Despite the many benefits of veterinary work, concerns have been raised regarding the relatively higher risk, compared with the risk for the general population, of poor mental health outcomes among veterinarians. A relatively high rate of death by suicide among veterinarians was first described in 1980 and has since been corroborated by data from Canada and the United States. Early work by Bartram et al proposed a model linking the prevalence of psychological morbidity and work-related stress to the high risk of suicide among veterinarians in the United Kingdom. Hatch et al reported in 2011 that Australian veterinarians had higher rates of depression, anxiety, stress, and burnout than did the general population.

However, not all results have been consistent. An international review by Platt et al in 2010 suggested that there was little evidence overall of an increased risk of poor mental health outcomes among veterinarians, relative to the risk among the general population. More recently, a 2017 survey by Volk et al on the well-being of American veterinarians came to a similar conclusion.

To date, the only published report of poor mental health outcomes among Canadian veterinarians comes from an online survey by the CVMA in 2012. The results suggested that mental health is poor, compared with the mental health of the general population. These results should serve as a call to action for tools and educational programs directed at supporting veterinarian mental wellness in Canada, with special attention paid to the disparate needs of the genders. (J Am Vet Med Assoc 2020;256:365–375)
an area of concern for Canadian veterinarians; however, because the study was limited to CVMA members and relied on self-reporting to assess burnout and suicidal ideation, there remains a large gap in the literature regarding the mental health status of Canadian veterinarians.

The importance of veterinarian mental health extends beyond concerns for the affected individuals themselves. Studies of human medical professionals have demonstrated that the mental health of caregivers may have a profound impact on the recipients of their care, including negative impacts on patient safety, adherence, satisfaction with care, and patient mortality rate. Physician burnout has also been shown to have significant economic costs, with interventions to reduce burnout suggested to produce a measurable return on investment. In veterinary medicine, the recipients of care include both animal patients and their human owners.

The Canadian public depends on approximately 12,500 veterinarians for services ranging from food safety to agricultural support to companion animal care for the 60% of Canadians who own pets. Consequently, the mental health and wellness of Canadian veterinarians have broad implications for Canadian society. It is important, therefore, to address the paucity of knowledge on Canadian veterinarian mental health.

The objective of the study reported here was to estimate the prevalence of perceived stress, burnout, depression, anxiety, compassion fatigue, compassion satisfaction, resilience, and suicidal ideation among Canadian veterinarians. A secondary objective was to compare results for Canadian veterinarians with results for an international normative sample representing the general human population and with results for a population of veterinarians from the United Kingdom.

Materials and Methods

Data collection

The study was designed as a cross-sectional online survey. The survey was administered through the use of standard software; was available in either French or English, depending on the participant’s preference; and was open from February through July 2017. Individuals were eligible for inclusion if they were a veterinarian residing in Canada at the time of the survey and able to read and write in either French or English. Recruitment assistance was received from nonlicensing provincial and federal veterinary associations, such as the CVMA, veterinary college alumni organizations, and species-specific and specialty veterinary associations. In addition, Veterinary Purchasing Co Ltd sent notices of the survey to their veterinary clients via electronic mailing lists and newsletters. Links to the survey were also disseminated through social media. Participants were given an opportunity to be entered in a drawing to receive 1 of 5 prizes of $400 (odds of winning were given as approx 1/500). The survey consisted of 5 previously validated psychometric scales along with questions regarding satisfaction with available support, personal history of mental illness and suicide, and demographic and employment characteristics.

PSS

Perceived stress was measured with the PSS, a widely used self-reporting scale that measured the degree to which participants found their lives to be “unpredictable, uncontrolled, and overloading.” The 10-item version of the PSS, available in both French and English, was used. Questions regarding the frequency of positive and negative thoughts and feelings during the previous month were rated on a 5-point scale from 0 (never) to 4 (very often). Total scores ranged from 0 to 40, with higher scores indicating higher levels of perceived stress. Gender-specific mean scores were compared with gender-based norms reported by Cohen and Janicki-Deverts.

MBI–Human Services Survey

Burnout was assessed with the MBI, the most widely used, validated psychometric instrument for burnout. The MBI–Human Services Survey was used because it is the version used to assess the experienced feelings of caregiving professionals toward their job and the recipients of their care. The 22-item survey, available in French and English, included 3 subscales, with each subscale describing a key dimension of burnout. The Emotional Exhaustion subscale consisted of 9 items, the Depersonalization subscale consisted of 5 items, and the Personal Accomplishment subscale consisted of 8 items. Each item was rated on a 7-point scale to describe the experience in terms of frequency; responses ranged from 0 (never) to 6 (every day). The Emotional Exhaustion and Depersonalization subscales described negative job- and recipient-related feelings, respectively, with high scores being associated with burnout. Low scores in the Personal Accomplishment subscale were associated with burnout.

