for those who died, their cause of death. To estimate state-level suicide rates, VHA users who died from suicide were assigned to specific states based on the location of the VHA medical center where they last received services. Rates among VHA users were estimated for each year, sex, and age group (18–29, 30–64, and 65 years and older), using the total number of suicides among those who received VHA services in the 16 NVDRS states, divided by the total number of veterans receiving care from VHA medical centers in those states.

The NVDRS provided information on the total number of suicide deaths among veterans, independent of whether they received VHA services, by year, sex, and age category for each of the 16 states from 2005 to 2008 based on the methods detailed in their coding manual.²⁹ NVDRS data included information on each decedent's veteran status, which was used in previous studies.^{2,8,9} This was assessed from an indicator of whether the decedent ever served in the US Armed Forces, which was derived from the standardized death certificates in the NVDRS states and is included in a section that is usually completed by funeral directors on the basis of all of the information and reports available to them.^{30,31} For each year, gender, and age group, suicide rates among all veterans in the NVDRS states were estimated from the total number of veteran suicides identified by NVDRS divided by the total number of veterans in those states. Data on the size of the total veteran population, and for veterans who were VHA utilizers versus nonutilizers, were derived from the Veteran Population (VetPop) 2007 file³² maintained by the VA.

The nature of the data use agreements between NVDRS and the states precluded disclosure of identifying information on decedents. Consequently, suicide rates for nonutilizers were estimated indirectly, using the relevant numerators and denominators for the 16 states. The numerators were estimated from the total number of veterans identified as having died from suicide in NVDRS data for the 16 states minus the number of suicide deaths among VHA utilizers in these states. Denominators were estimated by subtracting the number of individuals served by VA facilities in the NVDRS states from the total number of veterans in those states as indicated from the VetPop 2007 data.

Statistical analyses were conducted using Predictive Analytics SoftWare Statistics 18 (SPSS Statistics, Hong Kong). Comparisons of suicide rates were conducted using the generalized linear modeling command, with Poisson log linear modeling for counts.

RESULTS

Suicide counts, populations, and rates in the 16 states for 2005–2008, overall and by VHA user status, are presented in Table 1 for veteran women and in Table 2 for veteran men. These provided information by year for veterans in the 16 states, overall and by age category.

Among all veteran women in the 16 states, approximately 21.8% utilized VHA services: 28.1% of veteran women younger than 30 years, 22.2% of those aged 30 to 64 years, and 15.5% of those 65 years and older. There were no significant changes in suicide rates between 2005 and 2008. Suicide rates for veteran women were lower than those observed for men, overall, for each of the age categories and among both VHA utilizers and nonutilizers. The relatively low numbers of suicides among women in these states precluded meaningful comparisons between rates in utilizers and nonutilizers across the years.

For veteran men in the 16 states, approximately 17.9% utilized VHA services: 15.5% of those younger than 30 years, 16.2% of those aged 30–64 years, and 20.8% of those 65 years and older. The proportion of veterans younger than 30 years who utilized VHA health care increased significantly from 14.3% in 2005 to 16.8% in 2008 (average of 0.87% per year). There were no significant changes over time for those aged 30–64 years or for those aged 65 years and older.

Further, among all veteran men, for those aged 30–64 years and those aged 65 years and older, there were no significant changes in suicide rates over time (Figure 1). For each of these groups, suicide rates for utilizers were consistently higher than for nonutilizers (Figure 2).

However, for all men younger than 30 years, suicide rates increased from 2005 to 2008 (Poisson log linear model; Wald $\chi^2_1 = 5.559$; $P = .018$), with significant increases among nonutilizers (Wald $\chi^2_1 = 9.204$; $P = .002$) but no significant increases among utilizers (Table 2; Figure 1). When models considered both

TABLE 1—Suicide Counts, At Risk Populations, and Suicide Rates Among Veteran Women, Overall and by Veterans Health Administration User Status: 16 National Violent Death Reporting System States, 2005–2008

