# Article

## Self-care practices and depression, anxiety, and stress scores in veterinary students during a semester

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### Abstract

**Objective**

To measure associations between self-care activities and depression, anxiety, and stress of preclinical veterinary students during a semester.

**Procedure**

Preclinical veterinary students at the University of Calgary Faculty of Veterinary Medicine were recruited voluntarily. Depression, anxiety, and stress scores (DASS-21) were measured, and a self-care questionnaire was administered at the beginning and end of the semester.

**Results**

Depression, anxiety, and stress scores did not change during the fall semester ($P = 1.000$). At the beginning of the semester, students who spent 15 to 30 min ($P = 0.042$) or 30 to 60 min ($P = 0.013$) outside daily had lower anxiety scores compared to those who spent $<$ 15 min outside daily; students who spent $>$ 2 h daily on social media had higher stress scores than students who spent $<$ 60 min ($P = 0.024$); and students who slept for 6 to 8 h daily had lower stress scores than students who slept $<$ 6 h ($P = 0.015$). At the end of the semester, students who "often" felt that self-care techniques managed their stress had lower depression ($P = 0.003$) and anxiety ($P = 0.011$) scores than those who "rarely" did; students who spent 30 to 60 min outside daily had lower depression scores than those who spent $<$ 15 min ($P = 0.031$); students who spent 15 to 30 min ($P = 0.002$) or 30 to 60 min ($P = 0.009$) outside daily had lower stress scores than those who spent $<$ 15 min; and students who exercised 30 to 60 min daily had lower stress scores than those who exercised $<$ 15 min ($P = 0.047$).

**Conclusion**

Self-care activities that were associated with lower depression, anxiety, or stress scores at the beginning or end of the semester included spending at least 15 min daily outside or exercising; spending $<$ 30 min on social media daily; and sleeping 6 to 8 h daily. These practices warrant further investigation.

**Clinical relevance**

Encouraging certain self-care practices among preclinical veterinary students has the potential to enhance their mental health and should be considered part of a veterinary school curriculum.

### Résumé

**Pratiques d'autosoins et scores de dépression, d'anxiété et de stress chez les étudiants vétérinaires au cours d'un semestre**

**Objectif**

Mesurer les associations entre les activités d'autosoins et la dépression, l'anxiété et le stress des étudiants vétérinaires au cours d'un semestre.


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**Procédure**

Les étudiants vétérinaires de la faculté de médecine vétérinaire de l'*University of Calgary* ont été recrutés sur une base volontaire. Des scores de dépression, d'anxiété et de stress (DASS-21) ont été mesurés et un questionnaire d'autosoins a été administré au début et à la fin du semestre.

**Résultats**

Les scores de dépression, d'anxiété et de stress n'ont pas changé au cours du semestre d'automne ($P$ = 1,000). Au début du semestre, les étudiants qui passaient 15 à 30 min ($P$ = 0,042) ou 30 à 60 min ($P$ = 0,013) à l'extérieur par jour présentaient des scores d'anxiété inférieurs à ceux qui passaient < 15 min à l'extérieur par jour; les étudiants qui passaient > 2 h par jour sur les réseaux sociaux avaient des scores de stress plus élevés que les étudiants qui passaient < 60 min ($P$ = 0,024); et les étudiants qui dormaient de 6 à 8 h par jour avaient des scores de stress inférieurs à ceux qui dormaient < 6 h ($P$ = 0,015). À la fin du semestre, les étudiants qui estimaient « souvent » que les techniques d'autosoins géraient leur stress avaient des scores de dépression ($P$ = 0,003) et d'anxiété ($P$ = 0,011) inférieurs à ceux qui l'étaient « rarement »; les étudiants qui passaient 30 à 60 min à l'extérieur quotidiennement avaient des scores de dépression inférieurs à ceux qui passaient moins de 15 min ($P$ = 0,031); les étudiants qui passaient 15 à 30 min ($P$ = 0,002) ou 30 à 60 min ($P$ = 0,009) à l'extérieur quotidiennement avaient des scores de stress inférieurs à ceux qui passaient < 15 min; et les étudiants qui faisaient de l'exercice de 30 à 60 min par jour avaient des scores de stress inférieurs à ceux qui faisaient de l'exercice < 15 min ($P$ = 0,047).