Mean scores were compared with normative values for individuals in medical occupations. Subscale scores were classified as low, average, or high on the basis of cutoffs reported for individuals in medical occupations. Specifically, Emotional Exhaustion subscale scores ≤18 were classified as low, scores ≥19 but ≤26 were classified as average, and scores ≥27 were classified as high. Depersonalization subscale scores ≤5 were classified as low, scores ≥6 but ≤9 were classified as average, and scores ≥10 were classified as high. Personal Accomplishment subscale scores ≤33 were classified as low, scores ≥34 but ≤39 were classified as average, and scores ≥40 were classified as high. It has been suggested that a high score in emotional exhaustion in combination with either a high score in depersonalization or a low score in personal accomplishment.
may reliably discriminate individuals with burnout from those without.\textsuperscript{23,24}

**HADS**

The HADS,\textsuperscript{25} a 14-item, self-reported scale, was used to detect clinically relevant states of depression (defined in this instance as “a reduced ability to experience pleasure”\textsuperscript{26}) and generalized anxiety. Originally designed for use in a hospital setting, the HADS has since been validated in primary care and community settings with individuals of various ages and from various occupational groups.\textsuperscript{26} The HADS consists of 2 distinct subscales with 7 items in each subscale and is available in French and English. Each item was measured on a 4-point Likert scale (0 to 3), resulting in possible scores ranging from 0 to 21 for each subscale. For clinical screening purposes, a score $\geq 8$ but $\leq 10$ on either subscale indicated a possible case and a score $\geq 11$ indicated a probable case.\textsuperscript{25} Mean scores were compared with gender-specific general population norms in the United Kingdom, as reported by Breeman et al.,\textsuperscript{25} because no Canadian normative data were available. Mean scores; proportions of respondents with possible depression, possible anxiety, probable depression, and probable anxiety; and proportion of respondents with both probable depression and probable anxiety (ie, probable comorbidity) were compared with values for veterinarians in the United Kingdom.\textsuperscript{2}

**ProQOL**

Version 5 of the ProQOL,\textsuperscript{28} a 30-item questionnaire available in French and English, was used to assess both positive and negative aspects of caregiving. It included 3 subscales, with 2 of these subscales (Burnout and Secondary Traumatic Stress) considered the basis for compassion fatigue. Burnout has been defined as “feelings of hopelessness and difficulties dealing with work or in doing your job effectively,”\textsuperscript{28} whereas secondary traumatic stress has been considered to be the result of “work-related, secondary exposure to extremely or traumatically stressful events.”\textsuperscript{28} The third subscale, Compassion Satisfaction, has been defined as the positive feeling derived from caregiving work.\textsuperscript{28} Participants were asked to indicate how frequently they had experienced each item over the past 30 days. Each subscale included 10 items, and responses were scored on a 5-point scale ranging from 1 (never) to 5 (very often).

Raw scores for each subscale were interpreted with reference to normative means and were classified as low, middle, or high on the basis of cutoffs proposed by De La Rosa et al.\textsuperscript{29} The specific cutoffs that were used represented the 25th, 50th, and 75th percentiles for the normative population.\textsuperscript{29}

**CD-RISC**

For the purposes of the present study, resilience was defined as a participant’s score on the CD-RISC,\textsuperscript{30} a 25-item questionnaire available in French and English that was developed to measure stress-coping ability. Each item was scored on a 5-point Likert scale, resulting in total scores ranging from 0 to 100. Participants were asked to consider how each item applied to them over the previous month, with responses ranging from 0 (not at all true) to 4 (true nearly all the time). The CD-RISC has been found to have sound psychometric properties and has been used in both the general population and in clinical samples in a variety of countries and languages.\textsuperscript{31} Results were compared with reported normative means for the general population of the United States in 2003.\textsuperscript{30}

**Satisfaction with available support**

Four original questions regarding satisfaction with the support received from the participant’s relationship or partner, family, friends, and work were included in the survey. Responses were scored on a 5-point scale ranging from 0 (not at all satisfied) to 4 (very satisfied). Translation into French was provided by a bilingual veterinarian and graduate student.

**Mental health history**

To provide brief insights as to the participants’ experience with mental illness, dichotomous (yes vs no) questions about any current or previous history of mental illness or treatment were included. Translation into French was provided by a bilingual veterinarian and graduate student.

