frontiers | Research Topics

Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters and laboratory animal facilities

Edited by
Sally Thompson Iritani, Sabrina Brando and Lynette Arnason Hart

Published in
Frontiers in Veterinary Science

ISSN 1664-8714
ISBN 978-2-8325-2474-9
DOI 10.3389/978-2-8325-2474-9

About Frontiers

Frontiers is more than just an open access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

Frontiers journal series

The Frontiers journal series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the *Frontiers journal series* operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

Dedication to quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews. Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the *Frontiers journals series*: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area.

Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers editorial office: frontiersin.org/about/contact

Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters and laboratory animal facilities

Topic editors

Sally Thompson Iritani — University of Washington, United States
Sabrina Brando — Consultant, Spain
Lynette Arnason Hart — University of California, Davis, United States

Citation

Iritani, S. T., Brando, S., Hart, L. A., eds. (2023). *Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters and laboratory animal facilities*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-2474-9

Table of contents

frontiers | Frontiers in Veterinary Science

TYPE Editorial
PUBLISHED 28 March 2023
DOI 10.3389/fvets.2023.1164483

OPEN ACCESS

EDITED AND REVIEWED BY
Marta Hernandez-Jover,
Charles Sturt University, Australia

*CORRESPONDENCE
Lynette Arnason Hart
✉ lahart@ucdavis.edu

SPECIALTY SECTION
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

RECEIVED 12 February 2023
ACCEPTED 02 March 2023
PUBLISHED 28 March 2023

CITATION
Thompson Iritani S, Brando S and Hart LA (2023) Editorial: Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters, and laboratory animal facilities. *Front. Vet. Sci.* 10:1164483. doi: 10.3389/fvets.2023.1164483

Editorial: Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters, and laboratory animal facilities

Sally Thompson Iritani[1], Sabrina Brando[2,3] and Lynette Arnason Hart[4]*

[1]Office of Research and Department of Environmental and Occupational Health Sciences, School of Public Health, University of Washington, Seattle, WA, United States, [2]AnimalConcepts, Teulada, Alicante, Spain, [3]Department of Psychology, University of Stirling, Stirling, United Kingdom, [4]Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, Davis, Davis, CA, United States

KEYWORDS

compassion fatigue, empathic strain, burnout, mental health, caregiving, animal welfare

Editorial on the Research Topic
Occupational stress and joy of animal care professionals in zoos, sanctuaries, farms, shelters, and laboratory animal facilities

This compilation of articles is focused on the relationship between people and animals in different animal care working environments. The human–animal bond permeates and defines our relationships with animals. Many occupations involve regular daily interactions with animals that require not only providing for the basic needs of the animals but also supporting the animals in a scenario that necessitates understanding the animals' behavior and providing for their psychological wellbeing. One of the important recognized components is that we need to move from a culture of stoicism to a culture of compassion and feeling. This cultural shift will allow individuals to experience their emotions and provide a caring environment for both people and animals. We need to provide animal care professionals with resources and support to ensure that they can approach their jobs with resilience and provide optimal care for the animals.

Impact on the animal care team

First and foremost, it is important to recognize that animal care is managed by a team of different professionals. This team consists of people with different attitudes toward and experiences of working with animals and people with different authority and decision-making regarding the care for the animals. Most animal care environments have primary caregivers who are responsible for the everyday needs of the animals, specialized teams that provide for the animals' health (clinical veterinary team) and wellbeing (psychological wellbeing and environmental surroundings), and high-level decision-makers such as directors of the zoos, sanctuaries, and farms. Each of these members will have a different experience of the joys and stressors related to their position; all team members, from frontline staff to the top leadership and CEO, should therefore be included and considered.

As such, Kogan et al. evaluated factors contributing to burnout and compassion fatigue, specifically for veterinary technicians on the team. Major factors that increased compassion satisfaction for these members were control over their schedules, recognition for their contributions, and opportunities for professional development. In addition, the authors identified that destigmatizing the "dirty work" would be helpful. This destigmatizing is important in other areas as identified in subsequent articles.

A particular stress of working with animals professionally is the requirement to deal with their deaths, often being in charge or participating in euthanasia, slaughter, or depopulation. The impact on the mental health of veterinary teams is a major focus of the American Veterinary Medical Association, which is building sources of support for those involved in the "Humane Endings" of animals in all contexts (1).

Animal care professionals involved in care for shelter animals

Burnout and compassion fatigue for animal caregivers were identified early among animal caregivers that work in animal shelters (2). While the field is moving away from compassion fatigue to empathic strain, this editorial and Research Topic uses both interchangeably and is based on previous research.

Animal shelter workers have a critical public health role in assuring safety for both animals and humans, and they can experience great joy when placing an animal in the right environment and a new home for its future safety and overall wellbeing. These workers are also exposed to situations that can negatively impact their mental health at a higher frequency. This is attributed to the moral stress involved with decision-making relating to possible euthanasia and potential exposure to neglect, injury, or abuse of an animal. Hoy-Gerlach et al. make the case, in their eloquent overview of this situation, that there is an important role for social workers that are specifically trained and proficient at supporting and addressing the human-animal bond, compassion satisfaction, compassion fatigue, empathic strain, and burnout. The authors give several suggestions for forming a framework to support this endeavor that includes more specialized training and recognition from both social work societies and national animal care and control organizations to incorporate this into their strategic initiatives.

Animal care professionals involved in care for research animals

Three of the articles in this Research Topic are focused specifically on the joys and associated sorrows of personnel that interact with research animals. This is another indicator of the amount of attention that is being devoted to recognizing and supporting animal caregivers in this profession. People that care for animals that are used in research are in a unique situation when it comes to the paradox of a caring profession. These jobs consist of providing daily care and oftentimes clinical care of animals that are used in scientific advancements to increase our understanding of both fundamental and applied biological sciences. There are associated challenges not seen in other animal care professions, in that there may be research protocols that involve creating an adverse effect on the animal and oftentimes at the end of an experiment the animals are euthanized for tissue collection and analysis.

LaFollette et al. have undertaken an extensive survey of a population of research animal care professionals and identified several areas for additional follow-up in evaluating the pervasiveness and contributing factors to compassion fatigue and compassion satisfaction. Compassion satisfaction was associated with higher social support, less animal stress/pain, and more human-animal interactions. In addition, a lower professional quality of life score was associated with the inability to provide more enrichment diversity at a greater frequency.

Murray et al. and Van Hooser et al. focused on intervention strategies for personnel that interact with research animals. Both articles make clear that the first step involves performing a needs assessment and determining what the organization needs to support its personnel. Murray et al. summarize two alternative approaches that can be tailored to an individual organization, depending on the size and complexity of the units involved. Van Hooser et al. summarize the approach used in a large academic institution. Importantly, the outcome is putting in place a compassion resiliency program that can support the needs of the organization and having a team approach that can ensure the sustainability of the program going forward.

Summary

These articles touch on the joys and sorrows of animal caregivers in different environments. Clearly, many of these professions involve tremendous rewards and are also associated with both moral and compassion stress. Two factors identified will universally help in supporting animal care professionals. One is destigmatizing the work of our animal care professionals and providing sustainable support across our professions. The other is continuing to promote self-care, as explained in the articles, and seeking help and support if someone is feeling overwhelmed by their work. Finally, we would like to highlight the importance of attention to the individual, leadership, and organizational aspects of human wellbeing in these diverse settings, as all are equally essential.

Author contributions

ST wrote the initial draft. LH and SB also contributed to the article and approved the submitted version.

Conflict of interest

SB is Director of the company AnimalConcepts.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

1. Kollias NS, Strand EB, Kogan LR, Houlihan KE, Thompson-Iritani S, Hoenig DE, et al. Psychological implications of humane endings on the veterinary profession. *J Am Vet Med Assoc.* (2023) 261:185–192. doi: 10.2460/javma.22.06.0234

2. Figley CR. Compassion fatigue: toward a new understanding of the costs of caring. In: Stamm BH, editor *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators* (pp. 3–28). Baltimore: The Sidran Press (1995).

frontiers in Veterinary Science

ORIGINAL RESEARCH
published: 05 March 2020
doi: 10.3389/fvets.2020.00114

Laboratory Animal Welfare Meets Human Welfare: A Cross-Sectional Study of Professional Quality of Life, Including Compassion Fatigue in Laboratory Animal Personnel

Megan R. LaFollette[1], Megan C. Riley[1], Sylvie Cloutier[2], Colleen M. Brady[3], Marguerite E. O'Haire[4] and Brianna N. Gaskill[1]*

[1] Department of Animal Sciences, College of Agriculture, Purdue University, West Lafayette, IN, United States, [2] Independent Researcher, Ottawa, ON, Canada, [3] Department of Agricultural Sciences Education and Communication, College of Agriculture, Purdue University, West Lafayette, IN, United States, [4] Department of Comparative Pathobiology, Center for the Human-Animal Bond, College of Veterinary Medicine, Purdue University, West Lafayette, IN, United States

OPEN ACCESS

Edited by:
Lynette Arnason Hart, University of California, Davis, United States

Reviewed by:
Vera Baumans, Utrecht University, Netherlands
Mitsuaki Ohta, Tokyo University of Agriculture, Japan