**Conclusion**

Les activités d'autosoins associées à des scores de dépression, d'anxiété ou de stress plus faibles au début ou à la fin du semestre comprenaient le fait de passer au moins 15 minutes par jour à l'extérieur ou de faire de l'exercice; passer < 30 minutes sur les réseaux sociaux quotidiennement; et dormir 6 à 8 h par jour. Ces pratiques méritent une enquête plus approfondie.

**Pertinence clinique**

Encourager certaines pratiques d'autosoins chez les étudiants vétérinaires a le potentiel d'améliorer leur santé mentale et devrait être considéré comme faisant partie du programme d'études d'une école vétérinaire.

(Traduit par Dr Serge Messier)

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## Introduction

Concerns about the mental health and well-being of veterinarians are increasing worldwide. A recent study measuring the perceived mental health of Canadian veterinarians demonstrated higher mean scores for depression and anxiety compared to the general population and to United Kingdom veterinarians (1). Higher-than-average levels of stress among veterinary professionals are documented as early as during veterinary school, with a correlation between stress, anxiety, and depression among veterinary students (2,3). Female and preclinical veterinary students appear more vulnerable to stress, anxiety, and depression (4). Academic stress negatively affects veterinary student depression and anxiety symptoms, general health, and life satisfaction (5), with workload and assessment reported as the most common stressors (6).

Self-care is "the practice of doing activities that you enjoy or that are relaxing, especially in order to improve or avoid stress" (7). Self-care is multifaceted and unique to each person; it can include a variety of health-promoting behaviors such as exercise, social connection, spiritual practice, medical appointments, or stress-management techniques. Organizations of healthcare professionals such as the Green Cross Academy of Traumatology regard self-care as a moral necessity for doing the work of caring for others (8). Nevertheless, self-care is not prevalent in veterinary school curricula and the practice of self-care is sparsely reported in the veterinary literature (9,10). An online survey of human medical students in the USA revealed that self-reported engagement in self-care activities is associated with a weakened relationship between perceived stress and physical and psychological quality of life (11).

The objective of the present study was to measure associations between self-care activities and depression, anxiety, and stress during a semester. The authors hypothesized that veterinary students regularly engaging in self-care activities would have lower depression, anxiety, and stress scores during the semester.

## Materials and methods

At the beginning of the fall semester (September 2018), veterinary students completing the first 3 preclinical years at the University of Calgary Faculty of Veterinary Medicine were recruited to participate in this voluntary study. A presentation explaining the study background and methods was delivered to prospective study participants. A follow-up email outlining this information was then sent to all students in Years 1, 2, and 3. Students who consented to study participation signed a waiver and were provided with a unique identification number to use when completing the online surveys (Qualtrics XM, Seattle, Washington, USA). Participants were informed that all results would remain anonymous and that participation in the study could be stopped at any time. Institutional Review Board ethics approval was obtained for this study.

Experiences of depression, anxiety, and stress were measured using the Depression Anxiety and Stress Scale (DASS-21), which has high reliability and validity (12). The DASS-21 scores were measured at the beginning and end of the semester. Students whose scores fell into the "severe" or "extremely

**Table 1.** Depression Anxiety and Stress Scale (DASS-21) scores measured in veterinary students at the beginning and end of a fall semester, with reference scores provided.

| Time point | Number of students | Depression score | Anxiety score | Stress score |
|---|---|---|---|---|
| Beginning of semester | 50 | 6 (4 to 13.5) | 6 (4 to 10) | 14 (8.5 to 20) |
| End of semester | 23 | 6 (2 to 14) | 4 (2 to 9) | 12 (9 to 17) |
| Reference scores | Normal | 0 to 4 | 0 to 3 | 0 to 7 |
| | Mild | 5 to 6 | 4 to 5 | 8 to 9 |
| | Moderate | 7 to 10 | 6 to 7 | 10 to 12 |
| | Severe | 11 to 13 | 8 to 9 | 13 to 16 |
| | Extremely severe | > 13 | > 9 | > 16 |

Values for the DASS-21 scores are presented as median (interquartile range).

severe" categories for depression, anxiety, or stress were referred to appropriate mental health resources. In addition, a self-care questionnaire (Appendix I, available online from: www.canadianveterinarians.net) was administered at the beginning and end of the semester to collect information regarding stress management and self-care strategies used.