**Suicide and suicidal ideation**

Participants were asked whether they had ever considered or attempted suicide. For comparison purposes, data on suicide attempts for the Canadian general population were obtained from the 2015 Canadian Community Health Survey.\textsuperscript{32} Three yes-or-no questions regarding suicidal ideation that were derived from the second National Survey of Psychiatric Morbidity\textsuperscript{33} were also included: In the last 12 months, have you felt that life was not worth living? In the last 12 months, have you wished that you were dead; and In the last 12 months, have you thought of taking your life, even if you would not really do it? A “yes” response to any of these questions qualified the participant as experiencing suicidal ideation.\textsuperscript{35} Results were compared with results for veterinarians in the United Kingdom\textsuperscript{2} as well as with an international normative range for suicidal ideation.\textsuperscript{34} Translation into French was provided by a bilingual veterinarian and graduate student.

**Statistical analysis**

Statistical analyses were conducted with standard software.\textsuperscript{b} For the PSS, MBI, HADS, and CD-RISC, missing scale or subscale items for a given participant were imputed on the basis of the mean score for that participant’s remaining items, provided no more than 1 item was missing per scale or subscale.\textsuperscript{35} Missing
items on the ProQOL were treated as described in the manual for the scale,28 which provided 4 decision rules for determining whether to score missing items as 0 or omit a response entirely.

Descriptive statistics (mean, median, SD, IQR, and proportion) were calculated for all participants and for participants categorized by gender, as applicable. Demographic and employment characteristics were compared with results from the 2016 Census of Canada36,37 or with data reported by the CVMA.37 as available. Distributions of psychometric scale scores were assessed graphically and with the Shapiro-Wilk test for normality, and a geometric mean was calculated for each nonnormally distributed continuous variable to describe the central tendency. The arithmetic mean was used for comparison purposes with other populations because data on distribution of normative populations were not available. Means were compared with t tests, and proportions were compared with χ² tests. All tests were 2-tailed; values of P < 0.05 were considered significant.

Results

There were 1,403 participants who completed at least one of the psychometric scales and were included in the analyses; approximately 90% of the participants completed all of the psychometric scales. We could not calculate a response rate for the survey because the various methods of survey dissemination, including social media, meant that we could not determine how many veterinarians received the survey invitation. However, the number of respondents represented approximately 10% of all Canadian veterinarians.37 Because none of the questions were mandatory, the number of responses for each question and scale varied. In addition, because some scales allowed for a score of 0 and geometric means excluded scores of 0, geometric means were calculated for the nonzero subset of the responses used to calculate the arithmetic means.

Study participants

Of the 1,248 respondents who reported their gender, 954 (76.4%) identified as female and 294 (23.6%) identified as male (Table 1). The percentage of female respondents was significantly (P < 0.001) higher than the percentages of female veterinarians reported by Statistics Canada (60.5%)36 and the CVMA (56.0%).37 Age distribution within each gender aligned well with distributions described by Statistics Canada when assessed graphically. The mean income for participant veterinarians was significantly (P < 0.001) higher than the mean income reported by Statistics Canada in 2015 for Canadian veterinarians.37

Most participants completed the English version of the survey (78.5% [1,101/1,403]) versus the French version (21.5% [302/1,403]). These proportions did not differ significantly (P = 0.16) from the proportions of veterinarians reporting English (76.9%) or French (22.6%) as their first official language spoken in the 2016 Census of Canada.36 Survey participants resided in all 10 Canadian provinces and in 2 of the 3 Canadian territories, with respondents representing a mean of 11.4% (SD, 5.4%) of veterinarians in each province or the territories.37 Overwhelmingly more respondents were in clinical practice (91.4% [1,257/1,353]) versus nonclinical practice (8.6% [116/1,353]; Table 2).

Table 1—Demographic and career characteristics of individuals (n = 1,403) who responded to an online survey on prevalence of perceived stress, burnout, depression, anxiety, compassion fatigue, compassion satisfaction, resilience, and suicidal ideation among Canadian veterinarians.