***Correspondence:**
Megan R. LaFollette
meglafollette@gmail.com

Specialty section:
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

Received: *25 November 2019*
Accepted: *14 February 2020*
Published: *05 March 2020*

Citation:
LaFollette MR, Riley MC, Cloutier S, Brady CM, O'Haire ME and Gaskill BN (2020) Laboratory Animal Welfare Meets Human Welfare: A Cross-Sectional Study of Professional Quality of Life, Including Compassion Fatigue in Laboratory Animal Personnel. Front. Vet. Sci. 7:114. doi: 10.3389/fvets.2020.00114

Laboratory animal personnel may experience significant stress from working with animals in scientific research. Workplace stress can be assessed by evaluating professional quality of life, which is comprised of compassion fatigue (i.e., burnout and secondary traumatic stress) and compassion satisfaction. This research aimed to explore the associations between risk factors and professional quality of life in laboratory animal personnel. In a cross-sectional, convenience sample design, laboratory animal personnel were recruited from widespread online promotion. A total of 801 personnel in the United States or Canada completed an online survey regarding professional quality of life, social support, euthanasia, enrichment, stress/pain levels, and human-animal interactions. Participants worked in a wide range of settings (e.g., industry, academia), research types (e.g., basic, applied, regulatory), species (e.g., non-human primates, mice), and roles (e.g., animal caretaker, veterinarian). Data were analyzed using general linear models. Personnel who reported higher compassion fatigue also reported lower social support, higher animal stress/pain, higher desire to implement more enrichment, and less control over performing euthanasia (p's < 0.05). Higher burnout was associated with less diverse/frequent enrichment, using physical euthanasia methods, and longer working hours. Higher secondary traumatic stress was associated with more relationship-promoting human-animal interactions (e.g., naming animals) and working as a trainers (p's < 0.05). Higher compassion satisfaction was associated with higher social support, less animal stress/pain, and more human-animal interactions (p's < 0.05). Surprisingly, neither personnel's primary animal type (e.g., non-human primates, mice) nor frequency of euthanasia (e.g., daily, monthly) were associated with professional quality of life (p's > 0.05). Our findings show that the professional quality of life of laboratory animal personnel is associated with several factors. Personnel reporting poorer professional quality of life also reported less social support, higher animal stress/pain, less enrichment diversity/frequency and wished they could provide more enrichment, using

physical euthanasia, and less control over performing euthanasia. Poorer professional quality of life was also seen in personnel working as trainers, at universities, and longer hours. This study contributes important empirical data that may provide guidance for developing interventions (e.g., improved social support, decreased animal stress, increased animal enrichment diversity/frequency, greater control over euthanasia) to improve laboratory animal personnel's professional quality of life.

Keywords: compassion fatigue, laboratory animals, human-animal interactions, workplace stress, euthanasia, enrichment, animal welfare, social support

INTRODUCTION

Laboratory animal personnel may be particularly at risk for workplace stress as a result of several factors related to working with laboratory animals—e.g., the constant making and breaking of human-animal bonds. Many laboratory animal personnel are responsible for directly or indirectly caring for laboratory animals and often form attachments with them (1). While taking care of these animals, personnel may also perform or view procedures that cause pain and distress as part of the experiment—which alone could lead to occupational or perpetration-induced traumatic stress (2, 3). Then, at the end of a study, laboratory animals are often euthanized—sometimes by their caretaker without the choice to pass this responsibility to another worker—either to collect tissues for analysis, because they cannot be used in other studies for scientific reasons, or because they cannot be adopted out. Adoption may not be possible because of possible harms to health and safety, lack of interested homes, or institutional reasons. This sticky moral situation is sometimes described as a "caring-killing paradox" (4, 5). This paradox may be exacerbated for stronger attachments which may occur for animals that caretakers interact with more frequently, more intensely, or even for animals with a closer evolutionary relationship to humans (6). Euthanizing animals (along with just working with animals at all) is thought to be one of the causes of workplace stress for many animal-care workers (3).

Workplace stress inherent to the responsibilities of laboratory animal personnel may be exacerbated due to emotional dissonance and moral stress (6). Emotional dissonance is the conflict between experienced emotions and expressed emotions (6). In the laboratory, emotional dissonance may occur from simultaneously feeling negative emotions from performing stressful tasks or euthanasia, but also feeling unable or unsupported in expressing these emotions. For example, feeling sad after a euthanasia, but being told that it's "weak" to feel that way or discouraged from talking about their feelings. Moral stress results from performing a task that is in conflict with what one believes they ought to do (7). Moral stress and emotional dissonance may also arise in personnel who may have entered the occupation because of their love, respect, and empathy for animals as well as their desire to care for them (2, 8). These personnel then face a contradiction between their internal desires and the reality that they must perform research procedures that may cause pain, stress, or death (5).

In a systematic review of workplace stress in animal-care workers, social support networks were considered key to minimizing workplace stress (3). Unfortunately, laboratory animal personnel may lack social support networks at work and home. In fact, working in an animal laboratory may promote social isolation rather than support. It is relatively common for organizations to encourage secrecy about their animal work because of concerns about negative societal views or public pressure, the antivivisection movement, and confidentiality of new research or products. At work, personnel may not feel as if they can turn to researchers or even fellow technicians about their feelings about their jobs which can cause even further feelings of isolation. Outside of work, negative social stigma may arise from the "dirty work" of performing scientific research with animals and euthanizing animals—which can prevent developing relationships and further compound any internal conflict and harm well-being (2, 6). Finally, many laboratory technicians may be required to work unsocial hours for studies, since animals need constant care and research projects often are not designed with human schedules in mind (6).

One particular type of workplace stress is compassion fatigue, which occurs in careers that involve caring for humans or animals. It is commonly defined as "a psychological syndrome, comprised of secondary trauma and burnout, which can adversely affect those who work in caring professions" (9). Secondary traumatic stress is typically caused by exposure to the trauma of others. Its symptoms are similar to those of post-traumatic stress disorder, including invasive thoughts, nightmares, hyper-vigilance, and avoidance. It can result in fear, sleep difficulties, and the avoidance of reminders of the individual's experiences. Burnout is generally defined as the gradual onset of emotions such as exhaustion, depression, anger, and frustration toward an individual's work environment, which eventually leads to feelings of hopelessness and difficulties in effectively performing tasks. Laboratory animal personnel may be at risk for compassion fatigue as a result of their role as animal caretakers that often includes exposure to—and sometimes perpetuation of—animal stress and pain. Their compassion fatigue may be exacerbated by the factors discussed above, although relatively few studies have been conducted with laboratory animal personnel specifically (10).

Beyond the negative effects of workplace stress on personnel themselves, there may also be negative workplace effects. In a study of 36 animal shelters across the United States, higher frequencies of dog euthanasia (hypothesized to be related to

workplace stress levels) were positively associated with higher employee turnover (11). Furthermore, personnel affected by severe workplace stress may provide lower quality of care, since one effect of burnout is difficulty in effectively performing tasks (9). Although the primary concern in studying workplace stress may be direct concern for the employees themselves, the potential effects on the work environment (e.g., decreased efficiency, higher turnover) and animal well-being provide additional rationale for understanding compassion fatigue in the animal laboratory.

Considering some indications of high levels of workplace stress in laboratory animal personnel and a lack of understanding of their associated factors (3), our objective was to explore associations between reported professional quality of life (i.e., compassion fatigue and satisfaction) and potential risk or protective factors in laboratory animal personnel. Based on previous research with veterinarians, shelter workers, and laboratory animal personnel, we hypothesized that higher reported levels of compassion fatigue would be associated with more frequent euthanasia, less control over euthanasia, caring for animals that experience more stress/pain, less social support, and working with non-human primates. With this knowledge, we hope to identify promising areas for intervention-based research and practices that combat workplace stress by decreasing compassion fatigue and increasing compassion satisfaction.

MATERIALS AND METHODS

All procedures and informed consent protocols were approved by Purdue University's Human Research Protection Program Institutional Review Board, protocol #1712020004. No interaction occurred between the research team and animals during the course of the study; therefore, we did not seek approval from Purdue University's Institutional Animal Care and Use Committee (IACUC).

Participants and Procedures

Participants were recruited through widespread online promotion designed to maximize sample size (12). Online contacts occurred between February 22 to March 26, 2018 through seven areas: direct emails to known laboratory personnel, list serves (e.g., CompMed, LAREF, etc.), email lists (e.g., CALAS, MSMR), social media groups (e.g., Laboratory Animal Sciences, Dog Spies on Facebook), LinkedIn (e.g., AALAS group, Animal Behavioral Biology), website advertising (CALAS & AALAS), and online webinars (e.g., AALAS). Each location was contacted up to four times with the same study flyer, but slightly different wording following recommended survey procedures (13). To facilitate increased participation by Canadians, all study materials were translated into French by one of the authors (SC), a native French Canadian. All participants gave their voluntary informed consent prior to completing a short 30-min survey (**Supplemental Table 1**). To compensate them for their time, participants were entered into a drawing for a choice between $40 USD cash or Amazon gift card (chosen by 38 and 62%, respectively). Participants were included in the study if they were over the age of 18 and currently working with laboratory animals in the United States and Canada. This study was restricted to personnel in the United States and Canada since both working and laboratory animal research conditions may be substantially different in other countries or part of the world.