### Statistical analyses

Summary statistics with median and interquartile range (IQR) were presented due to the small amount of data collected and the non-normal distribution of the data. The Mann-Whitney test (for 2 student subgroups) or Kruskal-Wallis test (for > 2 student subgroups) with a *post hoc* Dunn's test using the Bonferroni adjustment was used to test for differences between student subgroups. A linear regression model was used to examine associations between various amounts of participation in self-care activities and DASS-21 scores. Parameter estimates and standard errors (SE) were presented for significant results. Statistical significance was set at $P < 0.05$ for all tests. Analyses were carried out using statistical software (R version 4.2.0; www.R-project.org Vienna, Austria).

## Results

### Study participants

Fifty-six of 90 (62%) preclinical veterinary students consented to study participation at the beginning of the semester. Three students did not complete the DASS-21 or self-care questionnaires and were excluded from analyses. A total of 53 students completed the DASS-21 1 or more times throughout the semester, with 50 students completing the DASS-21 at the beginning and 23 students completing it at the end of the semester. Forty-eight students completed the self-care questionnaire at the beginning of the semester, whereas only 23 students completed the self-care questionnaire at the end of the semester.

### Depression Anxiety and Stress Scale (DASS-21)

The DASS-21 scores measured among the students at the beginning and end of the semester are summarized in Table 1, with reference scores for comparison. When scores collected at the beginning and end of the semester were combined, the median (IQR) for the depression score was 6 (2 to 14), for the anxiety score was 4 (4 to 10), and for the stress score was 14 (8 to 20). There was no difference between scores measured at the beginning and end of the semester ($P = 1.000$).

### Self-care and DASS-21 at beginning of semester

Forty-four students completed the self-care questionnaire and DASS-21 at the beginning of the semester. Four of the 48 students who completed the self-care questionnaire did not complete the DASS-21, and 6 of the 50 students who completed the DASS-21 did not complete the self-care questionnaire; these 10 students were excluded from this analysis. Stress management strategies most often employed by veterinary students at the beginning of the semester are depicted in Figure 1, with "talking to someone I trust," "exercising," "spending time outside/in nature," and "studying or working on coursework" being the most reported.

The DASS-21 scores at the beginning of the semester in relation to self-care practices measured in the questionnaire are shown in Table 2. Students who spent 15 to 60 min outside daily had lower anxiety scores than students who spent < 15 min outside daily [15 to 30 min: −5.27 (SE: 2.503), $P = 0.042$; 30 to 60 min: −6.80 (SE: 2.609), $P = 0.013$]. Students who spent > 2 h on social media daily had higher stress scores than students who spent < 30 min on social media daily [9.60 (SE: 4.098), $P = 0.024$]. Students who slept for 6 to 8 h daily had lower stress scores than students who slept < 6 h daily [6 to 7 h: −7.50 (SE: 3.609), $P = 0.044$; 7 to 8 h: −8.455 (SE: 3.324), $P = 0.015$].

### Self-care and DASS-21 at end of semester

Twenty-one students completed the self-care questionnaire and DASS-21 at the end of the semester. Two of the 23 students who completed the self-care questionnaire did not complete the DASS-21, and 2 of the 23 students who completed the DASS-21 did not complete the self-care questionnaire; these 4 students were excluded from the analysis. Stress management strategies most often employed by veterinary students at the end of the semester are depicted in Figure 2, with "talking to someone I trust," "studying or working on coursework," "exercising," and "sleeping" being the most reported.

The DASS-21 scores at the end of the semester in relation to the self-care practices measured in the questionnaire are shown in Table 3. Students who "often" felt that self-care techniques managed their stress had lower depression and anxiety scores than students who "rarely" did [depression: −27.33 (SE: 7.965), $P = 0.003$; anxiety: −18.22 (SE: 6.430), $P = 0.011$]. Furthermore, students who "sometimes" felt that