<table>
<thead>
<tr>
<th>Variable*</th>
<th>No. of respondents†</th>
<th>Arithmetic</th>
<th>Geometric</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1,254</td>
<td>45.0</td>
<td>43.4</td>
<td>12.1</td>
<td>44</td>
<td>25–89</td>
</tr>
<tr>
<td>Females</td>
<td>952</td>
<td>42.6‡</td>
<td>41.3‡</td>
<td>10.8</td>
<td>41</td>
<td>25–80</td>
</tr>
<tr>
<td>Males</td>
<td>294</td>
<td>52.8</td>
<td>51.1</td>
<td>12.8</td>
<td>55</td>
<td>26–89</td>
</tr>
<tr>
<td>Years since graduation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1,245 (1,243)</td>
<td>18.2</td>
<td>13.0</td>
<td>12.4</td>
<td>16</td>
<td>0–70</td>
</tr>
<tr>
<td>Females</td>
<td>948 (947)</td>
<td>15.8‡</td>
<td>11.2‡</td>
<td>11.0</td>
<td>14</td>
<td>0–70</td>
</tr>
<tr>
<td>Males</td>
<td>289 (288)</td>
<td>26.3</td>
<td>21.4</td>
<td>13.3</td>
<td>28</td>
<td>0–65</td>
</tr>
<tr>
<td>Hours worked/wk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1,244 (1,226)</td>
<td>39.0</td>
<td>36.9</td>
<td>14.1</td>
<td>40</td>
<td>0–100</td>
</tr>
<tr>
<td>Females</td>
<td>934</td>
<td>38.4§</td>
<td>36.4‡</td>
<td>13.2</td>
<td>39</td>
<td>0–99</td>
</tr>
<tr>
<td>Males</td>
<td>280</td>
<td>41.2</td>
<td>38.6</td>
<td>16.6</td>
<td>40</td>
<td>0–100</td>
</tr>
<tr>
<td>Annual income ($)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1,170</td>
<td>95,484</td>
<td>85,228</td>
<td>49,023</td>
<td>85,000</td>
<td>10,000–500,000</td>
</tr>
<tr>
<td>Females</td>
<td>896</td>
<td>86,630‡</td>
<td>78,742‡</td>
<td>41,167</td>
<td>80,000</td>
<td>10,000–500,000</td>
</tr>
<tr>
<td>Males</td>
<td>263</td>
<td>125,395</td>
<td>111,370</td>
<td>60,525</td>
<td>110,000</td>
<td>10,000–400,000</td>
</tr>
</tbody>
</table>

*For some variables, number of male respondents plus number of female respondents does not equal total number of respondents because of missing responses for gender for some respondents. †Values in parentheses represent number of respondents used to calculate geometric mean; calculation of the geometric mean was limited to nonzero scores. ‡Value for female respondents was significantly (P < 0.001) different from the value for male respondents. §Value for female respondents was significantly (P < 0.003) different from the value for male respondents.

The survey was open from February through July 2017; not all participants responded to all questions.
The PSS measured perceived stress and consisted of 10 questions regarding the frequency of positive and negative thoughts and feelings during the previous month. Each question was rated on a 5-point scale from 0 (never) to 4 (very often); total possible scores ranged from 0 to 40, with higher scores indicating higher levels of perceived stress.

Results of the Shapiro-Wilk test indicated that scores for the PSS were not normally distributed ($P < 0.001$). Arithmetic and geometric mean scores were significantly ($P < 0.001$ for both) higher for female participants than for male participants (Table 3). The arithmetic mean score for female participants was significantly ($P < 0.001$) higher than the reported female norm (16.1), but the arithmetic mean score for male respondents was significantly ($P = 0.021$) lower than the reported male norm (15.5).

### MBI–Human Services Survey

Results of the Shapiro-Wilk test indicated that scores for the 3 subscales of the MBI were not normally distributed ($P < 0.001$ for each). Female participants scored significantly higher than male participants did on the Emotional Exhaustion subscale, with a significantly lower percentage of females having a high emotional exhaustion score and a significantly higher percentage of females having a high emotional exhaustion score, compared with percentages for males (Table 4). Scores for the Depersonalization and Personal Accomplishment subscales did not differ significantly between females and males. On the basis of the scale’s decision criteria, $^{23,24}$ 493 of 1,272 (38.8%; 95% CI, 36.1% to 41.5%) participants could be classified as having burnout. A significantly ($P = 0.022$) higher percentage of female participants (40.6% [383/944]) than male participants (33.0% [93/282]) were classified as having burnout.

Survey participants had significantly ($P < 0.001$ for both) higher arithmetic mean scores for the Emotional Exhaustion and Depersonalization subscales, relative to the normative population of individuals in medical occupations\(^{21}\) (Emotional Exhaustion subscale norm, 22.2; Depersonalization subscale norm, 7.1). When analyzed by gender, female participants had a significantly ($P < 0.001$) higher arithmetic mean score for the Emotional Exhaustion subscale than did the normative population, but males did not ($P = 0.80$). In contrast, both genders had significantly ($P < 0.001$ for females and $P = 0.001$ for males) higher arithmetic mean scores than the mean score for the normative population of the Depersonalization subscale. The arithmetic mean score for the Personal Accomplishment subscale for survey participants was marginally lower than the mean score for the normative population,\(^{21}\) but the difference was not significant for participants as a whole ($P = 0.26$) or for each gender individually ($P = 0.21$ for females and $P = 0.46$ for males).

### HADS

Results of the Shapiro-Wilk test indicated that scores for the 2 subscales of the HADS were not normally distributed ($P < 0.001$ for each). Female participants had a significantly higher mean anxiety subscale score than did male participants, and the percentage of respondents classified as a probable case of anxiety was significantly higher for females than for males (Table 5). Female participants also had a significantly higher mean depression subscale score than did male participants. Overall, 100 of the 1,389 (7.2%; 95% CI, 5.9% to 8.7%) participants were classified as having probable comorbidity (ie, anxiety and depression subscale scores both $\geq 11$). The percentage of female respondents with probable comorbidity (7.8% [74/954]; 95% CI, 6.1% to 9.6%) was higher than the percentage of male respondents with probable comorbidity (6.1% [18/294]; 95% CI, 3.7% to

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**Table 2**—Employment of veterinarians who participated in the survey described in Table 1.

