

Development of a taxonomy of practice-related stressors experienced by veterinarians in the United States

Olivia H. Vande Griek BA

Malissa A. Clark PhD

Tracy K. Witte PhD

Randall J. Nett MD, MPH

Amanda N. Moeller BA

Margaret E. Stabler BA

From the Department of Psychology, Franklin College of Arts and Sciences, University of Georgia, Athens, GA 30602 (Vande Griek, Clark, Moeller, Stabler); the Department of Psychology, College of Liberal Arts, Auburn University, Auburn, AL 36849 (Witte); and Field Studies Branch, National Institute for Occupational Safety and Health, CDC, 1095 Willowdale Rd, Morgantown, WV 26505 (Nett).

Address correspondence to Ms. Vande Griek (olivia.vandegriek@gmail.com).

OBJECTIVE

To develop a comprehensive taxonomy of practice-related stressors experienced by US veterinarians.

DESIGN

Cross-sectional survey.

SAMPLE

A subset of 1,422 US veterinarians who provided written (vs selected) responses to a question in a previous survey regarding practice-related stressors.

PROCEDURES

Using grounded theory analysis, 3 researchers inductively analyzed written survey responses concerning respondents' main practice-related stressors. In 5 iterations, responses were individually coded and categorized, and a final list of practice-related stressor categories and subcategories was iteratively and collaboratively developed until theoretical and analytic saturation of the data was achieved.

RESULTS

A taxonomy of 15 categories of broad practice-related stressors and 40 subcategories of more specific practice-related stressors was developed. The most common practice-related stressor categories included financial insecurity ($n = 289$ [20.3%]), client issues (254 [17.9%]), coworker or interpersonal issues (181 [12.7%]), and work-life balance (166 [11.7%]). The most common subcategories were clients unwilling to pay (118 [8.3%]), low income (98 [6.9%]), cost of maintaining practice (56 [3.9%]), and government or state board policies (48 [3.4%]).

CONCLUSIONS AND CLINICAL RELEVANCE

This study provided a comprehensive list of the types of practice-related stressors experienced by US veterinarians, building a foundation for future research into relationships between job stress and mental health in this population. Frequency data on the various stressors provided an initial understanding of factors that might be contributing to high stress rates among US veterinarians. (*J Am Vet Med Assoc* 2018;252:227–233)

A considerable volume of research has shown that veterinarians have a higher risk of suicide and depressive symptoms than the general population.¹ Indeed, the risk of death by suicide among veterinarians across various countries reportedly ranges from 1.7 to 4 times the risk of the general population.^{2–4} Additionally, the reported prevalence of major depression in veterinarians ranges from 20% to 66%,^{5–7} and a recent study⁶ revealed that 9% of a large sample ($n = 11,627$) of US veterinarians have experienced serious psychological distress,⁶ compared with 3.2% of the general US population.⁸ In light of the high risks of suicide, depressive symptoms, and psychological distress, the veterinary profession has been identified by both academic and popular media entities as needing more research to identify factors contributing to this profession-wide problem.^{9,10}

One contributing factor might be practice-related stressors. Job-related stressors can lead

to burnout, in that a prolonged psychological response to ongoing emotional and interpersonal practice-related stressors can result in exhaustion, cynicism, and the perception of ineffectiveness.¹¹ Practice-related stressors have also been associated with depression^{12,13} and suicidal behaviors.^{14,15} Considering this relationship between practice-related stressors and depression as well as the disproportionate risks of depressive symptoms, serious psychological distress, and suicide among veterinarians versus the general population, it is important to understand the full range of practice-related stressors experienced by veterinarians that might be contributing to mental health problems across the profession.⁶

Research on this topic has just begun. For example, the most prevalent practice-related stressors experienced by veterinarians in the United Kingdom were identified in 1 study¹⁶ by use of the