Measures

This survey was developed by reviewing literature—using validated measures if possible—as well as consulting with experts in laboratory animal enrichment, survey methodology, and behavior theory. When validated measures did not exist, previous measures were modified or new items were created, reviewed by experts, piloted, and revised as necessary. All survey question text and scoring are available in (**Supplemental Table 1**).

Demographic and Work Factors

Participants were asked about their demographics and current work. Demographics included age, gender, race, and highest level of education. Current work included country of work, role (e.g., animal care technician, veterinarian), type of institution (e.g., academic, contract research organization), primary type of research (e.g., basic, applied, regulatory), animal type they spend the most time working with, and both years and hours per week working with laboratory animals in general. Participants were informed that work was defined broadly including both hands-on and hands-off work (i.e., from changing cages to approving research protocols on a review board).

Social Support and Animal Stress

Social support was assessed with questions specifically about support related to their work with laboratory animals and based off of a previous social support questionnaire (14). Participants were asked, first, how often they talk to others about the work they do with laboratory animals and, second, how often they feel like they have someone they can really count on when dealing with stress related to their work with laboratory animals.

Participants were also asked to self-assess the degree of stress and pain level for most of the animals they work with, using categories based off the official United States Department of Agriculture (USDA) pain and distress categories for laboratory animal research and Canadian Council for Animal Care guidelines (15). These categories included: little to none, minor, moderate, or severe.

Euthanasia, Enrichment, and Human-Animal Interactions

Euthanasia practices were assessed by asking participants three questions. First, "how often do you euthanize laboratory animals?" Second, participants were asked if they used the following types of euthanasia: injection, inhalant, cervical dislocation, penetrating captive bolt, blunt force trauma, or other (with the option to fill in their answers). Third, participants were asked to respond to the statement "I get to decide whether I am the one to euthanize the animals I have cared for" with one of the following options: never, some of the time, or all of the time.

Enrichment practices were assessed by asking participants two stand-alone questions and an enrichment diversity/frequency questionnaire based off a review of previous zoo and laboratory

animal literature (16–19). At the beginning of this section, to counter any misunderstandings about enrichment, participants were instructed that "in this study, we consider animal enrichment to be any attempt to improve animal welfare by enhancing the quality of a captive animal's care by providing stimuli necessary for psychological and physical well-being" (20). First, participants were asked about their degree of control or influence over the type or amount of enrichment provided. Second, participants were asked if they wished they could provide more enrichment to their animals than they currently do. Finally, participants were asked to describe the enrichment of whichever animal type (e.g., mouse, non-human primate) they had worked with most over the past year. Specifically, they were given a list of enrichments and asked how often (if at all) each one was used in their laboratory with that specific animal type. These individual enrichment values were then averaged to create a summary score for overall enrichment diversity/frequency. High scores indicate more frequent enrichment of a greater variety of types.

Human-animal interactions were assessed by asking participants how strongly they agreed or disagreed with four statements: that they often observe, pet, talk to, or name their laboratory animals [adapted from work by Hemsworth and Coleman (21)].

Professional Quality of Life

Workplace stress and satisfaction was assessed using a Professional Quality of Life (ProQOL) questionnaire to determine their prevalence of compassion fatigue (comprised of burnout and secondary traumatic stress) and compassion satisfaction. Compassion satisfaction refers to the pleasure that can be derived from an individual's ability to perform work well and contribute to the work setting and greater good of society (9). The ProQOL is one of the most widely used instruments to measure the positive and negative aspects of caring for others (9). It has good reliability and construct validity (9). Participants were asked 30 questions about their feelings both inside and outside of the workplace.

Data Analysis

Variable Coding

To ensure that all descriptive data reporting and summary scores indicated the same responses, only participants that answered at least 50% of questions per measure and had performed euthanasia at least once were included for analysis. Adding the requirement that participants had to have performed euthanasia at least once did not change statistical results, but allowed the inclusion of questions regarding control over euthanasia and euthanasia types in the analysis, which was significant.

To assist with analysis, categorical response options that resulted in <20 responses were collapsed into larger categories. For example, gender response categories of prefer not to answer, transgender man, transgender female, non-binary, blank were collapsed into an "other" category. Similarly, if fill-in answers had more than 20 similar responses then they were made into their own category. For example, a "trainer" category was added to participant role. Missing data for categorical variables (gender, race) were coded as "other." Additionally, race was coded as "mixed" for individuals who selected multiple race categories.

Furthermore, the types of laboratory animals that participants worked with most, certifications, and euthanasia types were coded into logical categories for clear and consistent interpretation. For animal types, rats, mice, and non-human primates remained in their own category because of how common their responses were. However, pigs, sheep, and goats were collapsed into the category of farm animals. Cats and dogs were collapsed into the category of companion animals. All other animal types were coded as others.

Quantitative Analysis

Data analysis was conducted in Statistical Package for the Social Sciences (SPSS 24.0) using descriptive statistics and general linear models. Prior to testing, all assumptions of general linear model were confirmed including independence of residuals, homogeneity of variance, normality of residuals, and multicollinearity in the data. Summary scores were calculated by taking an average of the individual items (excluding participants with >50% missing data per measure).

Professional quality of life level was determined following the ProQOL manual (9). In brief, after reverse coding selected items, raw data was converted to t-scores to standardize each subscale in which the scale mean equaled 50, with a standard deviation of 10. This manual encourages using continuous numbers for statistical analysis rather than using cut scores to separate participants into different levels of quality of life.

General linear models were used to test associations between professional quality of life and potential risk factors. The dependent variables for quantitative analysis were professional quality of life t-scores: burnout, secondary traumatic stress, and compassion satisfaction. The explanatory variables included social support, level of stress/pain of animals, euthanasia factors (frequency of euthanasia, control over euthanasia), animal interactions (enrichment diversity/frequency, control over enrichment, desire to provide more enrichment, general behaviors), demographic (sex, race, age, highest education), and work factors (institution type, research type, animal work with most, years worked, hours worked). Significance level was $p < 0.05$. Significant main categorical effects were further analyzed with bonferroni adjusted pairwise comparisons. Results are presented as mean ± standard deviation unless otherwise noted. Specific response choices (e.g. "always" or "never") are presented in italics in text.

RESULTS

Demographics and Work

A total of 1,449 individuals started the survey, but only 1,255 met the inclusion criteria for this study of currently working with vertebrate laboratory animals in the United States or Canada. Of those, only 801 answered at least 50% of questions per measure. Detailed demographic and work information for all included participants is shown in **Table 1**. The laboratory animal personnel were primarily white females with an average age of 40 years. On average, participants had worked with laboratory animals for

TABLE 1 | Demographic and work information for qualifying study participants ($N = 801$).

		N (%)
Country	USA	559 (70%)
	Canada	242 (30%)
Gender	Female	648 (81%)
	Male	143 (18%)
	Other	10 (1%)
Race	White	694 (87%)
	Asian	31 (4%)
	Mixed	20 (3%)
	Other	56 (7%)
Education	High school diploma or equivalent	16 (2%)
	Some college, no degree	65 (8%)
	Associate's or technical degree	176 (22%)
	Bachelor's degree	323 (40%)
	Graduate degree	221 (28%)
Institution	University	522 (65%)
	Contract Research Organization	170 (21%)
	Non-Profit	45 (6%)
	Government	25 (3%)
	Other	39 (5%)
Research Type	Applied	408 (51%)
	Basic	146 (18%)
	Product	67 (8%)
	Regulatory	58 (7%)
	Education or Training	53 (7%)
	Other	69 (9%)
Animal type worked with most	Mice	484 (60%)
	Non-human primates	104 (13%)
	Rats	86 (11%)
	Farm	39 (5%)
	Companion	33 (4%)
	Other	55 (7%)
Role	Animal care or laboratory technician	210 (26%)
	Veterinary Technician	173 (22%)
	Manager	156 (20%)
	Veterinarian	99 (12%)
	Trainer	31 (4%)
	Principal investigator	20 (3%)
	Other	112 (14%)
Continuous data	**Mean ± SD**	**Range**
Age (M +- SD)	40 ± 11 years	20–78
Years working with lab animals	13 ± 10 years	0–50
Hours per week working with lab animals	34 ± 12 hours/week	0–66

13 years and were currently working with laboratory animals for 34 h a week. For institution type, 65% of participants worked at a university, while 21% worked at a contract research organization. For their professional role, participants were mainly animal care technicians (26%), veterinary technicians (22%), or laboratory managers (20%). They primarily worked with mice (60%), non-human primates (13%), and rats (11%).

Social Support, Animal Stress, Euthanasia, Enrichment, and Human-Animal Interactions

Laboratory animal personnel reported about their social support & animal stress/pain (**Figure 1**, **Supplemental Table 2**). Although on average personnel reported moderate levels of social support, some personnel had low levels of social support. For example, 28% of personnel reported that they never or only sometimes feel that they have someone they can really count on when dealing with stress related to their work with laboratory animals. When asked about their animals' stress and pain, less than a third of personnel (28%) reported that most of the animals in their care experience moderate or severe stress or pain.