<table>
<thead>
<tr>
<th>Employment</th>
<th>No. of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical practice</td>
<td>1,237</td>
<td>91.4</td>
</tr>
<tr>
<td>Associate</td>
<td>623</td>
<td>46.0</td>
</tr>
<tr>
<td>Clinic owner</td>
<td>493</td>
<td>36.4</td>
</tr>
<tr>
<td>Locum or contract</td>
<td>45</td>
<td>3.3</td>
</tr>
<tr>
<td>Intern or resident</td>
<td>28</td>
<td>2.1</td>
</tr>
<tr>
<td>Faculty or teaching</td>
<td>12</td>
<td>0.9</td>
</tr>
<tr>
<td>Other(^a)</td>
<td>36</td>
<td>2.7</td>
</tr>
<tr>
<td>Species of clinical focus</td>
<td>1,229</td>
<td>90.8</td>
</tr>
<tr>
<td>Small animals only (eg, dogs, cats, birds, and exotics)</td>
<td>861</td>
<td>63.6</td>
</tr>
<tr>
<td>Mixed large and small animals</td>
<td>177</td>
<td>13.1</td>
</tr>
<tr>
<td>Large animals only (eg, cattle and pigs)</td>
<td>139</td>
<td>10.3</td>
</tr>
<tr>
<td>Equine only</td>
<td>40</td>
<td>3.0</td>
</tr>
<tr>
<td>Other (eg, fish and laboratory animals)</td>
<td>12</td>
<td>0.9</td>
</tr>
<tr>
<td>Nonclinical practice</td>
<td>100</td>
<td>7.4</td>
</tr>
<tr>
<td>Government</td>
<td>43</td>
<td>3.2</td>
</tr>
<tr>
<td>Academia</td>
<td>22</td>
<td>1.6</td>
</tr>
<tr>
<td>Industry</td>
<td>18</td>
<td>1.3</td>
</tr>
<tr>
<td>Other(^b)</td>
<td>17</td>
<td>1.3</td>
</tr>
<tr>
<td>Not currently employed</td>
<td>16</td>
<td>1.2</td>
</tr>
</tbody>
</table>

\(^a\)Includes other clinical roles, such as management and specialty practice. \(^b\)Includes other nonclinical roles, such as consulting, working for a nonprofit organization, and nonveterinary careers.

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**Table 3**—Scores for the PSS for veterinarians who participated in the survey described in Table 1.

<table>
<thead>
<tr>
<th>Variable*</th>
<th>No. of respondents(^\dagger)</th>
<th>Arithmetic</th>
<th>Geometric</th>
<th>SD</th>
<th>Median</th>
<th>IQR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All respondents</td>
<td>1,399 (1,397)</td>
<td>16.9</td>
<td>15.1</td>
<td>7.2</td>
<td>17</td>
<td>12–22</td>
</tr>
<tr>
<td>Females</td>
<td>952</td>
<td>17.6(\dagger)</td>
<td>16.5(\dagger)</td>
<td>7.0</td>
<td>18</td>
<td>12–23</td>
</tr>
<tr>
<td>Males</td>
<td>292 (290)</td>
<td>14.5</td>
<td>12.3</td>
<td>7.5</td>
<td>14</td>
<td>9–20</td>
</tr>
</tbody>
</table>

The PSS measured perceived stress and consisted of 10 questions regarding the frequency of positive and negative thoughts and feelings during the previous month. Each question was rated on a 5-point scale from 0 (never) to 4 (very often); total possible scores ranged from 0 to 40, with higher scores indicating higher levels of perceived stress. See Table 1 for key.

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**Table 4**—Scores for the MBI and HADS for veterinarians who participated in the survey described in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of respondents</th>
<th>Emotional Exhaustion</th>
<th>Depersonalization</th>
<th>Anxiety</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>All respondents</td>
<td>1,389 (1,397)</td>
<td>22.2</td>
<td>7.1</td>
<td>7.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Females</td>
<td>952</td>
<td>22.6</td>
<td>7.2</td>
<td>7.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Males</td>
<td>292 (290)</td>
<td>21.8</td>
<td>6.9</td>
<td>7.3</td>
<td>12.2</td>
</tr>
</tbody>
</table>
The arithmetic mean anxiety subscale scores for both female and male survey participants were significantly ($P < 0.001$ for both) higher than the respective gender-specific general population means$^{27}$ (6.78 for females and 5.51 for males). The arithmetic mean depression subscale scores for both female and male survey participants were also significantly ($P < 0.001$ for both) higher than the respective gender-specific general population means$^{27}$ (4.12 for females and 3.83 for males). When compared with results for veterinarians in the United Kingdom$^2$ (mean anxiety score, 7.9; mean depression score, 4.6; and percentage of respondents with probable comorbidity, 4.5%), survey participants had significantly higher mean anxiety ($P = 0.044$) and depression ($P < 0.001$) scores and a higher percentage of respondents with probable comorbidity ($P < 0.001$).