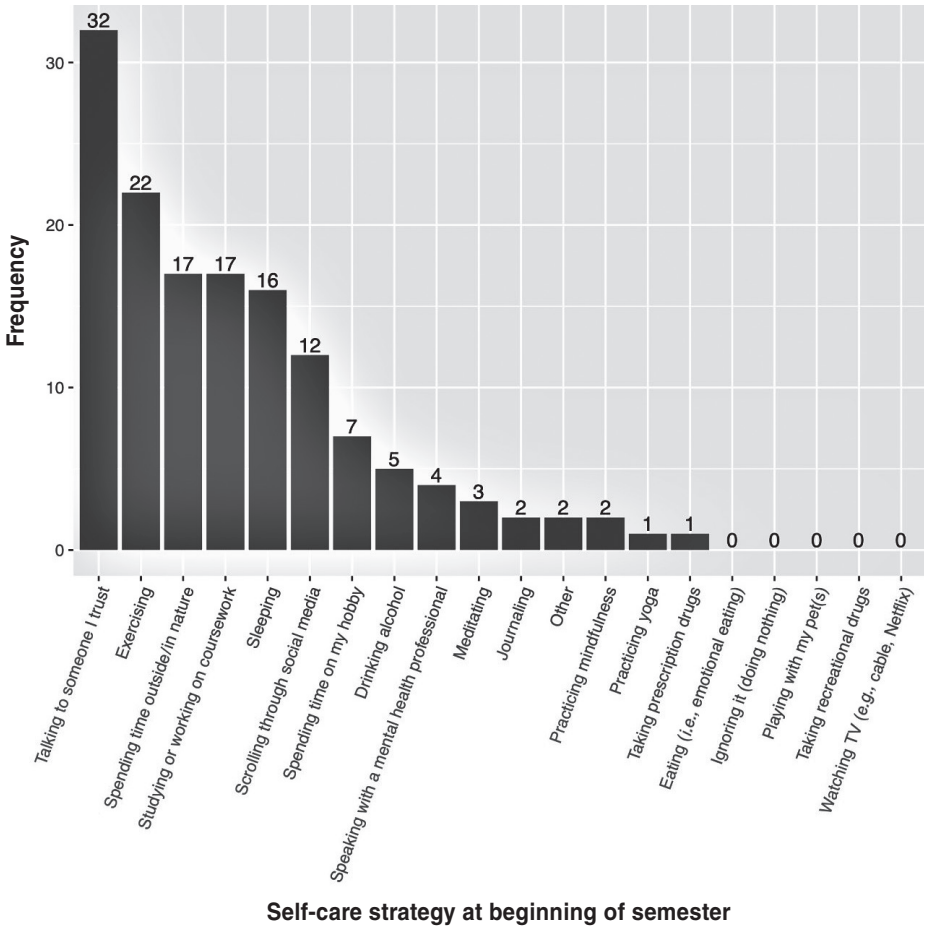


**Figure 1.** Preclinical veterinary student responses at the beginning of the fall semester to the survey question, "When I feel stress, I typically manage it by…" Students were encouraged to select up to 5 of their most often-employed stress-management strategies. The number above each bar indicates the number of individual student responses.

self-care techniques managed their stress had lower depression scores than students who "rarely" did [−20.18 (SE: 7.892), $P = 0.020$]. Students who spent 30 to 60 min outside daily had lower depression scores than students who spent < 15 min outside daily [−12.00 (SE: 5.095), $P = 0.031$]. Students who spent 15 to 60 min outside daily also had lower stress scores than students who spent < 15 min outside daily [15 to 30 min: −9.75 (SE: 3.840), $P = 0.021$; 30 to 60 min: −12.00 (SE: 4.105), $P = 0.009$]. Students who exercised 30 to 60 min daily had lower stress scores than students who exercised < 15 min daily [−8.714 (SE: 4.095), $P = 0.047$].

## Discussion

The present study did not detect significant differences between preclinical veterinary students' DASS-21 scores measured throughout a fall semester. At the beginning and end of the semester, veterinary student scores ranged from "mild" to "extremely severe" for depression, "mild" to "extremely severe" for anxiety, and "moderate" to "extremely severe" for stress. These findings appeared comparable to other studies investigating DASS-21 scores among preclinical veterinary students, including a recent study measuring DASS-21 scores among Korean veterinary students in which 31% of students were severely to extremely severely depressed, 36% were at least mildly anxious, and 43% were severely to very severely stressed (4). Similarly, in a large cohort (N = 1245) of North American veterinary students of which 10% were training at veterinary schools in Canada, nearly 1/2 of veterinary students experienced at least moderate stress and 2/3 exhibited mild to moderate symptoms of depression (2). The present study affirmed that stress, anxiety, and depression are common experiences among preclinical veterinary students.

The present study also investigated the frequency at which self-care strategies were used by preclinical veterinary students and the relationship with their DASS-21 scores, in addition to their feelings as to whether self-care techniques could manage their stress levels. At the end of the fall semester, students who felt that their current self-care techniques could "often" manage their stress had lower depression and anxiety scores than those who felt that their current self-care techniques could "rarely" manage their stress. Similarly, in a previous study investigating the effect of a self-care and mental wellness teaching intervention on the self-reported resilience of 1st-year veterinary students in the United Kingdom, the training helped veterinary students build a greater awareness of resilience and supported a more resilient approach to their personal and professional lives (9).

**Table 2.** Depression Anxiety and Stress Scale (DASS-21) scores and self-care practices among veterinary students at the beginning of a semester.

| Self-care practice | Number of students | Depression, median (IQR) P-*value* | Anxiety, median (IQR) P-*value* | Stress, median (IQR) P-*value* |
|---|---|---|---|---|
| Feel that current self-care techniques manage my stress | | | | |
| Never | 0 | — | — | — |
| Rarely | 3 | 16 (8 to 19) | 8 (8 to 8) | 18 (14 to 19) |
| Sometimes | 28 | 6 (4 to 10) | 6 (4 to 11) | 13 (10 to 21) |
| Often | 11 | 8 (3 to 14) | 4 (1 to 7) | 10 (7 to 16) |
| Always | 2 | 2 | 2 (1 to 3) | 9 (7 to 12) |
| | | *0.382* | *0.124* | *0.448* |
| Yoga practice | | | | |
| At least monthly | 15 | 6 (2 to 8) | 4 (3 to 6) | 12 (9 to 18) |
| Never | 29 | 6 (4 to 14) | 8 (4 to 10) | 14 (8 to 20) |
| | | *0.410* | *0.204* | *0.921* |
| Meditation practice | | | | |
| At least monthly | 6 | 7 (5 to 8) | 5 (4 to 9) | 11 (9 to 12) |
| Never | 38 | 6 (2 to 14) | 5 (4 to 10) | 14 (8 to 20) |
| | | *0.783* | *0.945* | *0.198* |
| Time spent on social media daily (h) | | | | |
| < 0.5 | 5 | 4 (4 to 8) | 4 (4 to 10) | 10 (4 to 12) |
| 0.5 to 1 | 11 | 6 (3 to 7) | 4 (4 to 9) | 12 (9 to 14) |
| 1 to 2 | 20 | 6 (2 to 11) | 5 (4 to 9) | 16 (8 to 20) |
| ≥ 2 | 8 | 12 (4 to 16) | 7 (4 to 12) | 16 (11 to 26)[a] |
| | | *0.543* | *0.807* | *0.121* |
| Time spent outside daily (min) | | | | |
| < 15 | 5 | 10 (6 to 10) | 10 (8 to 20) | 16 (12 to 18) |
| 15 to 30 | 22 | 8 (4 to 14) | 4 (4 to 10)[b] | 12 (8 to 16) |
| 30 to 60 | 15 | 4 (2 to 10) | 4 (3 to 8)[b] | 14 (7 to 21) |
| ≥ 60 | 2 | 2 (1 to 3) | 5 (5 to 6) | 16 (16 to 16) |
| | | *0.360* | *0.330* | *0.483* |
| Time spent exercising daily (min) | | | | |
| < 15 | 14 | 8 (5 to 10) | 7 (4 to 10) | 13 (9 to 22) |
| 15 to 30 | 15 | 6 (4 to 7) | 4 (4 to 9) | 12 (5 to 15) |
| 30 to 60 | 14 | 7 (2 to 16) | 5 (3 to 8) | 15 (10 to 18) |
| ≥ 60 | 1 | 0 | 4 | 16 |
| | | *0.368* | *0.669* | *0.332* |
| Total daily sleep (h) | | | | |
| < 5 | 0 | — | — | — |
| 5 to 6 | 6 | 7 (5 to 14) | 7 (5 to 8) | 20 (19 to 22) |
| 6 to 7 | 12 | 9 (6 to 14) | 10 (4 to 15) | 13 (12 to 16)[c] |
| 7 to 8 | 22 | 5 (2 to 8) | 4 (1 to 8) | 11 (8 to 18)[c] |
| ≥ 8 | 4 | 5 (4 to 8) | 4 (4 to 8) | 11 (8 to 17) |
| | | *0.498* | *0.093* | *0.125* |

*P*-value is for the Mann-Whitney or Kruskal-Wallis test.
Footnotes represent statistical significance in comparison to the least-practiced self-care activity: [a] compared to < 30 min, [b] compared to < 15 min, [c] compared to < 6 h.
IQR — Interquartile range.

Likewise, human medical students in the USA who self-reported more engagement in self-care activities were at lower risk for high levels of distress, suggesting greater resiliency (11). In the present study, it is possible that, by the end of the semester — after having had the concept of self-care introduced at the beginning, and with awareness raised about various activities representing self-care — some of the students felt the benefits of self-care in managing their stress. That awareness was then associated with lower depression and anxiety scores compared to those who did not believe that their self-care techniques managed their stress. Therefore, the authors inferred that veterinary students will likely benefit from teaching and experiential interventions to manage negative stress using self-care.

There were many activities and strategies that students perceived as self-care and engaged in at the beginning and end of the semester, and some of these were associated with DASS-21 scores. Spending > 15 min outside each day was associated with lower anxiety scores at the beginning of the semester and lower depression and stress scores at the end of the semester. The survey question in this study to assess time spent outside used the examples of exercising, walking a dog, or commuting. Thus, although it cannot be determined retrospectively whether the benefit of outdoor time was due to exposure to nature, a break from studying and coursework, connecting with a pet, or physical activity, the benefit of time spent outside warrants further investigation. A recent study investigating Texas university

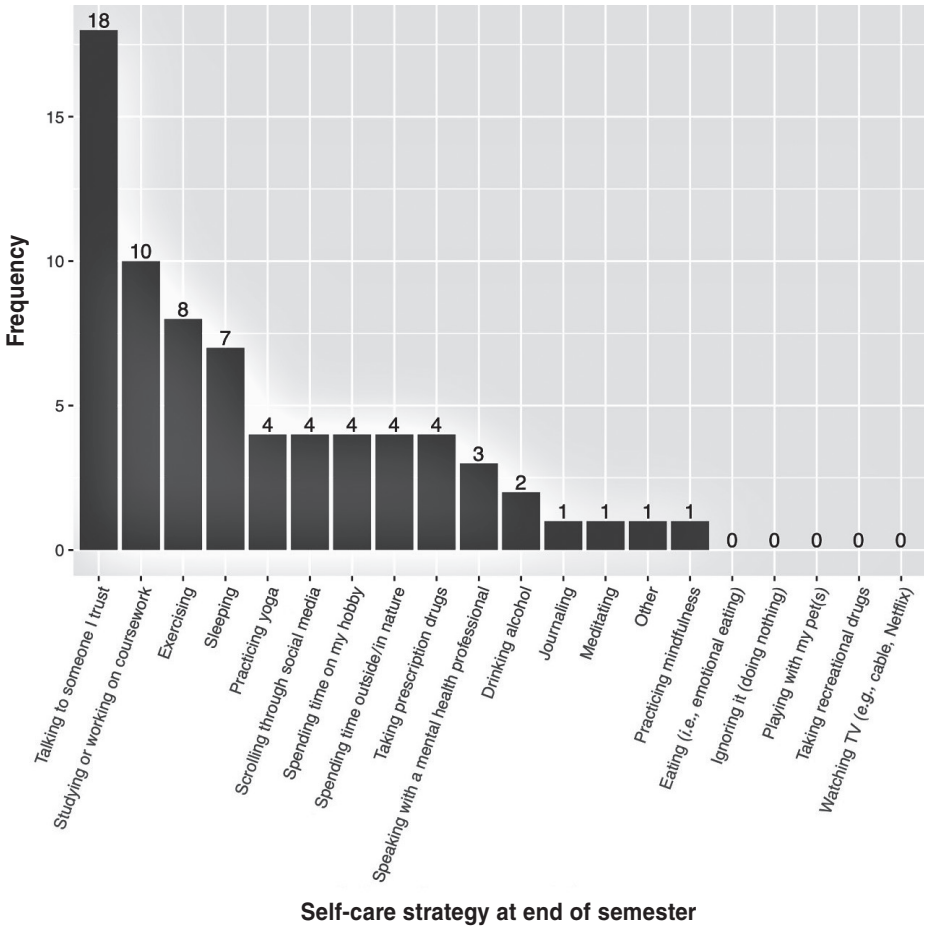


**Figure 2.** Preclinical veterinary student responses at the end of the fall semester to the survey question, "When I feel stress, I typically manage it by…" Students were encouraged to select up to 5 of their most often-employed stress-management strategies. The number above each bar indicates the number of individual student responses.