Laboratory animal personnel also reported about their euthanasia, enrichment, and animal interaction practices (**Figure 1**, **Supplemental Table 2**). For euthanasia frequency, about half of participants (52%) perform euthanasia on a daily or weekly basis. For euthanasia control, about 20% are never given the choice to abstain from euthanizing their own animals. Of the methods used for euthanasia, 88% of personnel reported the use of inhalants (e.g., carbon dioxide) and 70% of personnel reported the use of physical procedures (e.g., cervical dislocation). For enrichment control, almost a third of personnel (28%) reported having only a little or no control over enrichment provision. Most personnel (76%) wished they could provide more enrichment to the animals in their care. Finally, the majority of participants engaged in positive human-animal interactions, with 40% often naming their animals.

Professional Quality of Life

In this study, professional quality of life was associated with several factors (**Table 2**). Laboratory personnel that reported higher *compassion fatigue* (i.e., higher burnout and secondary traumatic stress) indicated less social support, more stress/pain in their animals, and less or no choice in deciding whether they would be the ones to euthanize their animals. Additionally, personnel that reported higher *compassion fatigue* indicated a greater desire to provide their animals with more enrichment than currently provided. Conversely, personnel that reported higher *compassion satisfaction* indicated more social support, less stress or pain in their animals, and performed certain relationship-promoting human-animal interactions more often (e.g., naming their animals).

The individual components of compassion fatigue—burnout and secondary traumatic stress—were also associated with several factors individually (**Tables 2**, **3**). Personnel that reported higher *secondary traumatic stress* indicated they performed certain relationship promoting human-animal interactions more often (e.g., naming their animals) and were more likely to indicate that their research type was in education or training (vs. applied, basic, or regulatory). Personnel that reported higher *burnout* indicated that they provided less diverse/frequent enrichment,

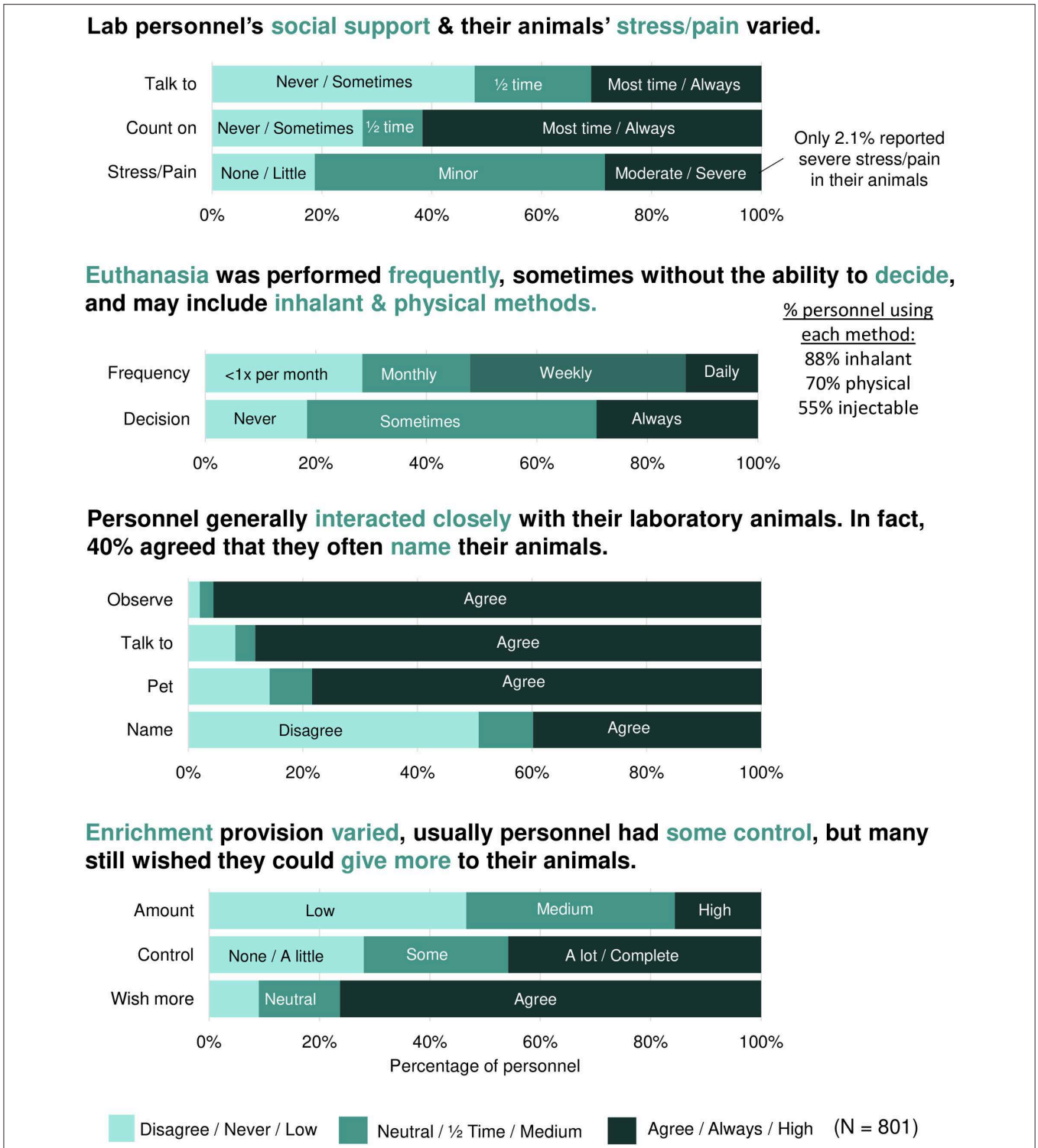


FIGURE 1 | Descriptive statistics of laboratory animal personnel social support, animal stress/pain, euthanasia, human-animal interactions, and enrichment. Summarized descriptive frequencies of the responses of 801 laboratory animal personnel in the United States and Canada to an online survey. Light blue indicates the low end of a scale such as disagree or never. Dark blue indicates a medium point such as neutral or half time. Black indicates the high end of the scale such as agree or always. Specific categories are indicated within the figure when possible.

TABLE 2 | Associations with professional quality of life in laboratory animal personnel.

		Dependent variables		
Independent variables (Potential risk factors)	**DF**	**Burnout**	**Secondary traumatic stress**	**Compassion satisfaction**
Social Support	1, 756	**(–) $F = 130.69$, $p < 0.0001$**	**(–) $F = 41.37$, $p < 0.0001$**	**(+) $F = 140.35$, $p < 0.0001$**
Animal Stress/Pain	1, 756	**(+) $F = 23.35$, $p < 0.0001$**	**(+) $F = 20.33$, $p < 0.0001$**	**(–) $F = 25.73$, $p < 0.0001$**
Euthanasia				
Control	1, 756	**(–) $F = 8.60$, p = 0.003**	**(–) $F = 16.52$, p < 0.0001**	$F = 0.98$, p = 0.322
Frequency	1, 756	$F = 0.23$, p = 0.629	$F = 1.24$, p = 0.267	$F = 1.10$, p = 0.294
Using physical methods	1, 756	**$F = 4.88$, p = 0.028**	$F = 0.05$, p = 0.829	$F = 1.12$, p = 0.290
Using injectable methods	1, 756	$F = 0.43$, p = 0.511	$F = 0.16$, p = 0.688	$F = 0.38$, p = 0.539
Using inhalant methods	1, 756	$F = 0.70$, p = 0.404	$F = 0.06$, p = 0.813	$F = 0.06$, p = 0.799
Enrichment				
Desire	1, 756	**(+) $F = 7.54$, $p = 0.006$**	**(+) $F = 12.71$, $p < 0.0001$**	$F = 2.95$, $p = 0.086$
Diversity/Frequency	1, 756	**(–) $F = 8.80$, $p = 0.003$**	$F = 0.26$, $p = 0.609$	$F = 3.79$, $p = 0.052$
Control	1, 756	$F = 0.12$, $p = 0.733$	$F = 0.04$, p = 0.842	$F = 1.68$, $p = 0.195$
Human-Animal Interactions	1, 756	$F < 0.01$, $p = 0.966$	**(+) $F = 21.63$, $p < 0.0001$**	**(+) $F = 25.91$, $p < 0.0001$**
Demographic Factors				
Gender	2, 756	**$F = 3.68$, $p = 0.026$**	$F = 2.65$, $p = 0.071$	$F = 2.16$, $p = 0.116$
Age	1, 756	$F = 2.19$, $p = 0.139$	$F = 0.87$, $p = 0.352$	$F = 0.01$, $p = 0.913$
Race	3, 756	$F = 0.25$, $p = 0.858$	$F = 0.87$, $p = 0.458$	$F = 1.08$, $p = 0.356$
Country		$F = 2.77$, $p = 0.097$	$F = 1.60$, $p = 0.206$	$F = 0.65$, $p = 0.422$
Work Factors				
Research type	5, 756	**$F = 2.89$, $p = 0.013$**	**$F = 3.26$, $p = 0.006$**	**$F = 2.43$, $p = 0.034$**
Institution type	4, 756	**$F = 3.56$, $p = 0.007$**	$F = 1.39$, $p = 0.236$	$F = 1.77$, $p = 0.133$
Role type	7, 756	$F = 0.80$, $p = 0.567$	$F = 0.71$, $p = 0.644$	$F = 0.76$, $p = 0.598$
Hours of work per week	1, 756	**(+) $F = 4.92$, $p = 0.027$**	$F = 2.52$, $p = 0.113$	$F = 0.03$, $p = 0.872$
Years working	1, 756	$F = 0.02$, $p = 0.880$	$F = 0.43$, $p = 0.512$	$F = 2.33$, $p = 0.127$
Highest education	4, 756	$F = 0.96$, $p = 0.429$	$F = 0.66$, $p = 0.618$	$F = 0.39$, $p = 0.815$
Animal type	5, 756	$F = 1.74$, $p = 0.123$	$F = 1.96$, $p = 0.083$	$F = 0.85$, $p = 0.513$

The associations from three general linear models on laboratory animal personnel professional quality of life (dependent variables: burnout, secondary traumatic stress, compassion satisfaction; N = 801). Participants were asked about the independent variables of social support, animal stress/pain, euthanasia, enrichment, human-animal interactions, and demographic, & work factors. DF, degrees of freedom. F, F-statistic. (+): the continuous factor has a positive association with the dependent variable. (–): the continuous factor has a negative association with the dependent variable Bold indicates a significant effect.

used physical methods of euthanasia (e.g., cervical dislocation), and worked more hours per week. Further, higher levels of *burnout* were associated with reporting "other" for gender (vs. male or female) and working at a university (vs. a contract research organization).