### ProQOL

Results of the Shapiro-Wilk test indicated that scores for the 3 subscales of the ProQOL were not normally distributed ($P < 0.001$ for each). Mean scores for the Compassion Satisfaction subscale did not differ significantly between genders, but a significantly higher percentage of males than females were classified as having a high Compassion Satisfaction score (Table 6). Mean scores for both the Burnout and Secondary Traumatic Stress subscales were significantly higher for female participants than for male participants. Percentages of participants assigned to the low and middle burnout categories and to the low, middle, and high secondary traumatic stress categories were significantly different between female and male participants.

When compared with normative means for each subscale (Compassion Satisfaction, 37.7; Secondary Traumatic Stress, 16.7; and Burnout, 22.8),$^{29}$ sur-
Survey participants had significantly higher arithmetic means on the Secondary Traumatic Stress and Burnout subscales (P < 0.001 for both), but not on the Compassion Satisfaction subscale (P = 0.42).

CD-RISC

Results of the Shapiro-Wilk test indicated that scores for the CD-RISC were not normally distributed (P < 0.001). The geometric mean CD-RISC score for all survey participants was 68.2 (SD, 14.2; median, 70.0; IQR, 60 to 80; n = 1,250). The arithmetic mean CD-RISC score for participants (69.8) was significantly lower than the normative mean score (80.1) for the general population of the United States in 2003.\(^ {30} \)

The mean score of female participants was significantly lower than that of males for both arithmetic means (69.4 vs 71.7; P = 0.016) and geometric means (67.9 vs 70.0; P = 0.028).

Satisfaction with available support

Participants reported the highest level of satisfaction with the support they received from their relationship or partner, with 870 of 1,086 (80.1%; 95% CI, 77.6% to 82.4%) reporting they were “satisfied” or “very satisfied.” A significantly (P = 0.001) higher percentage of male (87.1%) than female (77.9%) participants indicated they were “satisfied” or “very satisfied” with the support they received from their relationship or partner.

Approximately 70% of participants reported they were “satisfied” or “very satisfied” with the support they received from their family (71.3% [868/1,217]; 95% CI, 68.7% to 73.9%) and from their friends (69.3% [840/1,212]; 95% CI, 66.6% to 71.9%), with no significant differences between the genders (71.1% for females and 72.9% for males for support from family, and 70.3% for females and 66.1% for males for support from friends). Participants reported the lowest level of satisfaction with the support they received from their work environment, with 593 of 1,191 (50%; 95% CI, 46.9% to 52.7%) survey participants reporting that they were “satisfied” or “very satisfied” and no significant (P = 0.30) difference between the genders (females, 49.0%; males, 52.5%).

Mental health history

A significantly (P = 0.002) higher percentage of female participants reported a history of mental illness (30.8% [291/945]; 95% CI, 27.9% to 33.8%) than did male participants (21.5% [63/293]; 95% CI, 16.9% to 26.7%). Also, a significantly (P = 0.007) higher percentage of females reported mental illness at the time of the survey (15.5% [146/944]; 95% CI, 13.2% to 17.9%) than the percentage of males who did (9.2% [27/292]; 95% CI, 6.2% to 13.2%), and a significantly (P = 0.006) higher percentage of females were taking medication for mental illness at the time of the survey (13.7% [129/942]; 95% CI, 11.6% to 16.1%) than the percentage of males who were (7.6% [22/290]; 95% CI, 4.8% to 11.3%). Of 387 respondents with a history of mental illness, 333 (86%; 95% CI, 82.2% to 89.3%) had sought treatment, with no significant (P = 0.62) difference between the genders (females, 86.0%; males, 88.2%).

Suicide and suicidal ideation

The 12-month prevalence of suicidal ideation by survey participants was significantly (P = 0.012) lower than the estimated percentage for veterinarians in the United Kingdom in 2008,\(^ {2} \) but significantly (P < 0.001) higher than the estimated percentage for the international general population\(^ {34} \) (2.1% to 10.0%; Table 7).

Two hundred twelve of 1,250 (17.0%; 95% CI, 14.9% to 19.2%) survey participants reported
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Table 7—Prevalence of suicidal ideation during the preceding 12 months for veterinarians who participated in the survey described in Table 1.