Ages, y	All Veteran Women			VA Utilizer Women			VA Nonutilizer Women		
	Suicides, No.	Population, No.	Suicide Rate	Suicides, No.	Population, No.	Suicide Rate	Suicides, No.	Population, No.	Suicide Rate
2005									
All	50	527 208	9.48	9	110 904	8.12 ^a	41	416 304	9.85
18–29	10	59 507	16.81 ^a	0	16 102	0.00 ^a	10	43 405	23.04 ^a
30–64	36	387 007	9.30	8	82 765	9.67 ^a	28	304 242	9.20
≥ 65	4	80 694	4.96 ^a	1	12 036	8.31 ^a	3	68 658	4.37 ^a
2006									
All	65	536 668	12.11	16	114 654	13.96 ^a	49	422 014	11.61
18–29	9	59 280	15.18 ^a	2	16 931	11.81 ^a	7	42 349	16.53 ^a
30–64	53	396 950	13.35	13	85 751	15.16 ^a	40	311 199	12.85
≥ 65	3	80 438	3.73 ^a	1	11 972	8.35 ^a	2	68 466	2.92 ^a
2007									
All	72	545 600	13.20	21	119 327	17.60	51	426 521	11.96
18–29	9	58 791	15.31 ^a	2	17 269	11.58 ^a	7	41 769	16.76 ^a
30–64	60	407 003	14.74	19	90 338	21.03 ^a	41	316 665	12.95
≥ 65	3	79 806	3.76 ^a	0	11 720	0.00 ^a	3	68 086	4.41 ^a
2008									
All	55	517 566	10.63	18	118 812	15.15 ^a	37	398 754	9.28 ^a
18–29	9	58 614	15.35 ^a	4	15 988	25.02 ^a	5	42 626	11.73 ^a
30–64	43	376 875	11.41	14	88 531	15.81 ^a	29	288 344	10.06
≥ 65	3	82 077	3.66 ^a	0	14 293	0.00 ^a	3	67 784	4.43 ^a

^aRates based on small sample sizes must be interpreted with caution, as they are sensitive to small differences in counts.

differences between years and between VHA utilizers versus nonutilizers, the interaction term was significant (Wald $\chi^2_1 = 4.949$; $P = .026$), reflecting decreasing suicide rates in utilizers compared with nonutilizers over time (Figure 2). In 2005, rates were 21.9% higher in young male utilizers than in nonutilizers; by 2008, rates among young male utilizers were 46.8% lower (Figure 2).

A number of the findings reported here identified veteran men younger than age 30 as an important subgroup. Men younger than age 30 as a proportion of the total number of men in the 16 states receiving VA health care services increased from 2.8% in 2005 to 3.2% in 2006, to 3.6% in 2007, and to 3.9% in 2008 (Table 2). During this period, there were also substantial increases (>50%) in the proportion of these young men who served in Afghanistan or Iraq, and in those diagnosed with a substance use disorder, depression, posttraumatic stress disorder (PTSD), another anxiety disorder, or any mental health

condition. There were marginal increases in the proportion with diagnoses of bipolar disorder and decreases in the proportion with diagnoses of schizophrenia (Table 3).

DISCUSSION

The findings reported here are important for 2 reasons. First, they demonstrated the feasibility and utility of linking information from NVDRS, NDI, and VHA sources to compare outcomes in veterans who utilized VHA healthcare services and those who did not. Second, they constituted the first reported comparison of suicide rates between veteran utilizers and nonutilizers.

The findings presented here demonstrated that for veteran men overall, for those aged 30–64 years, and for those 65 years and older, suicide rates among VHA utilizers were persistently higher than for nonutilizers. Other findings demonstrated important trends among veteran men younger than 30 years. The

number of these veterans and the proportion of them using VHA services increased from 2005–2008. Suicide rates increased in the overall population of young veteran men in parallel with the rates in VHA service nonutilizers, as opposed to nonsignificant changes in VHA service utilizers. Most significantly, from 2005–2008, there were dramatic decreases in suicide rates in young male VHA utilizers relative to nonutilizers. We noted that in the general US population in the 16 states, the Web-based Injury Statistics Query and Reporting System/NVDRS web site indicated that suicide rates in 2008 were 19.4 per 100 000 among men age 18 to 29 years, and 25.1 and 28.3 among men age 30–64 and 65 years and older, respectively. Finally, findings were consistent with previous reports that suicide rates were higher for men than for women, both in veteran and nonveteran populations.^{19,33} Given the lower prevalence of suicide in women and the relatively low proportion of veterans who were women, it was not feasible to compare rates among veteran women by VHA utilization status in the 16 NVDRS states. Consequently, this discussion focused on findings among veteran men.

The results for all veteran men, for those aged 30–64 years and for those aged 65 years and older, were consistent with reported comparisons of suicide rates between VHA utilizers and age- and gender-matched individuals in the general population.¹⁹ As discussed previously,¹⁹ these findings might be related to selection of those who were more likely to be mentally ill, chronically ill, disabled, and economically disadvantaged by the eligibility criteria for enrollment in VHA.²⁶ Several lines of investigation supported selective use of VHA services by those with risk factors for suicide. Research conducted before the first Gulf War demonstrated that high illness levels and service connected disability were associated with use of VA health care services.³⁴ Research between the first Gulf War and OEF/OIF demonstrated that veterans who were unemployed and with greater levels of disability were more likely to use VA relative to non-VA outpatient health care services.³⁵ Findings from the first years of OEF and OIF demonstrated that the proportion of enrollees with serious mental illness in VHA was greater than that in private insurance plans or the Military Treatment System, and comparable to

TABLE 2—Suicide Counts, at Risk Populations, and Suicide Rates Among Veteran Men, Overall and by Veteran Health Administration User Status: 16 National Violent Death Reporting System States, 2005–2008

Ages, y	All Veteran Men			VA Utilizer Men			VA non-Utilizer Men		
	Suicides, No.	Population, No.	Suicide Rate	Suicides, No.	Population, No.	Suicide Rate	Suicides, No.	Population, No.	Suicide Rate
2005									
All	1767	6 193 444	28.53	423	1151 260	36.74	1344	5 042 184	26.66
18–29	100	222 255	44.99	17	31 966	53.18 ^a	83	190 289	43.62
30–64	931	3 636 370	25.60	217	594 346	36.51	714	3 042 024	23.47
≥ 65	736	2 334 819	31.52	189	524 948	36.00	547	1 809 871	30.22
2006									
All	1600	6 118 208	26.15	396	1 049 666	37.73	1204	5 068 542	23.75
18–29	104	229 848	45.25	15	33 827	44.34 ^a	89	196 021	45.40
30–64	900	3 575 049	25.17	219	548 316	39.94	681	3 026 733	22.50
≥ 65	596	2 313 311	25.76	162	467 523	34.65	434	1 845 788	23.51
2007									
All	1787	6 052 918	29.52	391	1 072 818	36.45	1396	4 980 100	28.03
18–29	137	241 339	56.77	18	38 544	46.70 ^a	119	202 795	58.68
30–64	965	3 490 677	27.65	216	563 769	38.31	749	2 926 908	25.59
≥ 65	685	2 320 902	29.51	157	470 504	33.37	528	1 850 398	28.53
2008									
All	1843	5 982 534	30.81	435	1 085 111	40.09	1408	4 897 423	28.75
18–29	144	250 070	57.58	14	42 113	33.24 ^a	130	207 957	62.51
30–64	992	3 406 930	29.12	248	575 991	43.06	744	2 830 939	26.28
≥ 65	707	2 325 534	30.40	173	467 007	37.04	534	1 85 8527	28.73

^aRates based on small sample sizes must be interpreted with caution, as they are sensitive to small differences in counts.

the proportion among Medicaid recipients; the proportion of those with depression was greater in the VA than any of the other coverage systems.³⁶ Finally, findings that PTSD predicted use of VHA services among Vietnam-era

veterans³⁷ were consistent with recent unpublished findings that PTSD and other mental health conditions predicted VHA use among OEF and OIF veterans. The findings reported here were consistent with the hypothesis that

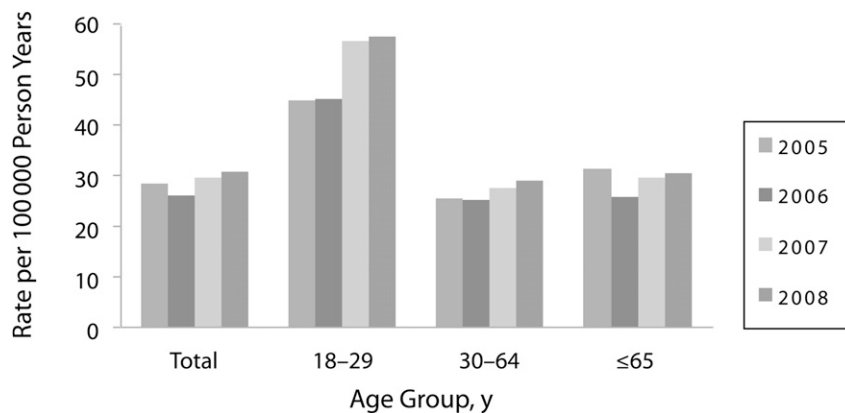


FIGURE 1—Suicide rates among veteran men, by year and age group: 16 National Violent Death Reporting System states, 2005–2008

suicide rates were higher among veterans who received VHA services than among those who did not receive VHA services. The results did not, however, confirm the hypothesis that mental health enhancements led to decreases over time in suicide rates. We noted that VHA mental health enhancements continued beyond 2008, and further monitoring is needed to determine whether these enhancements led to decreases in suicide rates.

Our findings demonstrate important trends among veteran men younger than 30 years. First, suicide rates increased between 2005 and 2008 in the total population of young veteran men in the 16 states included in NVDRS. Although the mechanisms underlying this increase remain to be determined, it is important to note that this effect appeared to parallel the increases observed among active duty service members.^{38,39} Second, as hypothesized, rates among young utilizers decreased relative to those among nonutilizers. In principle, this effect could occur for either of 2 reasons. First, it could result from selection factors, if over time, the young men who came to VHA for services were increasingly at lower risk for suicide. Alternatively, the relative decline among VHA utilizers could occur as a result of enhancements in access to effective treatments or if VHA services became more effective at preventing suicide. Given that mental health conditions are major risk factors for suicide,²¹ the increasing prevalence of mental health conditions in male VHA utilizers younger than 30 years (Table 3) appeared inconsistent with the possibility that the relative decreases in suicide rates in the young men served by VHA could be because of the enrollment of patients at lower risk. Accordingly, it was likely that the observed decreases in suicide rates for young male utilizers were because of enhancements in the effectiveness of VHA services. The findings presented in Figure 2 could be explained by assuming that young veteran men represented a group for whom the outcomes of care were most sensitive to these enhancements, possibly as a reflection of the acuity of their mental health conditions.

There were multiple potential limitations involved with the data sources and the necessary assumptions for completing these analyses. Of course, study findings might not be generalizable to the entire United States or the entire VHA health care system, to the extent

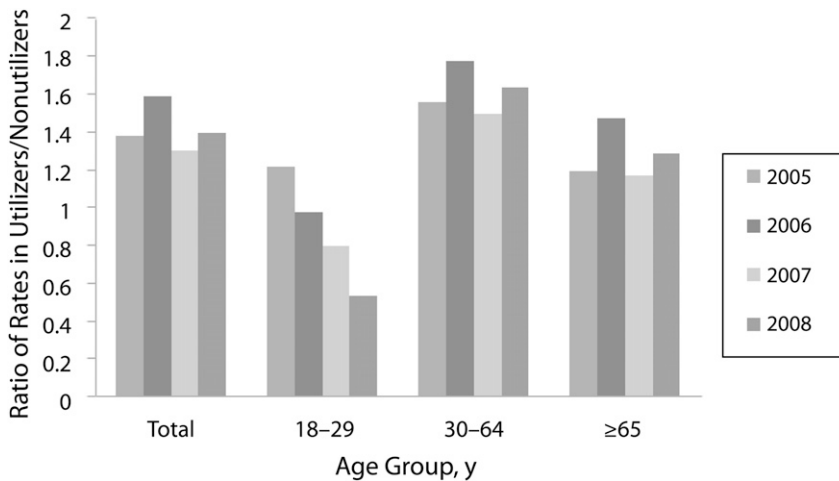


FIGURE 2—Ratio of suicide rates among veteran men utilizing Veterans Affairs health care services and among nonutilizers, by year and age group: 16 National Violent Death Reporting System states, 2005–2008

that the 16 NVDRS states were not representative of the nation or the VHA health system, for example, with respect to the geographic distribution of veterans and patterns of VHA utilization. Also, there were constraints related to measurement. Most concerning was the possibility that the NVDRS indicators of veterans status were derived from responses regarding whether decedents had ever served in the US Armed Forces. In some cases, positive responses might have included nonveterans

(e.g., active duty personnel, National Guard members who were never activated or deployed), and negative responses might have failed to identify veterans (e.g., those with previous service in the Coast Guard or Public Health Services; veteran decedents whose survivors were unaware of their veteran status). This raised important concerns regarding study findings, as secular trends in suicide mortality among activity duty personnel could affect the assessment of trends in suicide mortality among veterans who did not utilize VHA services. Certainly further research is needed to address this concern. Finally, we noted 3 other sources of potential measurement error. First, the source of veteran population counts was based on census data, information from the Department of Defense, and updates estimated using actuarial methods. Given the recent increases in the number of veterans returning from Afghanistan and Iraq, there might have been greater imprecision in the veteran population estimates, particularly for younger veterans. Second, because it was not possible to directly match individuals who were counted as veteran suicides by NVDRS with the VHA data, the calculation of rates among veteran nonutilizers was perforce estimated; rates for utilizers and nonutilizers were calculated for the 16 states from the number of individuals identified by VHA as utilizers in these states and, for nonutilizers, by the total number counted by NVDRS minus the number

identified by VHA. Third, although the NVDRS attributed individuals to states based on the location of their deaths, the VHA attributed veterans to states based on the location of the facility where they last received VHA services. Consequently, the different processes might have resulted in mismatches and noise or bias in the findings.

Mindful of these concerns, we noted that this study applied existing data to investigate pressing public health and health policy questions. Study findings offered new perspectives regarding suicide among veterans and differences in suicide rates between VHA utilizers and nonutilizers. The most significant findings might be the consistently higher rate of suicide among VHA utilizers aged 30–64 years and those 65 years and older and, among veterans younger than 30 years, the observed decreasing rates in VHA utilizers relative to nonutilizers between 2005 and 2008. Although definitive explanations for these findings will require additional research, the available evidence suggested that the increased rates in men aged 30–64 years and in elder populations might be because of the selective use of VHA services by individuals at increased risk, whereas among veterans younger than 30 years, the decreasing rates in VHA utilizers relative to nonutilizers might result from the ongoing enhancements in VHA mental health services. ■

TABLE 3—OEF/OIF Status and Clinical Characteristics of Veteran Men Younger Than 30 Years Utilizing the Veterans Health Administration: 16 National Violent Death Reporting System States, 2005–2008

	2005, %	2006, %	2007, %	2008, %
OEF/OIF	3.60	47.61	57.57	63.75
SUD	5.28	6.33	8.18	10.36
Depression	11.28	12.70	15.30	18.23
PTSD	7.93	11.50	16.65	21.68
Other anxiety	5.17	6.08	7.93	9.71
Bipolar	1.95	2.00	2.19	2.37
Schizophrenia	1.27	1.23	1.16	1.08
Any MH condition	23.16	27.04	33.53	39.42

Note. MH = mental health; OEF/OIF = Operation Enduring Freedom/Operation Iraqi Freedom; PTSD = posttraumatic stress disorder; SUD = substance use disorder.

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Contributors

I. R. Katz originated the analytic plan. I. R. Katz, J. F. McCarthy, and R. V. Ignacio conducted the analyses, interpreted the data, and wrote the article. All authors contextualized the findings, approved the final article, and take responsibility for the data integrity and accuracy of the analyses.

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Human Participants Protection

This study was approved by the Ann Arbor VA Medical Center Institutional Review Board.

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