Health and Safety Executive Management Standards Indicator Tool, which groups practice-related stressors into 7 main groups: demands, control, managerial support, peer support, relationships, role, and change. Within these broad categories, number of hours worked, making professional mistakes, client expectations, and administrative and clerical tasks were the most prevalent specific practice-related stressors that UK veterinarians reported, and these veterinarians reported higher levels of job stress and lower levels of managerial support than did the general population. However, as the investigators explained, a need remained to understand more of the profession-specific stressors that veterinarians experience, and use of the scale to capture responses may have restricted conclusions that could be drawn regarding the specific stressors identified in that study.¹⁶ The investigators further suggested that qualitative studies should be conducted to identify veterinary profession-specific stressors so that those stressors and their effects could be comprehensively addressed.¹⁶

A survey⁶ was consequently conducted in 2015 to estimate the prevalence of risk factors for suicide, attitudes toward mental illness, and practice-related stressors among 11,627 US veterinarians. In that study,⁶ participants were provided with a list of established practice-related stressors, with the option to write down practice-related stressors that were not listed in the survey. Aside from the written option, the 14 specific practice-related stressors included in the survey were demands of practice; practice management responsibilities; making professional mistakes; client complaints; dealing with personal, staff, or client grief; client expectations of being expert in all veterinary subject areas; animal deaths; competition with other veterinary practices; ethical challenges; fear of malpractice litigation; educational debt; poor social support; unclear management and work role; and lack of participation in decision-making. Of this list, the most prevalent practice-related stressors were demands of practice and practice management responsibilities. However, 1,516 (13.0%) participants reported that at least one of their practice-related stressors was not included in the list provided by the researchers and consequently wrote down their own answer. This large number supports the suggestion by investigators in the UK survey¹⁶ that a qualitative analysis may be necessary to understand the full range of specific practice-related stressors faced by veterinarians.

The original list of 14 stressors provided in the 2015 survey⁶ of US veterinarians differs substantially from the list in the UK survey,¹⁶ which included 27 specific practice-related stressors within 7 broad categories. Although some overlap exists between options in the 2 surveys (eg, fear of malpractice litigation), each survey also provided options that the other did not (eg, addictive behaviors in the UK survey¹⁶ and competition with other veterinary

practices in the US survey⁶). These discrepancies can ultimately lead researchers to draw different conclusions about the prevalent practice-related stressors and steps needed to address them, which further emphasizes the need for an inductively produced, comprehensive analysis of the practice-related stressors experienced by veterinarians. Such an analysis could allow identification of a fuller range of stressors, which could then be used more systematically and consistently across studies in this field.

The purpose of the study reported here was to qualitatively examine the written responses provided in the previous survey⁶ of US veterinarians and to use the results to create an inductively produced, profession-specific, comprehensive, and exhaustive taxonomy of practice-related stressors experienced within the veterinarian population. Results from this qualitative analysis could then be used to better understand the relationship between practice-related stressors, depressive symptoms, suicidal ideation, and psychological distress among veterinarians.

Materials and Methods

Participants

Responses from 11,627 US veterinarians who completed the prior US survey⁶ survey on attitudes toward mental illness and practice-related stressors were eligible for inclusion in the study. Of this original sample, 1,516 (13.0%) participants chose to write down the factors that they considered most stressful about veterinary medicine other than the specific stressors listed in the original survey. Responses from 94 (6.2%) of those participants were excluded from analysis owing to failure to provide sufficient information to allow response coding, leaving 1,422 participants (12.2% of all survey participants) in the final sample for qualitative analysis. Of these participants, 70.8% (n = 1,007) were female. Age distributions were as follows: 20 to 29 years, 4.6% (n = 66); 30 to 39 years, 22.2% (316); 40 to 49 years, 25.8% (367); 50 to 59 years, 30.6% (435); 60 to 69 years, 13.6% (194); and ≥ 70 years, 3% (43). Participants represented all 50 states, the District of Columbia, and Puerto Rico.