<table>
<thead>
<tr>
<th>Question*</th>
<th>No. of participants</th>
<th>Percentage responding “yes”</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the last 12 mo, have you felt that life is not worth living?</td>
<td>All 1,254</td>
<td>17.9</td>
<td>15.8–20.1</td>
</tr>
<tr>
<td></td>
<td>Females 950</td>
<td>18.2</td>
<td>15.8–20.8</td>
</tr>
<tr>
<td></td>
<td>Males 291</td>
<td>16.5</td>
<td>12.4–21.3</td>
</tr>
<tr>
<td>In the last 12 mo, have you wished that you were dead?</td>
<td>All 1,253</td>
<td>13.2</td>
<td>11.3–15.2</td>
</tr>
<tr>
<td></td>
<td>Females 949</td>
<td>14.2</td>
<td>12.1–16.6</td>
</tr>
<tr>
<td></td>
<td>Males 291</td>
<td>10.0</td>
<td>6.8–14.0</td>
</tr>
<tr>
<td>In the last 12 mo, have you thought of taking your life, even if you would not really do it?</td>
<td>All 1,255</td>
<td>19.4</td>
<td>17.2–21.7</td>
</tr>
<tr>
<td></td>
<td>Females 951</td>
<td>20.2</td>
<td>17.7–22.9</td>
</tr>
<tr>
<td></td>
<td>Males 291</td>
<td>17.2</td>
<td>13.0–22.0</td>
</tr>
<tr>
<td>12-mo prevalence of suicidal ideation†‡</td>
<td>All 1,254</td>
<td>26.2</td>
<td>23.7–28.9</td>
</tr>
<tr>
<td></td>
<td>Females 950</td>
<td>27.0</td>
<td>24.1–29.8</td>
</tr>
<tr>
<td></td>
<td>Males 291</td>
<td>23.7</td>
<td>18.8–28.6</td>
</tr>
</tbody>
</table>

†‡Defined as a “yes” response to any of the 3 preceding questions. See Table 1 for remainder of key.

that they had seriously considered suicide since starting veterinary school, with no significant (P = 0.89) difference between the genders. This estimate, which included only the adult life of participants, was significantly (P < 0.001) higher than the 12.2% of Canadians reported to have seriously considered suicide in their lifetime.32 Twenty-two of 1,252 (1.8%; 95% CI, 1.1% to 2.6%) participants reported having attempted suicide since the start of veterinary school, with no significant (P = 0.32) difference between the genders. Among the general population, 3.2% of Canadians aged 15 or older reported a suicide attempt at some point in their lifetime;32 however, our results could not be compared with this statistic because a large proportion of attempts occurred between the ages of 15 and 19,38 prior to the age when participants would have started veterinary school.

Discussion

To our knowledge, the present study represented the first attempt to use validated psychometric scales to characterize the mental health of Canadian veterinarians and the first to compare those results with normative data. Overall, the mental health of veterinarians who participated in our survey was poor, compared with the mental health of the general population. Specifically, participants had higher levels of perceived stress, burnout (emotional exhaustion and depersonalization), depression, anxiety, compassion fatigue (secondary traumatic stress and burnout), and suicidal ideation and lower resilience than did the refer-

cence populations to which they were compared. Female participants fared worse than male participants overall. As they pertain to the Canadian veterinarian population, results from this survey suggested that poor mental health is an important concern for the profession and warrants intervention, with special attention paid to the disparate needs of the genders.1

Gender differences in the prevalence of mental health disorders have been found consistently in epidemiological research, with mood and anxiety disorders being more common among females.59 The present study and previous studies of veterinarians2,10,11,40 found the same disparity. The healthy worker effect,41 which suggests that individuals who are unwell may leave an occupation, may have exaggerated this difference because most older veterinarians are male, but it is also possible that experience contributes to mental wellness among older participants. The dissonance between results for younger, predominantly female veterinarians and results for older, mostly male veterinarians was most readily demonstrated by the PSS scores. Male participants had significantly lower perceived stress than did the male normative population, whereas female participants had significantly higher perceived stress, compared with both male participants and the female normative population. Given the apparently higher prevalence of poor mental health among female veterinarians and the current demographic shift within the profession from largely male to largely female,42 there may be a risk of increasing mental health challenges for the veterinary profession. A cohort study would be ideal to monitor the wellness of veterinarians over time as the profession navigates changes in demographics. For example, a study that followed prospective veterinary college students through their studies would help differentiate the effects of self-selection, college selection, and occupational factors on mental health.33