students' interactions with nature and mental health scores while learning online during the COVID-19 pandemic reported that those who felt "a little better," "very good," or "enhancement of focus" when getting home after going outside had lower depression, anxiety, and stress during the spring/summer and fall semesters. The authors emphasized that having an awareness of the difference in mood attributed to time spent outside was important to reap the benefits of time in nature (13).

Exercising > 15 min per day was also associated with lower stress scores at the end of the semester. The benefits of exercise for stress management are well recognized; in a previous study investigating motivation for exercise among veterinary students in North Carolina, stress management was among the most significant overall factors (14). Physical activity is also widely associated with reduced depression and anxiety symptoms (15). Interestingly, another study investigating the effect on veterinary students at Virginia Tech of meeting the American Heart Association's physical activity guidelines (minimum of 150 min per wk of moderate-intensity aerobic physical activity, or 75 min per wk of vigorous aerobic activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity) reported that, despite almost 2/3 of students meeting aerobic physical activity guidelines, there was no association between physical activity and any of the health-related quality of life scores (16).

At the beginning of the semester, both spending < 30 min per day on social media compared to > 2 h and sleeping 6 to 8 h daily compared to < 6 h were associated with lower stress scores. Once again, it is difficult to determine whether these different self-care activities were related to each other, since those who were spending more time on social media were likely spending less time sleeping or engaging in other self-care activities. Interestingly, in a randomized survey of 3540 veterinarians working in the USA, spending ≥ 1 h each day on social media was negatively associated with mental health and well-being scores (17). Additionally, a study investigating medical students in India reported a negative relationship between time spent on social media and mental well-being scores (18). Poor study habits among undergraduate medical students in Ireland (19) and poor sleep quantity and quality among Iranian medical students (20) were likewise associated with excessive use of social media. Given the interrelation among social media use, sleep, and study habits among professional students, self-care strategies aimed at limiting social media use could benefit veterinary students.

**Table 3.** Depression Anxiety and Stress Scale (DASS-21) scores and self-care practices among veterinary students at the end of a semester.

| Self-care practice | Number of students | Depression, median (IQR) P-*value* | Anxiety, median (IQR) P-*value* | Stress, median (IQR) P-*value* |
|---|---|---|---|---|
| Feel that current self-care techniques manage my stress | | | | |
| Never | 0 | — | — | — |
| Rarely | 1 | 32 | 22 | 28 |
| Sometimes | 11 | 8 (4 to 21)[a] | 6 (3 to 16) | 12 (9 to 26) |
| Often | 9 | 2 (2 to 8)[a] | 4 (2 to 4)[a] | 12 (10 to 16) |
| Always | 0 | — | — | — |
| | | *0.073* | *0.113* | *0.256* |
| Yoga practice | | | | |
| At least monthly | 13 | 6 (4 to 8) | 4 (2 to 8) | 12 (10 to 18) |
| Never | 8 | 9 (2 to 23) | 5 (4 to 15) | 12 (10 to 19) |
| | | *0.798* | *0.483* | *0.855* |
| Meditation practice | | | | |
| At least monthly | 11 | 4 (2 to 16) | 6 (3 to 14) | 12 (10 to 26) |
| Never | 10 | 8 (5 to 14) | 4 (2 to 7) | 12 (9 to 16) |
| | | *0.500* | *0.518* | *0.523* |
| Time spent on social media daily (h) | | | | |
| < 0.5 | 2 | 14 (10 to 18) | 8 (5 to 11) | 9 (8 to 11) |
| 0.5 to 1 | 7 | 8 (2 to 15) | 2 (2 to 14) | 12 (8 to 22) |
| 1 to 2 | 9 | 4 (2 to 8) | 4 (4 to 6) | 16 (10 to 18) |
| ≥ 2 | 3 | 16 (10 to 18) | 4 (3 to 13) | 10 (9 to 21) |
| | | *0.495* | *0.938* | *0.645* |
| Time spent outside daily (min) | | | | |
| < 15 | 6 | 14 (8 to 22) | 12 (5 to 20) | 26 (19 to 29) |
| 15 to 30 | 8 | 5 (2 to 15) | 3 (2 to 7) | 12 (10 to 13)[b] |
| 30 to 60 | 6 | 2 (2 to 4)[b] | 5 (3 to 8) | 10 (9 to 15)[b] |
| ≥ 60 | 1 | 16 | 4 | 8 |
| | | *0.068* | *0.489* | *0.114* |
| Time spent exercising daily (min) | | | | |
| < 15 | 8 | 14 (5 to 22) | 10 (2 to 19) | 19 (10 to 27) |
| 15 to 30 | 6 | 3 (2 to 7) | 7 (3 to 10) | 14 (11 to 18) |
| 30 to 60 | 7 | 6 (3 to 10) | 4 (3 to 4) | 10 (7 to 14)[b] |
| ≥ 60 | 0 | — | — | — |
| | | *0.349* | *0.392* | *0.209* |
| Total daily sleep (h) | | | | |
| < 5 | 0 | — | — | — |
| 5 to 6 | 3 | 6 (5 to 19) | 6 (5 to 14) | 26 (18 to 27) |
| 6 to 7 | 3 | 8 (5 to 15) | 8 (4 to 11) | 12 (10 to 14) |
| 7 to 8 | 14 | 7 (2 to 15) | 4 (2 to 9) | 11 (9 to 18) |
| ≥ 8 | 1 | 2 | 2 | 12 |
| | | *0.675* | *0.519* | *0.730* |

*P*-value is for the Mann-Whitney or Kruskal-Wallis test.
Footnotes represent statistical significance in comparison to the least-practiced self-care activity using linear regression: [a] compared to "rarely," [b] compared to < 15 min.
IQR — Interquartile range.

An important limitation of the present study was the small sample size inherent to the small class sizes present at the veterinary school and the attrition among students consenting to study participation. Another recent study piloted a 6-week mindfulness-based intervention that included 4 workshops offered to 3rd-year veterinary students who attended on a volunteer basis. After an initial introduction session that was timetabled in the curriculum and offered to all 120 students, only 8 (7%) students participated in the mindfulness-based intervention. Furthermore, only 7 (6%) attended a follow-up session and offered feedback on their experience. Some students stated that it was "difficult to 'fit in' and sustain the longer mindfulness practices" and that "mindfulness practices could be a 'chore'" (21). In the present study, logging in to complete the survey and score was likely perceived as an unnecessary use of time amidst the many other obligations of veterinary training. In future studies investigating the impact of self-care strategies on veterinary student experiences, it would be ideal to include the interventions as a mandatory part of the students' curriculum.

Studies investigating the implementation of self-care programs or interventions among medical students have demonstrated positive effects: a 9-month self-care course lessened the worsening of psychological distress among 4th-year medical students in the USA (22); an 8-week mindfulness-based self-care program reduced burnout scores and lowered stress among 4th-year medical students in Chile (23); and an 8-week program that included time allotted and tools for evidence-based wellness strategies resulted in lower burnout scores and perceived

stress among 1st-year medical students in the USA (24). Based on research, taking a lifestyle medicine elective focused on nutrition, physical activity, and stress management improved nutrition, depression, and anxiety among preclinical medical students (25). It is likely that the benefits of self-care practices on student stress and mental health would be more prominent if interventions were structured rather than self-led.

In conclusion, the present study demonstrated that depression, anxiety, and stress scores did not significantly change among preclinical veterinary students during a fall semester and appeared consistent with previous studies. Students who believed their current self-care techniques could often manage their stress had lower depression and anxiety scores than those who believed it rarely did. Specific self-care activities associated with lower depression, anxiety, or stress scores at the beginning or end of the semester included spending at least 15 min outside or exercising daily, spending < 30 min daily on social media, and sleeping 6 to 8 h daily. Future studies exploring the effects of self-care on veterinary student stress and mental health should consider prospectively investigating these activities, ideally while implemented as part of the curriculum to promote participation.

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