Survey

As described for the original survey,⁶ participants had been recruited by means of several strategies. These strategies included posts on the Veterinary Information Network webpage, Veterinary Information Network and *JAVMA* News articles describing the study, and monthly email messages from veterinary medical associations of each state and Puerto Rico, with the exception of Maine. Respondents were excluded if they had never been employed as a veterinarian, did not practice in the United States, or had an unknown practice location. The electronic, voluntary, anonymous survey included

questions regarding demographic information, attitudes toward mental health, history of depression and mental health treatment, stressors related to veterinary medicine, and satisfaction related to veterinary medicine.

Responses

Responses from the previous survey⁶ that were analyzed in the present study pertained to the question requesting that participants select 3 factors that they considered most stressful about veterinary medicine from a list. The list included demands of practice; practice management responsibilities; making professional mistakes; client complaints; dealing with personal, staff, or client grief; client expectations of being expert in all veterinary subject areas; animal deaths (from illness or euthanasia); competition with other veterinary practices; ethical challenges; fear of malpractice litigation; educational debt; poor social support; unclear management and work role; lack of participation in decision-making; and other (“Please specify as much information as you would like”). Written responses to the open-ended final list option (other) were used in qualitative analyses.

Statistical analysis

To contextualize the frequencies of the categories derived in the present study, frequencies and percentages were calculated for the original practice-related stressors selected by the 11,627 participants in the previous study.⁶ Once these data had been analyzed, grounded theory analysis¹⁷⁻¹⁹ was used to summarize written responses to the request that participants specify other types of stressors not listed in the survey. Grounded theory is a general method of analysis that inductively develops theory from data through an iterative, rigorous process of coding.²⁰

Best practices of qualitative data analysis were used to analyze the data from the written responses in several stages.¹⁷ First, the grounded theory analytic process described elsewhere²⁰ was used to randomly divide the 1,422 open-ended responses into 5 sets of responses by means of a computerized randomizer algorithm, with the aim of setting up an iterative analysis framework. After the data were randomly divided into sets, the first set was independently examined by 3 researchers (OHVD, ANM, and MES) who separately developed initial response codes on the basis of key words or themes for each entry. After applying codes to each response, each researcher derived broader categories and, if applicable, subcategories to encompass the codes. Broad categories were determined from general responses (eg, “management”) as well as from more specific multiple responses (eg, “lack of managerial support” and “abusive boss”) that appeared to fit in a similar category. In the provided example, the more specific responses were placed in the broad category of management as well as in subcategories to accurately reflect their more specific and separate nature. Con-

sequently, although not all responses merited their own subcategories, all responses fit into at least 1 broad category.

After the first dataset was independently coded and categorized by each researcher, the 3 researchers collaborated to create 1 comprehensive list of categories and subcategories. The same process was then repeated with the second randomly selected set of data, with the code and category list refined in collaboration after a second round of independent coding. This process continued through all 5 sets, until all entries had been coded and a final, theoretically saturated taxonomy²⁰ of categories and subcategories had been created, such that each response could fall into at least 1 main category, and, if specific enough, into at least 1 subcategory. To determine interrater reliability of this classification scheme, 2 raters unfamiliar with the study were assigned a random sample of 100 responses to categorize per the final derived taxonomy, and results were compared by use of the Cronbach α reliability test.

Results

Quantitative data analysis

Responses to the original question regarding listed types of stressors experienced by the surveyed veterinarians ($n = 11,627$), in order of frequency, included demands of practice (6,985 [60.1%]); making professional mistakes (3,530 [30.4%]); client complaints (2,665 [22.9%]); practice management responsibilities (2,615 [22.5%]); client expectations of being an expert in all areas of veterinary medicine (2,379 [20.5%]); dealing with personal, staff, or client grief (1,957 [16.8%]); educational debt (1,924 [16.5%]); animal deaths (1,653 [14.2%]); ethical challenges (1,484 [12.8%]); fear of malpractice litigation (1,025 [8.8%]); unclear management and work role (870 [7.5%]); poor social support (664 [5.7%]); competition with other veterinary practices (608 [5.2%]); and lack of participation in decision-making (575 [4.9%]).

Qualitative data analysis

A fully saturated model of 15 categories and 40 subcategories of practice-related stressors was created for the 1,422 participants who provided a written response to the relevant survey question. Interrater reliability of this final taxonomy was 0.85. The 15 categories and their subcategories, listed in order of most to least frequent, and frequencies as well as illustrative quotations from participants were summarized (**Table 1**). The most common practice-related stressor categories among the written responses included financial insecurity, client issues, coworker or interpersonal issues, and work-life balance. The most common subcategories were clients unwilling to pay, low income, cost of maintaining practice, and government or state board policies.

Table 1—Categories, subcategories, and examples of written-in responses from 1,422 US veterinarians regarding types of practice-related stressors not specifically listed in a previous survey.⁶

Category and subcategory	No. (%) in category	Example response
1. Financial insecurity	289 (20.3)	"Cost of providing good service."
Low income	98 (6.9)	"Not making enough money to pay the bills and my staff."
Cost of maintaining practice	56 (3.9)	"Maintaining enough veterinarians to run practice to provide quality of life."
Low return on investment	31 (2.2)	"Disappointing economic return on the hours, work & dollars invested."
Debt	29 (2.0)	"The bills that are always due from owning a practice. There is NEVER enough money after school loans, bank loans, taxes and the rising cost of supplies."
Job outlook	17 (1.2)	"Lack of employment opportunities."
Retirement	16 (1.1)	"Lack of ability to prepare for retirement."
2. Clients	254 (17.9)	"Client complaints very stressful."
Unwilling or unable to pay	118 (8.3)	"Being bullied or shamed by clients who are unable to pay for services and feel I should provide services at a reduced cost or for free."
Unrealistic expectations for treatment	42 (3.0)	"Client unrealistic expectations/taking their own problems out on us."
Lack of compliance or responsibility for pet	24 (1.7)	"Frustration with clients and compliance and actually having them listen and taking recommendations."
Expectations of availability	21 (1.5)	"Client expectation of being always available."
3. Coworker or interpersonal issues	181 (12.7)	"The conflict, drama, and confrontations that seem never ending in all of the hospitals I have worked, including as a tech. This goes on between veterinarians, staff, clients, everyone."
Lack of support	34 (2.4)	"Hypercompetitive and unsympathetic colleagues."
Work environment	23 (1.6)	"Dysfunctional and hostile work environments in many veterinary hospitals."
Abusive or bullying coworkers	20 (1.4)	"Bullying from other staff members."
Unethical practices	11 (0.8)	"Unethical practice of fellow veterinarians, lowering the quality standards and therefore the profession prestige."
4. Work-life balance	166 (11.7)	"Unable to have a normal home life and social life because of practice demands."
Being on call	43 (3.0)	"Always on call."
5. Management issues	118 (8.3)	"Poor management threatening case load, practice reputation, and morale."
Lack of support or guidance	35 (2.5)	"Management being unsupportive of staff, when they automatically assume the client is always right and you must be at fault."
Abusive or bullying management	24 (1.7)	"Abusive management."
6. Job pressure	93 (6.5)	"Making the right clinical decision."
Too many responsibilities	44 (3.1)	"Too many responsibilities; never being 'done' with work when I leave."
Fear of mistakes or failure	18 (1.3)	"Fear of making professional mistakes or appearance thereof."
Surgery	13 (0.9)	"Performing surgery."
Complexity	6 (0.4)	"Having every day and every case be a test and/or judgement of my skill level. I am overall very successful with cases and clients, but every day is a new day, a new challenge, and after 30 years it has worn me down."
7. Private or public sector	83 (5.8)	"Increasing demand by government policies, rules, and unreasonable involvement in small business."
Government or state board policies	48 (3.4)	"State Board micromanaging practice and 'guilty until proven innocent' attitude."
Competition	17 (1.2)	"Competition from corporations for veterinary services (drugs, etc)."
Ethics	9 (0.6)	"Working in a laboratory animal facility and witnessing the studies and procedures performed. My personal disagreement with the value of much of the research causes a lot of depression and anger during my workday."
Drugs	2 (0.1)	"Access to drugs."
8. Training or staffing	73 (5.1)	"Human resource issues."
Low-skill staff or lack of training	26 (1.8)	"Lack of efficiency & training of support staff (receptionists, technicians), mistakes made by those staff members that affect my job and patient care."
Understaffing	12 (0.8)	"Trying to hire a good skilled vet/new grad."
9. Feelings of inadequacy	67 (4.7)	"Feeling inadequate, not smart enough, like I may mess up or miss something."
Knowing how to help but can't	22 (1.5)	"Economically depressed area where I practice leading to less than optimal treatment plans."
Underappreciated or lack of respect	18 (1.3)	"Being taken for granted, not appreciated, not valued."
Not knowing how to help	12 (0.8)	"The amount of frustrating cases where you can't do anything to help."
Gender bias	6 (0.4)	"Professional competency questioned by clients and staff due to ethnicity, gender and age."
10. Personal issues	63 (4.4)	"Stress in personal life."
Family	22 (1.5)	"My wife has an anxiety disorder and that wears on me."
Illness	17 (1.2)	"Chronic pain."
Boredom or lack of job fit	12 (0.8)	"Boredom with profession."
11. Future of the profession	37 (2.6)	"Fear of future of vet medicine as a career."
Shift of focus to profit	12 (0.8)	"The corporatization of veterinary medicine and the excessive emphasis on profit above all."
Technology or method advancement	11 (0.8)	"Time needed to convert to paperless record keeping."
12. Stress from animals	37 (2.6)	"I am a hospice veterinarian, so I see a lot more of illness and death than the average vet."
Compassion fatigue or grief	26 (1.8)	"Emotional baggage, compassion overload."
Suffering or owner mistreatment	9 (0.6)	"Dealing with the depressing side of shelter medicine, cruelty, noncaring owners, too many animals year after year."
Risk of injury	7 (0.5)	"Constant low-grade trauma to the body that is gradually leading to debilitation."
13. Negative public perception	24 (1.7)	"Public perception of us not being 'real doctors' and attitude that we should be treating animals for free since we love them so much."
Social media and internet	10 (0.7)	"Being extorted online (Yelp) and by clients who demand free services or retaliate by attempting to ruin my reputation."
14. High personal expectations	22 (1.5)	"Being perfect."
15. Academia	20 (1.4)	"Generating funding for research programs and student support."

Discussion

The taxonomy derived in the study reported here provided the most comprehensive analysis of practice-related stressors for veterinarians to date, closing a gap between stressors previously attributed to this population versus those that this population claims to actually experience.⁶ Grounded theory analysis was used to provide a theoretically saturated model of the wide range of stressors that veterinarians experience, which may help to explain the disproportionately high rates of suicide, depressive symptoms, and psychological distress among veterinarians.

Creation of this taxonomy demonstrated the successful use of person-centric, qualitative methodologies to analyze profession-associated problems on a deeper level than could be captured solely through quantitative methods. Building from the ground up, this taxonomy was created in such a way to extensively capture the practice-related stressors of veterinarians as they were reported, rather than providing an initially defined list from which participants were forced to select. This inductive approach therefore provided a coherent examination of the worker and their experiences, rather than the worker as an object of organizationally relevant factors.²¹

Our findings indicated that financial insecurity, client issues, coworker or interpersonal issues, and work-life balance were the most commonly reported stressors by veterinarians who provided new categories as their main practice-related stressors in the original survey.⁶ However, on a more specific, subcategory level, the most common stressors were clients unwilling to pay, low income, cost of maintaining practice, and government or state board policies. By understanding these specific problems through the capture of real experiences cited by veterinarians, researchers and practitioners can begin to address the problems directly and, in doing so, enhance the well-being of this population.

Although no conclusions can be drawn as to whether the identified stressors were related to the high prevalence of mental illness, the proposed model can be used to guide more specific questions about the relationships between veterinarians' practice-related stressors and their outcomes and can serve as a starting point for intervention-based work. This model can also be used to create more comprehensive surveys targeted at veterinarians, so that future research on this timely and urgent issue can be performed to fully address the potential mechanisms behind the high prevalence of mental illness and risk of suicide.

Because the taxonomy developed in the present study was descriptive in nature, it should be used as a starting point for future research regarding veterinarians. Such research should assess differences in these stressors among veterinary practice types and demographic groups and between this particular profession and workers in general. The identified stressors

should also be examined as potential predictors of depressive symptoms and suicidal behavior among veterinarians. We would predict that certain stressors of a potentially chronic nature, such as financial insecurity and job pressure, might be more strongly correlated with mental health problems than stressors that are more easily dealt with or are transient in nature, such as coworker issues. However, there are many ways in which these stressors could be organized or categorized to make relational predictions.

Additionally, research is needed to examine the stressor work-life balance as it relates to the changing gender demographics of the veterinary profession, which has shifted from primarily male dominated to primarily female dominated.²² Considering that more families are comprised of dual earners than ever before,²³ it is likely that work-life balance is an important issue that will continue to grow. For veterinarians with children or other people requiring care in their household, having both caretakers (2-parent homes) or single caretakers (single-parent homes) in the workforce results in a greater need to balance demanding job responsibilities with family responsibilities. Additionally, as the veterinary profession becomes increasingly female dominated, the issue of parental leave and childcare becomes more salient. Because only women bear children and many veterinarian practices are small businesses that lack formal parental leave benefits or policies, this issue will continue to challenge work-family balance, which was historically less relevant to the profession. As such, research should be conducted into how new workplace policies such as flexible schedules or parental leave can be managed to improve work-life balance for veterinarians.

Although findings of the present study cannot be immediately used to draw relationships between practice-related stressors and development of mental illness, they can be immediately used to encourage and elicit changes in workplaces to target such stressors. Several of the identified categories and subcategories, such as managerial support, coworker issues, work environment, and fear of mistakes or failure, provide an example of practice-related stressors that can be addressed and improved upon within workplaces. As research begins to examine how these stressors are specifically related to mental illness, veterinary practitioners can also begin to prioritize which issues may be most crucial to address and improve upon.

The stressors in this taxonomy that could most easily be addressed include those that can be changed at a practice or leadership level, such as management issues, work-life balance, training or staffing, high personal expectations, and coworker issues. For example, within the management issues category, the subcategory of lack of support or guidance could be addressed by having managers provide clearer guidelines and support for their subordinates to do a good job. Indeed, perceived support of one's supervisor

has been related to an employee's job satisfaction, attitudinal commitment to the organization, and intention to leave the organization,²⁴ indicating that lack of support or guidance may be detrimental not only to the individual employees but also to the organization. Additionally, coworker issues could be addressed by practice management personnel through creation of an environment in which supportive peer relationships are encouraged.²⁵ This could be done by providing employees with opportunities to bond with one another or interventions aimed at building coworker trust. Practice management personnel could also create policies that provide employees with greater work-life balance or more predictable schedules that minimize being on call, better training practices for new and existing employees, and a workplace culture that does not encourage unrealistic expectations for employees.

Finally, many of the stressors included in the taxonomy reported here are directly or indirectly related to the nature of many veterinary practices being small businesses. Veterinarians receive training in veterinary medicine but may then need to acquire new skills to run a small business that can successfully compete with other veterinary practices and larger corporations. For example, the stressor subcategories of competition, too many responsibilities, cost of maintaining a practice, and understaffing all reflect stressors likely associated with owning a small business. Consequently, educational opportunities should be provided regarding small-business ownership to help individuals with some of these stressors.

The taxonomy derived in the present study included some redundancy with the original list of stressors included in the 2015 survey,⁶ as opposed to novel stressors, and this represents a study limitation. Despite the instruction that participants describe unlisted stressors in their written response, a review of the data indicated that some participants simply provided more detail about a stressor that they had selected in the original list, although this pattern was uncommon (ie, most participants described a novel stressor). However, we did not view this limitation as corrupting the data. To the contrary, this situation may have instead allowed for more fine-grained responses, furthering our ability to perform a fully comprehensive analysis of both categories and subcategories. For example, a participant selected "client complaints" from the original list of stressors and then followed up by writing down "dealing with client issues, [and their] failure to understand scheduling." This type of response allowed for the distinction between the initial category of client complaints⁶ and the new subcategory, expectations of availability, which may have drastically different effects on employee outcomes. Furthermore, the separation of these categories provided more information to help mitigate this specific stressor.

We believe that this taxonomy of stressors experienced by US veterinarians, as developed in the present study, provides a starting point for understanding how specific stressors relate to the distinctively high prevalence of mental illness in this population. We demonstrated how person-centric and qualitative methods can be used in research on mental illness in veterinarians to gain a more comprehensive understanding of problems that are difficult to address through quantitative techniques. The inductive approach to creating this taxonomy provided a perception-driven model on which to base further quantitative analyses. A combination of this qualitative analysis with future quantitative analyses of relationships between stressors and mental illness in the veterinary profession may allow for a deep understanding of these matters and data-driven solutions.

Acknowledgments

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

References

1. Platt B, Hawton K, Simkin S, et al. Suicidality in the veterinary profession: interview study of veterinarians with a history of suicidal ideation or behavior. *Crisis* 2012;33:280-289.
2. Bartram DJ, Baldwin DS. Veterinary surgeons and suicide: a structured review of possible influences on increased risk. *Vet Rec* 2010;166:388-397.
3. Blair A, Hayes HM Jr. Mortality patterns among US veterinarians, 1947-1977: an expanded study. *Int J Epidemiol* 1982;11:391-397.
4. Jones-Fairnie H, Ferroni P, Silburn S, et al. Suicide in Australian veterinarians. *Aust Vet J* 2008;86:114-116.
5. Bartram DJ, Yadegarfar G, Baldwin DS. A cross-sectional study of mental health and well-being and their associations in the UK veterinary profession. *Soc Psychiatry Psychiatr Epidemiol* 2009;44:1075-1085.
6. Nett RJ, Witte TK, Holzbauer SM, et al. Risk factors for suicide, attitudes toward mental illness, and practice-related stressors among US veterinarians. *J Am Vet Med Assoc* 2015;247:945-955.
7. Skipper GE, Williams JB. Failure to acknowledge high suicide risk among veterinarians. *J Vet Med Educ* 2012;39:79-82.
8. Reeves WC, Strine TW, Pratt LA, et al. Mental illness surveillance among adults in the United States. *MMWR Suppl* 2011;60:1-29.
9. Stoewen DL. Suicide in veterinary medicine: let's talk about it. *Can Vet J* 2015;56:89-92.
10. Wolfe LA. Confronting suicide in the veterinary community. Available at: www.veterinarypracticenews.com/confronting-suicide-in-the-veterinary-community. Accessed Dec 15, 2016.
11. Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol* 2001;52:397-422.
12. Melchior M, Caspi A, Milne BJ, et al. Work stress precipitates depression and anxiety in young, working women and men. *Psychol Med* 2007;37:1119-1129.
13. Waldenström K, Ahlberg G, Bergman PU, et al. Externally assessed psychosocial work characteristics and diagnoses of anxiety and depression. *Occup Environ Med* 2008;65:90-96.
14. Hatch PH, Winefield HR, Christie BA, et al. Workplace stress, mental health, and burnout of veterinarians in Australia. *Aust Vet J* 2011;89:460-468.
15. Ostry A, Maggi S, Tansey J, et al. The impact of psychosocial work conditions on attempted and completed suicide among

- western Canadian sawmill workers. *Scand J Public Health* 2007;35:265-271.
16. Bartram DJ, Yadegarfar G, Baldwin DS. Psychosocial working conditions and work-related stressors among UK veterinary surgeons. *Occup Med (Lond)* 2009;59:334-341.
 17. Glaser BG, Strauss A. *The discovery of grounded theory: strategies for qualitative research*. Chicago: Aldine, 1967;1-282.
 18. Glaser BG. *Basics of grounded theory analysis: emergence vs forcing*. Mill Valley, Calif: Sociology Press, 1992;1-129.
 19. Strauss AL, Corbin J. *Grounded theory in practice*. Beverly Hills, Calif: Sage, 1997;1-288.
 20. Birks M, Mills J. *Grounded theory: a practical guide*. London: Sage Publications, 2011;1-224.
 21. Weiss HM, Rupp DE. Experiencing work: an essay on a person-centric work psychology. *Ind Organ Psychol Perspect Sci Pract* 2011;4:83-97.
 22. Lofstedt J. Gender and veterinary medicine. *Can Vet J* 2003;44:533-535.
 23. Kent L. The rise in dual income households. Available at: www.pewresearch.org/ft_dual-income-households-1960-2012-2. Accessed Feb 3, 2017.
 24. Ng TH, Sorensen KL. Toward a further understanding of the relationships between perceptions of support and work attitudes: a meta-analysis. *Group Organ Manage* 2008;33:243-268.
 25. Biron M. Effective and ineffective support: how different sources of support buffer the short- and long-term effects of a working day. *Eur J Work Organ Psychol* 2015;22:150-164.



From this month's AJVR

Effects of stacked wedge pads and chains applied to the forefeet of Tennessee Walking Horses for a five-day period on behavioral and biochemical indicators of pain, stress, and inflammation

James B. Everett et al

OBJECTIVE

To determine the effects of stacked wedge pads and chains applied to the forefeet of Tennessee Walking Horses on behavioral and biochemical indicators of pain, stress, and inflammation.

ANIMALS

20 Tennessee Walking Horses.

PROCEDURES

Horses were randomly assigned to 2 treatment groups: keg shoes (control; n = 10) or stacked wedge pads and exercise with chains (10). Ten days before treatment application, an accelerometer was attached at the left metatarsus of each horse to record daily activity. Horses were exercised for 20 minutes daily, beginning on day -7. On day 0, exercise ceased, the forefeet were trimmed, and the assigned treatment was applied. From days 1 through 5, horses were exercised as before. Blood samples for measurement of plasma cortisol, substance P, and fibrinogen concentrations were collected on days -5, 1, and 5 before and after exercise and every 30 minutes thereafter for 6 hours.

RESULTS

No significant differences in plasma concentrations of cortisol, substance P, and fibrinogen were detected between groups. Although lying behaviors changed after shoes were applied, these behaviors did not differ significantly between groups. Shoeing appeared to have altered behavior to a greater extent than did the type of treatment applied.

CONCLUSIONS AND CLINICAL RELEVANCE

Application of stacked wedge pads and chains to the forefeet of horses for a 5-day period as performed in this study evoked no acute or subacute stress or nociceptive response as measured. Although these findings should not be extrapolated to the long-term use of such devices in Tennessee Walking Horses performing the running walk, the data should be considered when making evidence-based decisions relating to animal welfare and the use of stacked wedge pads and chains. (*Am J Vet Res* 2018;79:21-32)



See the midmonth issues of *JAVMA* for the expanded table of contents for the *AJVR* or log on to avmajournals.avma.org for access to all the abstracts.