Anxiety, depression, burnout, stress, and compassion fatigue are all closely linked, whereas resilience, compassion satisfaction, and work engagement (also described as personal accomplishment) act as potential mediators.1,14,45 Burnout and compassion fatigue are widely understood as negative consequences of professional demands.59 Burnout was originally conceived as a construct to describe the negative impact of interpersonal work, but has been expanded to include all work-related stressors,22 whereas compassion fatigue is a direct consequence of caregiving work and exposure to the trauma of others.59 Anxiety and depression have been linked to an increased risk of burnout46 and increased work-related stress.47 Psychological stress has been shown to influence many aspects of physical health, including mortality rate.20 Additionally, concomitant anxiety and depression are risk factors for suicide,48 which is of particular concern to the profession in view of the high rate of death by suicide among veterinarians that has been reported in Canada and other countries.5,6,8

Suicidal
ideation attributed to poor mental health is compounded by a unique set of risk factors experienced by veterinarians, including access to lethal drugs and a culture of acceptance regarding euthanasia and death.49

Poor mental health affects the quality of life of individual veterinarians, which in itself is of concern. However, further concerns arise when considering veterinarians’ contributions to public health, agricultural industries, and the companion animal population. Although there is a lack of research on the impact of veterinarian mental health on work productivity and the recipients of care, it is reasonable to draw from our knowledge of other caregiving professions. For example, physicians with burnout are reported to be less productive and may be more likely to retire early or reduce their work hours,50 resulting in a diminished pool of experience for the profession as a whole. Training and replacing medical professionals pose high costs for the profession as well as the recipients of their care.51 Caregiver burnout has also been associated with longer recovery times for patients and reduced patient safety.14 Clinician-patient communication is impacted by physician stress,52 and communication influences not only patients’ adherence to recommendations and health outcomes,53 but also their satisfaction52 and the likelihood of malpractice claims.54 Client satisfaction may be of particular importance in the veterinary profession, given that many practitioners are also small business owners or employees.

Fortunately, research into wellness interventions such as mindfulness training,35 resilience building,56 and workplace culture initiatives57 has shown that caregiver mental health can be sustainably improved. Researchers in the human health-care field have postulated that changes to the medical culture could reduce burnout57,58 and secondary traumatic stress (“second victim syndrome”),59 and a recent systematic review and meta-analysis60 suggested that changes at both the individual and organizational levels can be effective in reducing physician burnout. Only half of the participants in the present study were satisfied with the support they received from work, representing the lowest level of satisfaction with any of the support systems listed. Canadian employers are responsible for the occupational health and safety of their workers,61 suggesting that they should strive to integrate mental wellness programs and support services into the workplace, regardless of the underlying causes of poor mental health in this population. Indeed, workplace interventions have been shown to be more effective at protecting worker health than relying on individual changes.62 Recommended evidence-based workplace interventions include management skills training, reduced working hours, and additional provision of support services.43

The cross-sectional survey design was a limitation of the present study. We were not able to conclude that the veterinarian occupation itself is the cause of the poor mental health seen in participants, nor would we make any conclusions about how mental health outcomes may vary over the career of a veterinarian. Interpretation of prevalence estimates obtained via cross-sectional occupational studies should also be done with caution owing to the healthy worker effect,41 which suggests that individuals who are unwell may leave an occupation, resulting in an underestimation of the prevalence of illness. Although the present survey did not exclude veterinarians who had retired or switched careers or who were on leave, only about 1% of participants reported they were not working as a veterinarian at the time of the study.

The low response rate was another limitation of the present study. However, there was a wide range of participants from across regions and veterinary careers, and the survey sample compared well with Canadian Census data. Nevertheless, some discrepancies were noted, particularly with regard to income and gender. The mean income for participant veterinarians was higher than that reported by Statistics Canada in 2015,37 possibly owing to an inconsistency between self-reported income (as in the survey) and the data collected from Canada Revenue (as reported by the census). Regarding gender, female participants were overrepresented, which is a common phenomenon with online surveys related to gender-based differences in participation rates.63 Male veterinarians may also have found the topic of the survey to be less salient to them and, thus, may have been less likely to participate.64 The analysis of age categories with respect to the Census of Canada data suggested that age did not play a significant role in response rate, but access bias stemming from the online nature of the survey may have limited the participation of some individuals. Despite these limitations, the prevalence of poor mental health outcomes we found was unlikely to be an overestimate; previous work in this domain has suggested that nonresponse bias in mental health research may actually result in an underestimation of prevalence as a result of defensiveness and nonresponse by those with psychiatric illness.65

Overall, the present study demonstrated that a substantial number of Canadian veterinarians are experiencing poor mental health, with a disparity between the genders. These data should serve as a call to action for investment in supportive and educational programs to promote veterinarian wellness in Canada as well as further research into risk factors and areas for potential intervention.

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Footnotes
a. CoreXM, Qualtrics, Provo, Utah.
b. Stata/SE version 15, StataCorp LLC, College Station, Tex.

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