In this study, there were also a few notable null findings (**Tables 2**, **3**). That is, professional quality of life was not associated with control over enrichment provision, years of working with laboratory animals, euthanasia frequency (e.g., daily vs. monthly), or the animal type personnel worked with most (e.g., non-human primates vs. mice). Also, although on a main effect level *burnout* and *compassion satisfaction* were associated with research type, *post-hoc* Bonferroni corrected pairwise comparisons did not find any significant differences (p's < 0.05).

DISCUSSION

To our knowledge, this is the first large cross-sectional study to explore risk factors for laboratory animal personnel's professional quality of life. We successfully surveyed 801 personnel in the United States and Canada working with a variety of different species, research types, and institutions. Results indicate that compassion fatigue in laboratory animal personnel is associated with less social support and more painful/stressful research, difficult euthanasia, enrichment, and workplace settings. At least one component of compassion fatigue was associated with reporting more stress/pain in animals in personnel's care, less control over euthanasia, euthanasia using physical methods, less diverse/frequent enrichment, and a desire for more enrichment. At least one component of compassion fatigue was also associated with more relationship-promoting human-animal interactions (e.g., naming), working as a trainer, at a university, or more hours per week. Surprisingly, compassion fatigue was not associated with euthanasia frequency or working with non-human primates. Compassion satisfaction was associated with higher social support, less pain or stress in animals, and more human-animal interactions that promote the development of human-animal relationships.

TABLE 3 | *Post-hoc* comparisons of significant effects on professional quality of life in laboratory animal personnel.

	Burnout	Secondary traumatic stress	Compassion satisfaction
Gender			
Other (+) vs. Female	$p = 0.034$		
Other (+) vs. Male	$p = 0.021$		
Research type			
Education (+) vs. Applied	-	$p = 0.009$	-
Education (+) vs. Basic	-	$p = 0.013$	-
Education (+) vs. Regulatory	-	$p = 0.014$	-
Institution type			
University (+) vs. CRO	$p = 0.011$		

This table displays the post-hoc comparisons of significant independent categorical variables form ***Table 2****. The tests performed were pairwise comparisons that were Bonferroni adjusted for multiple comparisons. Data is taken from self-report data from laboratory animal personnel (N = 801) reporting on their professional quality of life including compassion fatigue (i.e., burnout and secondary traumatic stress) and compassion satisfaction. Blank cells indicates that the post-hoc test was not performed. "–" indicates that the result was not significant.*

Thus, far very few strategies for combatting compassion fatigue in animal care workers have been evaluated empirically and therefore recommendations specific to this field cannot be made (7). However, drawing upon literature from other professions where compassion fatigue is common, a few general recommendations can be made. Specifically, interventions that address psychoeducation, coping skills, and relaxation techniques (e.g., mindfulness-based approaches) may be beneficial for addressing compassion fatigue and workplace stress (7).

Social Support

In this study, the degree of social support that laboratory animal personnel felt varied and was strongly associated with both compassion fatigue and compassion satisfaction. Almost a third of personnel, less than half of the time, felt like they could really count on someone to help with work issues. In turn, lower social support was associated with higher compassion fatigue (i.e., both burnout and secondary traumatic stress) and lower compassion satisfaction. There is a great deal of scientific literature about the importance of social support for human mental and physical health (22, 23). In fact, social support has been found to be a protective factor against compassion fatigue in various animal care workers (3). Social support is the perception or reality that one is cared for, has access to supportive resources, and is part of a supportive social network. Therefore, in this study, it was expected that social support would be a protective factor against compassion fatigue and also bolster compassion satisfaction.

Unfortunately, some laboratory animal personnel may have difficulty gaining work-related social support because of the stigmatization of the field and working hours. For example, the general public may view work with laboratory animals as "dirty" and perceive laboratory animal personnel as physically, morally, and socially tainted (2, 6, 24). This societal stigmatization may lead to social isolation due to a perceived or actual inability to discuss their work with others without judgment or backlash. This work-related social isolation may be perpetuated by some organizations that discourage open sharing about research because of concerns about backlash or confidentiality. These circumstances may further cause personnel to feel unable to discuss work concerns with close friends. Finally, as research studies may have late night, early morning, and weekend requirements—and personnel may be required to work long hours—these working hours factors may also prevent establishing social connections (6).

These results may indicate that efforts to increase social support—such as encouraging greater openness in talking about research or establishing support groups—may act as a protective factor against compassion fatigue. Rather than encouraging secrecy, organizations could provide employees with guidance about effective ways to talk about their research in general and also emphasize finding a trusted individual to confide in about difficulties with work. In addition to relying on employees own social networks, organizations could also ensure that social support is provided within the workplace. For example, social support groups could be established, and social workers could be hired or contracted to reach out to at risk personnel. These social support groups could be focused specifically on talking about stress or grief related to working with laboratory animals or focused on teaching evidence-based cognitive-behavioral techniques, such as mindfulness (7). Unfortunately, a recent-review of such interventions for animal care professionals revealed only 4 studies which makes best-practice recommendations difficult, therefore the current recommendation is to draw from the human care profession (7).

Animal Stress

The degree of stress or pain experienced by most of the animals that personnel work with also varied, although most personnel indicated it was minor (53%) or moderate (26%). Higher levels of animal stress or pain was associated with higher compassion fatigue and lower compassion satisfaction. These findings are logical as secondary traumatic stress is typically caused by exposure to the trauma of others and in general, occupations exposed to more stress and pain are more at risk for compassion fatigue.

These results may indicate that extra education, support, and monitoring could be provided to laboratory animal personnel caring for research animals in projects that experience greater stress and pain. For example, these personnel could be provided with training materials on compassion fatigue and mental health care prior to such studies, encouraged (or required) to take regular assessments about their professional quality of life, and provided with additional social support or mental health resources. It is also likely important to ensure that personnel understand why the research is occurring and inform them that feeling negative emotions during these experiments are normal. In a qualitative interview study of 21 laboratory personnel, half of them mentioned they would like to receive more information about the research their animals are involved with and several felt this would help with grieving (25). Finally, it has been

suggested that it may be beneficial to recognize the "animal heroes" participating in research with some sort of memorial or recognition service (26).

Euthanasia

Surprisingly, personnel who euthanized animals more frequently (e.g., daily vs. monthly) did not consistently report higher levels of compassion fatigue; there was no association between these two factors. Previously, more frequent euthanasia was identified as a risk factor for veterinary, animal control, and related professionals (27). However, euthanasia in the laboratory may be characteristically different from euthanasia in an animal shelter or hospital. Typically, decisions about when to euthanize research animals is clearly standardized and determined before animals even arrive. For many projects, euthanasia is the expected, necessary outcome of the project and conducted after the animal has made a contribution to research. This is contrary to animal shelters or hospitals, where workers may feel as if they have "failed" the animal for not getting it adopted or healing it; additionally, the difficult choice of euthanasia must be uniquely made for each individual animal. This is especially apparent in a study showing higher employee turnover at shelters when euthanasia was performed for reasons not related to behavior or health (11). The predictability and perceived necessity of euthanasia may be a key factor in mitigating the negative emotional impact on personnel even when it occurs at high frequencies.

Although euthanasia frequency was not related to compassion fatigue severity, this study did find that personnel with less control over euthanasia, reported having higher compassion fatigue. Therefore, it may be important for laboratory animal personnel to be able to make the decision concerning whether they are the one to euthanize the animals they have cared for. For some personnel, it may either be particularly distressing to euthanize an animal they have formed a close relationship with or they may specifically want to say goodbye and give that animal a final comforting presence during their last moments. It is also possible that during a particularly tough week, they may need to simply take a break from this stressful procedure. Previous research in human healthcare workers has shown that understanding, predicting, and having control over difficult work situations has a significant direct relationship with perceived stress (28) and that seems to hold true for euthanasia in laboratory animal personnel.

Finally, in this study, personnel using physical euthanasia methods (vs. not using physical methods) also reported higher burnout. Physical methods of euthanasia include cervical dislocation, penetrating captive bolt, and blunt force trauma. Although these methods are approved under certain circumstances by the American Veterinary Medical Association (AVMA) and other laboratory animal regulatory agencies, there has been discussion on what are truly the best ways to give a "good death" to an animal (29). Many individuals anecdotally report that physical methods are more traumatic to administer than inhalant or injectable methods. For example, decapitation or captive bolt euthanasia often result in a lot of blood and gore. Furthermore, physical methods often result in muscles twitching involuntarily, even though the animal is immediately unconscious. Thus, these hands-on methods may cause personnel to feel more personal responsibility for the animal's death and can be more physically taxing to administer. Finally, even if these methods are approved by regulatory bodies and AVMA, if personnel do not believe they are humane this may influence levels of compassion fatigue. Of note, although not directly addressed in this survey, an commonly suggested strategy for combatting euthanasia stress in laboratory animal personnel that is efforts to memorialize or acknowledge the animals in research (26). Overall though, these results indicate the importance of considering the effects of different euthanasia methods on personnel.

Enrichment

Our enrichment-related findings seem to point to a close connection of animal and human welfare. In this study, we considered animal enrichment to be any attempt to improve animal welfare by enhancing the quality of a captive animal's care by providing stimuli necessary for psychological and physical well-being (20). Personnel who reported providing less diverse and frequent of enrichment also reported higher burnout. Initially, this may seem counter-intuitive since diverse and frequent enrichment provision takes greater time and effort on behalf of the personnel. In fact, a lack of time is frequently cited as a reason not to provide certain types of enrichment, particularly human-animal interaction related enrichment (30). However, the positive emotions that result from providing more enrichment may help counter feelings of burnout. Additionally, personnel who wished they could provide more enrichment to their animals also reported more burnout and secondary traumatic stress. Therefore, it appears that compassion fatigue severity is related to the feeling and reality that better enrichment for laboratory animals is needed. However, unlike for euthanasia, in this study control over enrichment provision was not associated with compassion fatigue. It seems that for enrichment, control is less important than good quality enrichment (i.e., measured in this study by higher frequency and variety). Of course, it is also possible that personnel that work at institutions who support greater enrichment diversity/frequency have less burnout because working conditions are better, rather than enrichment itself *per se* helping with burnout. However, several qualitative interview studies with laboratory animal personnel indicate that personnel do truly enjoy providing enrichment for their laboratory animals, even if it may require substantial amounts of time (25, 31). This is further evidenced by numerous posters by personnel at various national meetings that focus on refinements to improve animal welfare. Regardless, an important implication of this finding is that increasing enrichment diversity and frequency to laboratory animals may not only be used to increase the welfare of laboratory animals, but also to improve the professional quality of life of laboratory personnel.

Human-Animal Interactions

In this study, laboratory animal personnel reported that they often performed behaviors that indicate positive attitudes

and promote positive human-animal relationships. Almost all personnel agreed that they often observed and talked to their animals, but only 79% agreed that they often pet their animals and only 40% agreed that they often named their animals. Personnel indicating higher levels of these select human-animal interactions also reported both higher levels of both compassion satisfaction and secondary traumatic stress. This means that these personnel may gain additional satisfaction from their even closer relationships with their laboratory animals. However, when these closer relationships occur they may also experience greater distress such as emotional dissonance and moral contradictions when research procedures necessitate causing pain, stress, or death in these same animals (1, 6). Considering these contrary effects, it is difficult to make general recommendations for personnel on these specific human-animal interactions in terms of human welfare. In terms of animal welfare, petting may be beneficial for some animals, such as dogs (32), but negative for others such as naïve laboratory rats, in which case rat tickling is recommended instead (33). Despite this, positive human-animal interactions should be beneficial for animal welfare although more research is needed in this area (34, 35).

Demographic and Work Factors

Surprisingly, the type of animal that personnel worked with most was not associated with greater compassion fatigue. For example, personnel that primarily worked with non-human primates or companion animals did not report more severe compassion fatigue when compared to those who worked with mice, rats, farm, or other animals. Anecdotally, working with non-human primates or even companion animals were thought to come with a higher risk of compassion fatigue. Non-human primate research could be more difficult due to our close evolutionary relationships with non-human primates, a greater social stigma to non-human primate research, and that non-human primates may require more intense care. In fact, previous reviews suggests that there are significant emotional costs that are associated particularly with caring for non-human primates (36). Companion animal research could be more difficult because of the different relationship many people have with dogs and cats.

The lack of association between compassion fatigue and animal type found in this study could be due to several possible explanations. First of all, personnel working with non-human primates or companion animals may feel greater social support or reward from both their professional and personal networks because of their species-specific work. Additionally, they may be supported in their workplace to give their animals more enrichment and be given more support through euthanasia. It is also possible that laboratory personnel working with these species may have developed resilience to their stressful position. That is, personnel who were unable to cope with this stressful position may have already left the field or changed their primary animal type before this survey. Finally, it also evident that personnel can also bond extremely strongly to all types of laboratory animals including mice, rats, rabbits, and more and therefore it compassion fatigue may be more related to the strength of the bond rather than the type of the animal.

Our results showed that the only demographic factor—gender—was significantly associated with compassion fatigue. Higher burnout was reported by individuals who identified as an "other" gender (i.e., non-binary, transgender man, transgender female, prefer not to answer) compared to male or female. This result should be interpreted with caution since our sample size of these individuals was very low ($n = 10$). However, it would not be surprising for these individuals to enter the laboratory animal profession at a higher baseline of stress. After all, research shows that individuals that identify as transgender experience increased social stressors such as isolation, victimization, and discrimination (37). These social stressors may occur both during and outside of the work, therefore compounding any difficulties with the laboratory animal workplace and leading to higher levels of burnout. Regardless of the explanation of this result, considering that simply working in the laboratory animal can lead to some social stigma, these individuals may need additional support systems within the workplace.

In terms of work factors, three separate results were found. First of all, burnout was higher in individuals working more hours per week. As this is a known risk factor for burnout this is to be expected (27). Second, burnout was higher in individuals working at a university in comparison to a contract research organization. This was initially surprising as we thought that individuals working at a contract research organization may have greater compassion fatigue since they often have less control over their studies. However, perhaps this results was found as the university environment often has additional funding pressures and fewer animal care personnel overall which therefore may have less support.

Finally, personnel who worked in educational or training "research" had greater secondary traumatic stress than applied, basic, or regulatory personnel. This makes sense because individuals in these roles are responsible for training other laboratory personnel how to handle animals and perform possible stressful procedures. Secondary traumatic stress is typically caused by exposure to the trauma of others (9). Trainers are exposed to both animal and human stress during training sessions. Since new personnel are learning new skills they may cause more stress in the animals. Furthermore, these personnel may feel stress themselves as they find practical and emotional difficulty in performing their tasks. These students may physically sweat, tremble, wretch, or cry because of their difficulties (personal communication). For example, trainers are often present for new laboratory animal personnel's first exposure to euthanasia—which may be emotional. Trainers may try to empathize with their students to help them through their experience. Furthermore, trainers may even teach their students to recognize negative behaviors, manage grief, and deal with compassion fatigue (38). Although important, this may take a toll—and may be something trainers themselves are not adequately prepared for. Trainers' euthanasia experiences may also be particularly difficult as they may be highly bonded to their animals and the euthanasia may feel less of a necessity than in a typical research study.

Limitations

This study is not without its limitations. First, this study was cross-sectional, so it is not possible to determine causation in the identified associations. For example, perhaps developing compassion fatigue causes personnel to withdraw from social support systems, rather than a lack of social support being a contributing factor to developing compassion fatigue. Further studies would benefit from empirical intervention studies where individuals are randomly assigned to a control condition or treatment designed to manipulate suspected protective factors (e.g., increased social support) to determine the direction of causality. Regardless, this study provides important guidance into what such interventions might include and provides a basis for further research.

Second, this study may have missed information from personnel who currently or previously experienced compassion fatigue since participants were recruited via convenience sampling and inclusion criteria required participants to be currently working with laboratory animals and euthanized animals at least once. This excludes individuals who may have previously worked with laboratory animals but left their positions precisely because of their compassion fatigue. There has been some work suggesting that the highest degree of employee turnover in animal-care fields occurs within the first year after experiencing animal euthanasia (39). In fact, one individual respondent who screened out of the survey indicated this very circumstance. However, as those individuals would not be currently providing enrichment or euthanasia, their responses would not have been comparable to the rest of the survey population. Additionally, individuals with severe compassion fatigue may be less likely to have seen advertisements for this study through emails, list-serves, and online promotion as they may be withdrawing from any additional responsibilities related to the field. Regardless of these potential limitations, this study's findings are still valid for the professional quality of life of laboratory animal personnel that are currently in the field.

CONCLUSIONS

In conclusion, these results provide valuable insight into laboratory animal personnel's professional quality of life, including compassion fatigue. This information is critical for advancing our understanding of how the animal research environment interacts with human mental health—and provides guidance for possible interventions.

This research identified several possible risk factors. Personnel who reported higher compassion fatigue (i.e., burnout and secondary traumatic stress) also reported lower social support, higher stress or pain in their animals, a desire to provide more enrichment, and less control over providing euthanasia. Personnel who reported higher burnout also reported less frequent enrichment provision, more hours of work per week, working at a university, and using physical euthanasia methods while higher secondary traumatic stress was reported with more frequent relationship promoting human-animal interactions (e.g., naming) and working as a trainer. Personnel who reported higher compassion satisfaction also reported higher social support, less stress or pain in their animals, and more relationship promoting human-animal interactions. Surprisingly, compassion fatigue was not associated with the type of animal that personnel primarily worked with (e.g., non-human primates vs. mice) or frequency of euthanasia. These findings provide much-needed data about factors specific to laboratory animal research that may interact with professional quality of life.

Overall, this study contributes empirical data from a large sample ($N = 801$) to the discussion on compassion fatigue in laboratory animal personnel. This research has provided key guidance for designing future interventions and randomized trials. These efforts may benefit from focusing on improving personnel's social support, control over euthanasia, and animal enrichment to improve laboratory animal personnel's professional quality of life, including compassion fatigue.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Purdue University's Human Research Protection Program Institutional Review Board, protocol #1712020004. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. No interaction occurred between the research team and animals during the course of the study; therefore, we did not seek approval from Purdue University's Institutional Animal Care and Use Committee (IACUC).

AUTHOR CONTRIBUTIONS

ML, BG, SC, MO'H, and CB contributed to the conceptualization and methodology of the study. ML and MR contributed to data curation and wrote the first and second drafts of the manuscript, respectively. ML, BG, and MO'H performed the statistical analysis. All authors contributed to the manuscript revision, read, and approved the submitted version.

FUNDING

This work was made possible with support by the Animal Welfare Institute, https://awionline.org (ML, BG, SC, and MO'H). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funders. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

ACKNOWLEDGMENTS

We gratefully acknowledge the laboratory animal personnel who took the time to participate in and promote this study. We

thank Dr. Melissa Swan, Dr. Peggy O'Neil, and Amy Robinson-Junker for piloting and reviewing the survey before its release. We also thank the undergraduate research assistants who helped in piloting the survey and coding the data including Nicole Brockway. Finally, we thank Purdue University's laboratory animal trainer, Carol Dowell, for giving us insight into potential difficulties face by this role.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fvets.2020.00114/full#supplementary-material

Supplemental Table 1 | Survey questions, responses, and coded values.

Supplemental Table 2 | The scale, mean (M), standard deviation (SD), and % of participants in each response category for continuous variables.

REFERENCES

1. Herzog H. Ethical aspects of relationships between humans and research animals. *ILAR J*. (2002) 43:27–32. doi: 10.1093/ilar.43.1.27
2. Rohlf V, Bennett P. Perpetration-induced traumatic stress in persons who euthanize nonhuman animals in surgeries, animal shelters, and laboratories. *Animal*. (2005) 13:201–19. doi: 10.1163/1568530054927753
3. Scotney RL, McLaughlin D, Keates HL. A systematic review of the effects of euthanasia and occupational stress in personnel working with animals in animal shelters, veterinary clinics, and biomedical research facilities. *J Am Vet Med Assoc*. (2015) 247:1121–30. doi: 10.2460/javma.247.10.1121
4. Arluke A. "Managing Emotions in an Animal Shelter," in Manning A, Serpell J, editors. *Animals and Human Society: Changing Perspectives*. New York, NY: Routledge. (1994). pp. 145–65.
5. Reeve CL, Rogelberg SG, Spitzmüller C, Digiacomo N. The caring-killing paradox: euthanasia-related strain among animal-shelter workers1. *J Appl Soc*. (2005) 35:119–43. doi: 10.1111/j.1559-1816.2005.tb02096.x
6. Davies K, Lewis D. Can caring for laboratory animals be classified as emotional labor? *Anim Technol Welf*. (2010) 9:1–6.
7. Rohlf V. Interventions for occupational stress and compassion fatigue in animal care professionals—A systematic review. *Traumatology*. (2018) 24:186–92. doi: 10.1037/trm0000144
8. Fournier AK, Mustful B. "Chapter 27 - Compassion fatigue: presenting issuespractical applications for animal-caring professionals. In: Kogan, L. Blazina C, editors. *Clinician's Guide to Treating Companion Animal Issues*. Academic Press (2019). p. 511–534. doi: 10.1016/B978-0-12-812962-3.00027-7
9. Stamm BH. *The Concise ProQOL Manual*. 2nd ed. Pocatello, ID: ProQOL.org (2010).
10. Newsome JT, Clemmons EA, Fitzhugh DC, Gluckman TL, Creamer-Hente MA, Tambrallo LJ, et al. Compassion fatigue, euthanasia stress, and their management in laboratory animal research. *J Am Assoc Lab Anim Sci*. (2019) 58:289–92. doi: 10.30802/AALAS-JAALAS-18-000092
11. Rogelberg SG, Reeve CL, Spitzmüller C, DiGiacomo N, Clark OL, Teeter L, et al. Impact of euthanasia rates, euthanasia practices, and human resource practices on employee turnover in animal shelters. *J Am Vet Med A*. (2007) 230:713–9. doi: 10.2460/javma.230.5.713
12. Goodman LA. Comment: on respondent-driven sampling and snowball sampling in hard-to-reach populations and snowball sampling not in hard-to-reach populations. *Soc Methodol*. (2011) 41:347–53. doi: 10.1111/j.1467-9531.2011.01242.x
13. Dillman DA. *Mail and Internet Surveys: The Tailored Design Method – 2007 Update With New Internet, Visual, and Mixed-Mode Guide*. Hoboken, NJ: John Wiley & Sons (2011).
14. Sherbourne CD, Stewart AL. The MOS social support surey. *Soc Sci Med*. (1991) 32:705–14. doi: 10.1016/0277-9536(91)90150-B
15. Griffin G, Locke P. Comparison of the Canadian and US laws, regulations, policies, and systems of oversight for animals in research. *ILAR J*. (2016) 57:271–84. doi: 10.1093/ilar/ilw037
16. Balcombe JP. Laboratory environments and rodents' behavioral needs: a review. *Lab Anim*. (2006) 40:217–35. doi: 10.1258/002367706777611488
17. Baumans V, Van Loo PLP. How to improve housing conditions of laboratory animals: the possibilities of environmental refinement. *Vet J*. (2013) 195:24–32. doi: 10.1016/j.tvjl.2012.09.023
18. Hoy JM, Murray PJ, Tribe A. Thirty years later: enrichment practices for captive mammals. *Zoo Biol*. (2010) 29:303–16. doi: 10.1002/zoo.20254
19. Jaasma L. *A Review of the Housing Conditions for Laboratory Animals*. (2014) Available online at: http://dspace.library.uu.nl/handle/1874/295632 (accessed May 24, 2018).
20. Shepherdson DJ. Tracing the path of environmental enrichment in zoos. In: Shepherdson DJ, Mellen JD, Hutchins M, editors. *Second Nature: Environmental Enrichment For Captive Animals*. Washington, DC: Smithsonian Institution Press (1998). p. 1–12.
21. Hemsworth PH, Coleman GJ. *Human-Livestock Interactions: The Stockperson and the Productivity and Welfare of Intensively Farmed Animals*. 2nd ed. Wallingford, Oxfordshire, UK: Cambridge, Mass (2011). doi: 10.1079/9781845936730.0000
22. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. *PLoS Medicine*. (2010) 7:e1000316. doi: 10.1371/journal.pmed.1000316
23. Gariépy G, Honkaniemi H, Quesnel-Vallée A. Social support and protection from depression: systematic review of current findings in Western countries. *Br J Psychiatry Suppl*. (2016) 209:284–93. doi: 10.1192/bjp.bp.115.169094
24. Baran BE, Rogelberg SG, Lopina EC, Allen JA, Spitzmueller C, Bergman M. Shouldering a silent burden: the toll of dirty tasks. *Hum Relat*. (2012) 65:597–626. doi: 10.1177/0018726712438063
25. Chang FT, Hard LA. Human-animal bonds in the laboratory: how animal behavior affects the perspective of caregivers. *ILAR J*. (2002) 43:10–8. doi: 10.1093/ilar.43.1.10
26. Iliff SA. An additional "R": remembering the animals. *ILAR J*. (2002) 43:38–47. doi: 10.1093/ilar.43.1.38
27. Hill EM, LaLonde CM, Reese LA. Compassion fatigue in animal care workers. *Traumatology*. (2020) 26:96–108. doi: 10.1037/trm0000218
28. Tetrick LE, LaRocco JM. Understanding, prediction, and control as moderators of the relationships between perceived stress, satisfaction, and psychological well-being. *J. Appl Psychol*. (1987) 72:538. doi: 10.1037/0021-9010.72.4.538
29. Hawkins P, Prescott M, Carbone L, Dennison N, Johnson C, Makowska I, et al. A good death? *Animals* . (2016) 6:50. doi: 10.3390/ani6090050
30. LaFollette MR, Cloutier S, Brady C, Gaskill BN, O'Haire ME. Laboratory animal welfare and human attitudes: a cross-sectional survey on heterospecific play or "rat tickling." *PLoS ONE*. (2019) 14:e0220580. doi: 10.1371/journal.pone.0220580
31. Greenhough B, Roe E. Exploring the role of animal technologists in implementing the 3rs: an ethnographic investigation of the UK University Sector. *Sci Technol Hum Val*. (2018) 43:694–722. doi: 10.1177/0162243917718066
32. McGowan RTS, Bolte C, Barnett HR, Perez-Camargo G, Martin F. Can you spare 15 minutes? The measurable positive impact of a 15-min petting session on shelter dog well-being. *Appl Anim Behav Sci*. (2018) doi: 10.1016/j.applanim.2018.02.011
33. LaFollette MR, O'Haire ME, Cloutier S, Blankenberger WB, Gaskill BN. Rat tickling: a systematic review of applications, outcomes, and moderators. *PLoS ONE*. (2017) 12:e0175320. doi: 10.1371/journal.pone.0175320
34. Hosey G, Melfi V. Human-animal interactions, relationships and bonds: a review and analysis of the literature. *Int J Comp Psychol*. (2014) 27:117–42.
35. Waiblinger S, Boivin X, Pedersen V, Tosi M, Janczak A, Visser E, et al. Assessing the human-animal relationship in farmed

species: a critical review. *Appl Anim Behav Sci*. (2006) 101:185–242. doi: 10.1016/j.applanim.2006.02.001
36. Coleman K. Caring for nonhuman primates in biomedical research facilities: scientific, moral and emotional considerations. *Am J Primatol*. (2011) 73:220–5. doi: 10.1002/ajp.20855
37. Bockting WO, Miner MH, Swinburne Romine RE, Hamilton A, Coleman E. Stigma, mental health, and resilience in an online sample of the US transgender population. *Am J Public Heal*. (2013) 103:943–51. doi: 10.2105/AJPH.2013.301241
38. Overhulse KA. Coping with lab animal morbidity and mortality: a trainer's role. *Lab Anim*. (2002) 31:39–42. doi: 10.1038/5000166
39. Reeve CL, Spitzmuller C, Rogelberg SG, Walker A, Schultz L, Clark O. Employee reactions and adjustment to euthanasia-related work: identifying turning-point events through retrospective narratives. *J Appl Anim Welf Sci*. (2004) 7:1–25. doi: 10.1207/s15327604jaws0701_1

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Veterinary Science

ORIGINAL RESEARCH
published: 12 June 2020
doi: 10.3389/fvets.2020.00328

Veterinary Technicians and Occupational Burnout

Lori R. Kogan[1], Jean E. Wallace[2], Regina Schoenfeld-Tacher[3], Peter W. Hellyer[1] and Madeline Richards[4]*

[1] Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO, United States, [2] Department of Sociology, Faculty of Arts, University of Calgary, Calgary, AB, Canada, [3] Department of Molecular Biomedical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, United States, [4] Department of Biomedical Sciences, Colorado State University, Fort Collins, CO, United States

Burnout and compassion fatigue are common conditions affecting health care providers. Unique occupational conditions in veterinary medicine make technicians especially susceptible to burnout. A total of 1,642 practicing veterinary technicians completed an anonymous online survey comprised of demographic questions, and two tools to assess burnout: the Maslach Burnout Inventory-General Survey (MBI-GS) and the Stanford Professional Fulfillment Index (PFI). Over half of participants (862/1479, 58.3%) had EE scores over the 3.0 threshold for burnout. On the PFI, the total score for the 10 burnout questions was $x = 1.54$ ($SD = 0.75$), which is above the 1.33 cutoff for burnout. The mean score of 2.26 ($SD = 0.81$) on the professional fulfillment scale is also indicative of burnout. The relationship between enabling resources and scores on each MBI-GS scale was analyzed. Schedule control was the most significant predictor of lower EE scores. The perception of adding value to the practice was associated with lower scores on the CY scale and higher scores on the PE scale. Given the correlation between burnout and environmental factors, veterinary practices are encouraged to explore non-monetary mechanisms for enhancing job satisfaction. This includes giving technicians greater control over their schedules, recognizing their contributions to the team, and providing opportunities for professional development. From a morale standpoint, destigmatizing the dirty work done by technicians can also help combat burnout among veterinary technicians.

Keywords: burnout, veterinary technicians, occupational stress, Maslach Burnout Inventory, Stanford Professional Fulfillment Index

OPEN ACCESS

Edited by:
Sally Thompson Iritani, University of Washington, United States

Reviewed by:
Samuel Karpen, University of Georgia, United States
Elpida Artemiou, Ross University School of Veterinary Medicine, Saint Kitts and Nevis

****Correspondence:***
Lori R. Kogan
lori.kogan@colostate.edu

Specialty section:
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

Received: *09 April 2020*
Accepted: *12 May 2020*
Published: *12 June 2020*

Citation:
Kogan LR, Wallace JE, Schoenfeld-Tacher R, Hellyer PW and Richards M (2020) Veterinary Technicians and Occupational Burnout. Front. Vet. Sci. 7:328. doi: 10.3389/fvets.2020.00328

INTRODUCTION

Research pertaining to health care providers' burnout and compassion fatigue is plentiful within human medical fields. Although exact figures of the percentage of medical professionals suffering from burnout vary, most estimates exceed 50%, presenting a public health concern that impacts not only the professional, but patients, coworkers, family members and health care organizations (1–6). Although fewer studies have been conducted pertaining to veterinary professionals, they have reached similar conclusions; namely that burnout and compassion fatigue are common among this population and can lead to serious negative physical, and psychological impact (7).

Compassion fatigue can be defined as exhaustion due to the demands of being empathic and helpful to those who are suffering (8). It is often the result of witnessing trauma or being involved

in another's painful experience and can lead to burnout—a psychological syndrome comprised of emotional exhaustion, depersonalization and a sense of reduced personal accomplishment (9, 10). Emotional exhaustion relates to the depletion of one's emotional resources; depersonalization refers to cynical, callous or detached attitudes toward the job, clients or patients; and lack of personal accomplishment can be defined as a negative self-appraisal of incompetence and ineffectuality (10, 11). Burnout is typically the result of both external and internal stressors (12) and often measured across three dimensions: exhaustion, cynicism, and a sense of inefficacy (13). The Maslach Burnout Inventory used in this study is the most commonly used instrument to assess burnout and consists of these three subscales (14).

Work factors found to contribute to physician burnout include excessive workloads, long working hours, frequent on-call duties, and excessive time spent on documentation/paperwork (5, 6). In addition, a loss of autonomy and decreased control over the work environment have been found to be common factors leading to burnout (15). Factors found to contribute to burnout in veterinarians include excessive workload and work hours, on-call duties, limited resources, workplace conflicts, and the unique challenges that come with euthanasia (7, 16–20). Additional stressors for veterinary professionals include unrealistic expectations from pet owners, situations where they need to balance the affordability of treatment with the provision of high quality care, and low income paired with high debt load (12, 21–24).

More recently, studies have explored the role of enabling resources that may enhance worker engagement, meaningful work and well-being while reducing feelings of burnout and compassion fatigue (25–27). Work factors that appear to mitigate burnout, for physicians and veterinarians alike, include schedule control, opportunities for professional development and the use of skills and knowledge, the ability to develop and use their skills, respect from colleagues, and a feeling of satisfaction with one's position/job (4, 16, 18). Cake et al. (25) proposed that animal care workers' opportunities for self-actualization may result from applying their specialized skills and knowledge to meeting the challenges of their work and that self-actualizing work may enhance their engagement, feelings of accomplishment and personal growth as well contribute to a sense of being involved in meaningful work. Work environments that promote these positive responses may foster resilience and well-being for those encountering highly stressful work situations (10, 26). Personal characteristics associated with physician burnout include being self-critical, engaging in unhelpful coping strategies, sleep deprivation, over commitment, perfectionism, poor work–life balance, and an inadequate support system outside the work environment (15, 28). Similar results have been found among veterinarians (16) with younger, female, and single veterinarians most at risk for psychological distress (23). Dawson (29) has suggested that personality characteristics might even play a larger role than occupational factors in predicting workplace stress among veterinary professionals.

We examine four clusters of enabling resources, plus financial compensation, that may offer veterinary technicians a sense of purpose, meaning and personal growth in their work and explore how these factors relate to each of the three dimensions of burnout. Because these factors may impact burnout differently, they were each assessed separately. Schedule control refers to the flexibility and autonomy technicians have in regards to their work schedules. Schedule control includes flexibility of one's schedule, as well as control over days/hours, time at work, and length of shifts.

Having a sense of autonomy (decision latitude) is a widely recognized resource that is positively related to well-being (16, 30). Using skills and knowledge contributes to a sense of accomplishment, personal growth and engagement. Technicians who have the opportunity to solve complex problems and contribute significantly to animal care will feel their work is more meaningful and fulfilling (27). Opportunities for learning and success are key to enhancing a sense of accomplishment and personal growth that result in meaningful engaging work (25, 26). Respect from colleagues can foster a sense of community, trust and belonging in the workplace.

Veterinary professionals' high rates of stress, burnout, and emotional exhaustion (31) are especially alarming given the fact that male veterinarians' suicide rates are 2.1 times as high and female veterinarians are 3.5 times as high as the general U.S. population (32). They are also more likely to die from suicide than other health care professionals (33). Perhaps even more staggering are the rates of suicidal ideation (seriously thinking of taking one's own life) among veterinarians. Studies from the United Kingdom (U.K.), United States (U.S), Australia and Canada report that ∼20% of all veterinarians have had suicidal thoughts in the past year, compared to ∼3% in the general adult population (24). