Behavioral health and sleep problems among US Army veterinarians and veterinary technicians participating in the Millennium Cohort Study

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OBJECTIVE
To determine the prevalences and relative odds of mental health problems, suicidal ideation, psychotropic medication use, problem drinking, trouble sleeping, and lack of social support among veterinarians and veterinary technicians, compared with other medical professionals, in the US Army.

SAMPLE
7,744 US Army personnel (957 officers [101 veterinarians and 856 physicians and dentists] and 6,787 enlisted personnel [334 veterinary technicians and 6,453 medics]) participating in the Millennium Cohort Study.

PROCEDURES
Eligible participants completed ≥1 survey while serving as an Army veterinarian, veterinary technician, physician, general dentist, or medic. Analysis methods including multivariable logistic regression adjusted for covariates and stratified by pay grade were used to investigate associations between each health-care occupation and outcomes of interest.

RESULTS
Veterinarians had higher reported prevalences of mental health problems, trouble sleeping, and lack of social support than did nontrauma physicians, trauma physicians, or dentists. On multivariable analysis, veterinarians had higher odds of mental health problems, trouble sleeping, and lack of social support, compared with physicians and dentists combined; odds for these outcomes were also higher for veterinarians, compared with various individual reference groups. Veterinary technicians had lower reported prevalence and lower odds of psychotropic medication use, compared with medics.

CONCLUSIONS AND CLINICAL RELEVANCE
Further examination of Army policies and organizational structures related to veterinarians may be warranted, along with the development of policies and interventions designed to improve mental health, sleep quality, and social support among military veterinarians. (J Am Vet Med Assoc 2021;258:767–775)

Occupation-related mental distress is widely known to affect health-care professionals at greater rates than that experienced by the general population. Moreover, studies of health-care professionals have found greater occurrences of mental illness among veterinarians than among other medical professionals (eg, physicians, dentists, and nurses). Previous investigations have identified a higher frequency of depression, anxiety, psychological distress, psychotropic medication use, problem (alcohol) drinking, and suicide among veterinarians and veterinary students than among the general population.

ABBREVIATIONS
DoD Department of Defense
DSM-IV Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
PCL-C Posttraumatic Stress Disorder Checklist—Civilian Version
PHQ Patient Health Questionnaire
PTSD Posttraumatic stress disorder

The documented higher proportions of suicide among veterinarians, compared with the general population, are of particular concern. Results of 1 recent US study indicate that standardized mortality ratios for suicide are significantly greater among veterinarians and veterinary technicians than the general population but are similar between veterinary assistants or laboratory animal caretakers and the general population. In contrast, another survey-based US study found a lower prevalence of suicide attempts among veterinarians than among the general population, despite a similar prevalence of mental illness. The higher rate of suicide deaths paired with a lower prevalence of suicide attempts may indicate that veterinarians are more likely to die on their first suicide attempt as a result of access to and knowledge about lethal means, specifically pentobarbital.

Greater rates of psychosocial distress may be influenced by stressors associated with the veterinarian occupation such as a heavy workload, financial stress,
and responsibility for euthanizing animals. The authors of several studies have hypothesized that performing animal euthanasia could be related to increased risks for depression, suicidal ideation, and suicidal behavior. However, results of 1 study suggest that performing animal euthanasia is a protective factor against suicide among veterinarians with depression, in which performing euthanasia > 11 times/wk attenuates the association between depression and odds of suicide. Thus, performing euthanasia might also be associated with positive effects on veterinarians’ mental health, potentially owing to the merciful ending of an animal’s suffering. Furthermore, a recent study found that psychological distress among US veterinarians is associated with working long hours, student debt, and working as a relief veterinarian. Results of a 2014 survey show that 1 in 5 veterinarians are cyberbullied by pet owners for various reasons such as not waiving fees when asked. Although study results have been somewhat mixed, psychological distress among veterinarians likely has several complex causes.

Despite evidence suggesting that veterinarians have a high prevalence of mental health problems, there are gaps in understanding the scope of the problem in the United States and particularly among military veterinary staff. With few exceptions, the aforementioned studies were restricted to populations in Europe, Australia, and New Zealand. Most of these investigations did not directly compare mental health problems between veterinarians or veterinary technicians and other appropriately matched health-care professionals and did not account for demographics and other potential risk factors in their analyses. To our knowledge, only 1 empirical study has examined mental health and social support of veterinarians and veterinary technicians in the military. Sleep quality has also been understudied among veterinarians and veterinary staff despite the known and often bidirectional associations between sleep and mental health (i.e., poor sleep can exacerbate mental health conditions, which in turn may result in even worse sleep quality). In addition, fatigue and sleep deprivation can contribute to the occurrence of occupational and traffic accidents as well as medical errors.

The approximately 1,400 military veterinarians and their staff presently serving in the US Army are likely affected by the same occupational stressors as their civilian counterparts while also experiencing additional stressors unique to military service. Their respective duties include providing medical care to government-owned and privately owned animals and support for zoonotic disease control and prevention. During a deployment, military veterinarians also have a public health mission that may include euthanizing stray animals or injured military animals. This responsibility may place veterinarians and veterinary technicians in conflict with other deployed personnel who might be inclined to take in stray dogs and cats. One recent study of US military personnel found that veterinarians and veterinary staff have more severe secondary traumatic stress symptoms (i.e., PTSD-like symptoms after witnessing patient trauma, also described as compassion fatigue) and anger reactions than nonveterinary health-care personnel. However, that study examined a small sample of deployed service members and thus had limited generalizability to the military veterinarian population.

The Millennium Cohort Study, the largest and longest-running ongoing study of US military personnel, provides an opportunity to examine mental health and related outcomes in a representative sample of veterinarians and veterinary technicians. A previous analysis examining mental health outcomes with these cohort data found no significant difference in the odds of new-onset PTSD or depression between health-care professionals, including veterinarians, and other military professionals deployed in support of operations in Iraq and Afghanistan; however, results specific to veterinarians were not examined. The purpose of the study reported here was to assess and compare the prevalences of self-reported mental health problems, suicidal ideation, psychotropic medication use, problem drinking, sleep problems, and lack of social support among veterinarians, veterinary technicians, and other medical professionals in the US Army. Participants were restricted to Army personnel because other US armed services do not have occupations designed specifically for clinical veterinary personnel. The Army currently has > 700 personnel filling veterinarian-specific positions and another 700 personnel serving as veterinary technicians.

Materials and Methods
Sample
Human subjects participated in the study after giving their free and informed consent. The research was conducted in compliance with all applicable federal regulations governing the protection of human subjects in research and approved by the Naval Health Research Center Institutional Review Board (protocol NHRC.2000.0007).

The Millennium Cohort Study was established in 2001 to evaluate the short- and long-term health effects associated with military service, and detailed descriptions of the study methodology are available elsewhere. Briefly, random samples of US military personnel, representing all service branches and components, were invited to enroll in periodic phases of the study (July 2001 to June 2003 [panel 1], June 2004 to February 2006 [panel 2], June 2007 to December 2008 [panel 3], and June 2011 to April 2013 [panel 4]; summarized as years 2001, 2004, 2007, and 2011). Enrolled participants completed a comprehensive survey at enrollment as well as additional surveys approximately every 3 to 4 years, even after leaving military service. Surveys consisted of questions on a
wide range of topics, including physical, mental, and behavioral health, as well as military and nonmilitary life experiences.

For the present study, we restricted the sample to Army personnel who held one of the following specific health-care occupations (as determined on the basis of Army or DoD occupation codes; Supplementary Appendix S1, available at: avmajournals.avma.org/doi/suppl/10.2460/javma.258.7.767) at any time during their military service: veterinarian, non-trauma physician, trauma physician, general dentist, veterinary technician, or medic. Eligible participants must have completed ≥1 Millennium Cohort Study survey following the initiation of service in their health-care occupation, referred to as the baseline survey for the purposes of this study. Warrant officers and veterinarian food technicians were excluded from the study because their job functions differed markedly from the other occupations included in the study. Individuals who held multiple qualifying health-care occupations over time were also excluded to maintain clear distinctions between comparison groups. Finally, individuals missing demographic or military characteristics data were excluded.

**Measures**

The outcomes of interest were assessed from participants’ surveys, which the participant may have completed while serving in or after separating from the military.

Participants were identified as having mental health problems if they met the criteria for 1 of 4 measures: PTSD, depression, panic, or anxiety. A positive screen for PTSD was determined on the basis of the 17-item PCL-C in accordance with the DSM-IV criteria. Participants rated their experience of each symptom in the past month on a scale from 1 (not at all) to 5 (extremely). Those who responded with moderately, quite a bit, or extremely on ≥1 intrusion item, ≥2 hyperarousal items, and ≥3 avoidance items met the criteria for probable PTSD. The DSM-IV was used because data collection predated the publication of the fifth edition of the manual, and the PCL-C was selected instead of a military experience–specific version of the checklist because not all Millennium Cohort Study participants were or had been deployed and the PCL-C was applicable to experiences related to any traumatic event.

Depression, panic, and anxiety were measured with standard scoring algorithms from the PHQ. The PHQ consists of multiple questions that can be grouped in scales and used as a screening tool for mental and behavioral health conditions including depression (PHQ-8), panic, anxiety, and problem drinking.

Depression was identified when the participant met DSM-IV criteria for major depressive disorder (ie, reporting experiencing ≥5 of the 8 items from the PHQ-8, including anhedonia or depressed mood, on more than half the days or nearly every day vs not at all in the past 2 weeks). Panic syndrome criteria were met if the participant indicated having an anxiety attack in the past 4 weeks, having had previous anxiety attacks, having such attacks come on suddenly, and worrying about future attacks, in addition to having ≥4 of the 11 physical symptoms related to an anxiety attack (eg, having chills or feeling short of breath). Other anxiety syndrome criteria were met if the participant indicated being bothered by feeling nervous, anxious, or on edge or worrying a lot about different things on more than half the days in the past 4 weeks in response to the first item and ≥3 of the 6 remaining items assessing anxiety symptoms.

Other outcomes of interest included suicidal ideation, psychotropic medication use, problem drinking, trouble sleeping, and lack of social support. Suicidal ideation was ascertained if participants indicated having thoughts that they would be better off dead or thoughts of hurting themselves in some way on several days or more in the past 2 weeks. This specific item was only available on the 2001, 2004, and 2007 surveys, whereas the other outcomes of interest were available on all surveys through 2011. Psychotropic medication use was identified when a participant reported taking any medicine for anxiety, depression, or stress at the time of the survey. Problem drinking was indicated by an affirmative response to any of 5 alcohol-related items on the PHQ (indicating the participant drank alcohol even though a doctor recommended against it, drank or had effects of drinking [described as being high or hungover] while working or taking care of other responsibilities, missed or was late for work or other activities because of being drunk or hungover, had difficulty getting along with others when drinking, or drove a car after drinking too much) >1 time in the past 12 months. Trouble sleeping was identified when the participant indicated having trouble falling asleep or staying asleep over the past 4 weeks. Lack of social support was identified if a participant reported being bothered at all during the past 4 weeks by having no one to turn to when they had a problem.

Most study participants completed >1 survey. Therefore, starting from baseline, each survey for an individual (identified with a unique study ID) was sequentially checked for an outcome of interest (eg, the presence of mental health problems), and the first survey in which that outcome was identified was used as the assessment point in the analysis. For example, if a participant had a positive result for an outcome of interest at baseline, that survey was used as the assessment point for that outcome. If not, each consecutive survey was checked for the outcome of interest until the last completed survey, which was the assessment point for participants who did not have the outcome. This process was repeated for each outcome. The median number of days between the commencement of the participant’s Army health-care occupation and the assessment point were calculated and compared across occupations.
Military health-care occupation was the primary exposure of interest. Occupations were identified by assessment of DoD and Army occupation codes obtained from the Defense Manpower Data Center.\(^a\) Because differences in various factors that could be associated with the outcomes of interest (eg, income, education, military experiences, and occupations) were expected between officers and enlisted personnel, the study sample was subdivided into these 2 groups. The officer group comprised veterinarians, nontrauma physicians, trauma physicians, and general dentists. The enlisted group included veterinary technicians and medics. A complete listing of occupation codes and descriptions\(^b\) is provided (Supplementary Appendix S1).

Sex, race-ethnicity, age, financial problems, pay grade, and number of surveys completed were measured at the assessment point, whereas deployment experience was evaluated up to the assessment point. With the exception of financial problems and the number of surveys completed, demographic and military characteristics were obtained from DoD personnel records maintained by the Defense Manpower Data Center.\(^b\) Categories were collapsed when needed owing to small cell sizes. Sex was self-reported as male or female. Race-ethnicity was self-reported, and depending on the service branch and the year when an individual joined the military, > 1 response could be provided. Participants who provided > 1 response to this question were categorized as having a race-ethnicity of other. For enlisted personnel, race-ethnicity was categorized into 3 groups: Black (non-Hispanic), white (non-Hispanic), and other; this category was reduced to 2 groups of white (non-Hispanic) and other for officers owing to the limited sample size. Age was dichotomized on the basis of birth year as prior to 1970 or 1970 and later (1970 was the 50th percentile for officers, and the same cutoff was used for enlisted personnel for consistency). Deployment dates were obtained from the Contingency Tracking System database maintained by the Defense Manpower Data Center, and deployment experience was categorized as yes for participants actively or previously deployed in support of military operations in Iraq or Afghanistan and no for all others. Pay grade was categorized as junior enlisted (grades E1 to E4) or noncommissioned officer (grades E5 to E9) for enlisted personnel, and officers comprised a single category of commissioned officers (grades O3 to O6). Financial problems were ascertained from the Millennium Cohort Study survey. A participant who indicated having suffered major financial problems (such as bankruptcy) in the past 3 years (or ever, if the assessment point was the participant’s baseline survey) or being bothered at all by financial problems or worries in the past 4 weeks was classified as having financial problems.

**Statistical analysis**

Descriptive analyses, including \(\chi^2\) tests, were used to compare demographics, military characteristics, and health outcomes among Army health-care occupations within the subgroups of officers and enlisted personnel. Values of \(P < 0.05\) were considered significant. The study populations varied slightly for each of the 6 outcomes; results from descriptive analyses were only presented for the outcome of mental health problems.

Multivariable logistic regression models were used to estimate ORs with 95% CIs for associations between occupation and each outcome of interest for the study (mental health problems, suicidal ideation, psychotropic medication use, problem drinking, trouble sleeping, and lack of social support). Models stratified by pay grade were run for each of these outcomes. The ORs were estimated for separate models in which veterinarians were compared with each of 3 reference groups: nontrauma physicians, trauma physicians, and general dentists. Then, ORs were estimated for veterinarians, compared with these 3 groups combined as a single reference group (physicians and dentists combined). Veterinary technicians were compared with medics. Covariates in statistical models included sex, race-ethnicity, age, financial problems, deployment experience, pay grade, and the number of surveys completed from baseline to the assessment point (with the first survey considered number 1). Covariates were selected a priori and remained in all multivariable models regardless of statistical significance to facilitate comparisons between groups. The variance inflation factor was used to assess for collinearity; a value > 4 indicated possible collinearity. Data for all 4 enrollment panels from the Millennium Cohort Study were pooled for these analyses. Significant associations between occupation and each outcome of interest were indicated when the 95% CIs for the ORs excluded 1.0. All analyses were performed with a statistical software package.\(^c\)

**Results**

Initial screening of records identified 8,471 US Army veterinarians, nontrauma physicians, trauma physicians, general dentists, veterinary technicians, and medics enrolled in the first 4 panels of the Millennium Cohort Study. Of these, 7,878 completed ≥ 1 survey while serving in their health-care occupation. Eight of these individuals were excluded because of job function (warrant officer or veterinarian food technician), and 124 were excluded because they held multiple qualifying health-care occupations over time; another 2 were excluded owing to missing demographic or military characteristics data. The final sample for the present study included 7,744 individuals (957 officers and 6,787 enlisted personnel). Of the 957 officers in the study, 101 (10.6%) were veterinarians, 592 (61.9%) were nontrauma physicians, 115 (12%) were trauma physicians, and 149 (15.6%) were general dentists. Of the 6,787 enlisted personnel, 334 (4.9%) were veterinary technicians and 6,453 (95.1%) were medics. The fi-
nal sample sizes for each outcome differed slightly for officer and enlisted personnel populations after participants with missing data for the outcome of interest were removed (n = 955 and 6,639, respectively, for mental health problems; 699 and 4,528, respectively, for suicidal ideation; 955 and 6,609, respectively, for psychotropic medication use; 953 and 6,568, respectively, for problem drinking; 955 and 6,639, respectively, for trouble sleeping; and 953 and 6,621, respectively, for lack of social support). Descriptive and military characteristics of participants who provided data related to the mental health outcome were summarized (Table 1). Results were similar for the same data sets for all other outcomes of interest (not shown).

Results of χ² analysis indicated veterinarians had higher reported prevalences of mental health problems, trouble sleeping, and lack of social support, compared with nontrauma physicians, trauma physicians, and dentists (Table 2). Among enlisted personnel, the prevalence of reported psychotropic medication use was significantly lower for veterinary technicians than for medics in this analysis. The median number of days between the commencement of a participant’s health-care occupation and the assessment point (across all assessments) did not differ substantially by occupation among officers (veterinarians, 761 days [range, 217 to 2,478 days]; nontrauma physicians, 757 days [range, 5 to 2,469 days]; trauma physicians, 761 days [range, 28 to 2,647 days]; and general dentists, 718 days [range, 3 to 5,378 days]) or enlisted personnel (veterinary technicians, 1,004 days [range, 19 to 2,778 days]; medics, 1,014 days [range, 2 to 4,664 days]).

Results of adjusted multivariable logistic regression modeling revealed that veterinarians had higher odds of experiencing mental health problems, compared with general dentists (OR, 2.53); higher odds of experiencing trouble sleeping, compared with nontrauma physicians (OR, 2.07), trauma physicians (OR, 1.90), and general dentists (OR, 2.18); and higher odds of lack of social support, compared with nontrauma physicians (OR, 1.71) and general dentists (OR, 1.94; Table 3). Compared with physicians and dentists combined, veterinarians also had higher odds of mental health problems (OR, 1.89), trouble sleeping (OR, 2.07), and lack of social support (OR, 1.68). Among enlisted personnel, the only significant association with outcomes of interest in multivariable analyses was that the odds of psychotropic medication use were lower for veterinary technicians, compared with medics (OR, 0.72).

### Table 1—Results of a comparison of demographic and military characteristics for 7,594 of 7,744 study participants (955/957 officers and 6,639/6,787 enlisted personnel) who provided mental health problem data in a survey-based study to assess the prevalences and odds of mental health problems, suicidal ideation, psychotropic medication use, problem drinking, trouble sleeping, and lack of social support among veterinarians and veterinary technicians, compared with other medical professionals, in the US Army.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Officers</th>
<th>Enlisted personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Veterinarians (n = 101)</td>
<td>Nontrauma physicians (n = 590)</td>
</tr>
<tr>
<td>Demographic characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>41 (40.6)</td>
<td>369 (62.5)</td>
</tr>
<tr>
<td>Female</td>
<td>60 (59.4)</td>
<td>221 (37.5)</td>
</tr>
<tr>
<td>Race-ethnicity*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>93 (92.1)</td>
<td>475 (80.5)</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Other</td>
<td>8 (7.9)</td>
<td>115 (19.5)</td>
</tr>
<tr>
<td>Birth year</td>
<td>0.421</td>
<td></td>
</tr>
<tr>
<td>Before 1970</td>
<td>46 (45.5)</td>
<td>304 (51.5)</td>
</tr>
<tr>
<td>1970 or later</td>
<td>55 (54.5)</td>
<td>286 (48.5)</td>
</tr>
<tr>
<td>Financial problems</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>56 (55.4)</td>
<td>414 (70.2)</td>
</tr>
<tr>
<td>Yes</td>
<td>45 (44.6)</td>
<td>176 (29.8)</td>
</tr>
<tr>
<td>Military characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deployment experience†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>90 (89.1)</td>
<td>539 (91.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>11 (10.9)</td>
<td>51 (8.6)</td>
</tr>
<tr>
<td>Army pay grade</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Junior enlisted (E1–E4)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Noncommissioned officers (E5–E9)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Commissioned officers (O3–O6)</td>
<td>101 (100)</td>
<td>590 (100)</td>
</tr>
</tbody>
</table>

All participants were enrolled in the Millennium Cohort Study beginning in the years 2001, 2004, 2007, and 2011. Data indicate the number (%) of participants in a given occupation for each characteristic shown. The P values reflect the results of the χ² test of independence. Values of P < 0.05 were considered significant.

†Deployed in support of Operation Iraqi Freedom or Operation Enduring Freedom.

— = Values were not calculated separately for this group. NA = Not applicable.
Presence of an outcome of interest was identified when participant responses on a survey reflected the following: PTSD, depression, panic, or anxiety (mental health problems); thoughts that they would be better off dead or thoughts of hurting themselves in some way on several days or more in the past 2 weeks (suicidal ideation); taking any medicine for anxiety, depression, or stress (psychotropic medication use); an affirmative response to any of 5 alcohol-related items on the PHQ (problem drinking); having trouble falling asleep or staying asleep over the past 4 weeks (trouble sleeping); or being bothered at all in the past 4 weeks by having no one to turn to when they had a problem (lack of social support). Not all participants answered every question; because of rounding, the percentages within a column for a given characteristic do not always total 100%

See Table 1 for remainder of key.

Table 3—Results of multivariable regression analyses (adjusted ORs) for the outcomes of interest for the 7,744 study participants in Table 2.

<table>
<thead>
<tr>
<th>Health outcome</th>
<th>Occupation</th>
<th>Comparison (referent) group</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental health problem</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>1.78 (0.92–3.43)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.76 (0.68–4.55)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>2.53 (1.04–6.19)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.89 (1.01–3.58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>0.96 (0.73–1.25)</td>
</tr>
<tr>
<td>Suicidal ideation</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>1.99 (0.70–5.68)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.22 (0.30–4.90)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>2.20 (0.57–8.52)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.91 (0.70–5.17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>1.13 (0.71–1.81)</td>
</tr>
<tr>
<td>Psychotropic medication</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>1.30 (0.74–2.30)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.87 (0.81–4.28)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>1.69 (0.81–3.55)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.42 (0.81–2.47)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>0.72 (0.52–0.99)</td>
</tr>
<tr>
<td>Problem drinking</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>1.24 (0.61–2.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.16 (0.47–2.89)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>1.50 (0.63–3.54)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.28 (0.64–2.53)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>0.89 (0.66–1.19)</td>
</tr>
<tr>
<td>Trouble sleeping</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>2.07 (1.31–3.26)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.90 (1.05–3.44)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>2.18 (1.25–3.78)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.07 (1.33–3.23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>0.93 (0.74–1.18)</td>
</tr>
<tr>
<td>Lack of social support</td>
<td>Veterans</td>
<td>Nontrauma physicians</td>
<td>1.71 (1.04–2.79)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trauma physicians</td>
<td>1.24 (0.65–2.34)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General dentists</td>
<td>1.94 (1.06–3.54)</td>
</tr>
<tr>
<td></td>
<td>Veterinary technicians</td>
<td>Physicians and dentists combined&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.68 (1.05–2.71)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medics</td>
<td>1.06 (0.83–1.35)</td>
</tr>
</tbody>
</table>

For comparison among officer groups, the full models were adjusted for sex, race, birth year, financial problems, deployment experience, and number of surveys completed. For comparison between groups of enlisted personnel, the full models were adjusted for sex, race, birth year, financial problems, deployment experience, pay grade, and number of surveys completed. Findings were considered significant if the 95% CI for the OR did not include 1.0.

<sup>a</sup>Physicians and dentists combined included nontrauma physicians, trauma physicians, and general dentists as 1 group.

See Table 2 for remainder of key.
Discussion

To the authors’ knowledge, the present study was the first large-scale, empirical examination of mental health findings, trouble sleeping, and perceptions of social support among US Army veterinarians and veterinary technicians. Overall, the survey results indicated that Army veterinarians had significantly higher odds of experiencing mental health problems, trouble sleeping, and lack of social support, compared with Army physicians and general dentists. Compared with medics, veterinary technicians did not have significantly higher odds for any of the selected health outcomes and had significantly lower odds of psychotropic medication use.

Our findings indicating greater overall psychological distress among veterinarians, compared with other medical professionals in the Army, were consistent with most findings from previous studies of civilian veterinarians.\textsuperscript{1,6,7} The prevalence of mental health problems among veterinarians was approximately twice that of physicians and dentists in our study, and odds of mental health problems for veterinarians were approximately twice those for dentists or physicians and dentists combined in the final adjusted models. Although the prevalences of suicidal ideation and psychotropic medication use among veterinarians were also apparently greater than those found for physicians and dentists, the differences were nonsignificant and the odds of these outcomes did not differ for veterinarians, compared with any of the relevant reference groups, possibly because of the small sample size. It should be noted that the proportions of participants who answered the question about suicidal ideation were smaller than those of participants who answered questions about the other outcomes of interest.

The study reported here also examined other aspects of health among Army veterinary professionals, including problem drinking, trouble sleeping, and lack of social support. The proportion of veterinarians who reported problem drinking was slightly higher, compared with those of physicians and dentists, but this difference was nonsignificant. Findings related to this topic in previous studies\textsuperscript{9,10} of veterinarians have been inconsistent. For example, results of 2 studies\textsuperscript{8,9} indicate that civilian veterinarians may drink alcohol more frequently but they may consume less on the days they drink and may not have higher rates of binge drinking than the general population. However, Harling et al\textsuperscript{9} suggested that veterinarians may be more vulnerable to alcohol-related problems, although no direct comparison to nonveterinarian counterparts was conducted. Future research is needed to determine whether veterinarians have a higher risk for problem drinking, heavy drinking, or alcohol misuse than nonveterinarians and to investigate potential risk factors for these outcomes.

Our study found that veterinarians reported having trouble sleeping approximately 60% more often than physicians or dentists and had odds of this outcome approximately 2 times those for each of the referent groups in the final adjusted models. To our knowledge, this was the first examination of sleep problems among veterinarians. The reason for this finding was not clear, although 1 study\textsuperscript{47} found that euthanizing animals is reported to negatively impact the sleep of animal shelter workers and is associated with nightmares. Trouble sleeping may also be influenced by other occupational stressors. Veterinarians may feel moral distress when animal owners select treatment options inconsistent with what the veterinarian perceives as the correct course of action. Working long hours has been associated with serious psychological distress in veterinarians,\textsuperscript{57} which may impact sleep quality. Overall, sleep problems are of particular concern given the link between sleep problems and subsequent health disorders and performance decrements.\textsuperscript{28,48–50}

Regarding lack of social support, a great deal of research has shown the importance of social connection in sustaining individual health and has shown the health risks associated with loneliness, including increased risk for suicidal behaviors.\textsuperscript{51–53} In the present study, being bothered by a lack of social support was reported by more than a third of veterinarians, which was a greater prevalence than was found for physicians and dentists. In the final adjusted models, odds of this outcome for veterinarians were nearly twice those for nontrauma physicians, general dentists, and physicians and dentists combined. In the Army, veterinarians are members of a small community often stationed in geographic isolation from other veterinarians, particularly during deployment; these isolating circumstances may negatively impact veterinarians’ perceived social support. Penix et al\textsuperscript{27} found that deployed military veterinary staff were less likely to report team support and supportive leadership behaviors, compared with other medical staff during deployment. However, only about 10% to 17% of participants in our study sample were deployed during the study period. Civilian veterinarians have also reported lower levels of social support in the workplace.\textsuperscript{54,55} and 1 previous study\textsuperscript{7} found that 81 of 394 (21%) civilian veterinarians experienced some form of workplace abuse. Although the present study did not address workplace abuse, more research is needed to identify whether the perceived lower levels of social support among Army veterinarians are attributable to providing veterinary services, the veterinary workplace environment, or military-specific factors. Understanding the reasons for perceived lack of social support is needed to develop strategies to mitigate this outcome and associated health risks.

In contrast to the findings for veterinarians, the prevalences of mental health problems, trouble sleeping, and lack of social support as well as suicidal ideation and problem drinking did not differ significantly for veterinary technicians, compared with medics, and in the final adjusted models, the odds for these outcomes did not differ between enlisted personnel groups. However, veterinary technicians had a lower
prevalence and lower odds of psychotropic medication use, compared with medics. These novel findings suggested that the observed disparities among officer health professionals may not exist among enlisted health professionals.

The main strengths of the study reported here included the large size and representative sampling frame of the Millennium Cohort Study\(^\text{56}\) that made comparisons among a range of medical professionals possible and provided the ability to adjust for potential confounders. Notable limitations of the present investigation included the cross-sectional design and lack of veterinary-specific questions that could shed light on potential moderating factors. In addition, the number of participants with suicidal ideation may have been underestimated because this outcome variable was based on the response to 1 survey item that assessed symptoms in the 2 weeks prior to survey completion. However, given the limited number of studies focused on health outcomes of both veterinarians and veterinary technicians, the present study included arguably the most robust sample to date, with data collected on a variety of health outcomes and key covariate information. The longitudinal nature of the Millennium Cohort Study provides the potential for long-term follow-up studies and larger sample sizes as new participants are enrolled.

The greater vulnerability of Army veterinarians to mental health problems, trouble sleeping, and lack of social support, compared with relevant reference groups, suggested that further examination of Army policies and organizational structures related to veterinarians may be warranted, along with the development of programs designed to improve the long-term health and well-being of these professionals. Future studies with occupationally specific survey questions and veterinary staff interviews would also be beneficial in understanding the risk of adverse health outcomes among this profession. Military veterinarian professionals may be dispersed, whether deployed or in garrison, and unable to benefit from team support of other veterinarians. Instead, military personnel may be able to identify alternative methods to promote the adjustment of veterinarians tasked with ensuring the health of animals. Future efforts that may be considered include providing supervisor training on engaging in supportive positive behaviors that target key outcomes and address barriers to health in the occupational culture.\(^\text{56,57}\) In addition, training could be provided directly to veterinarians about these risks and alternative health-promoting strategies that may reduce the prevalence of adverse outcomes. Such efforts could be integrated with onboarding procedures and routinely included in veterinarian education courses in the military services to generate increased awareness and a shift in occupational culture.

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**Footnotes**


**References**


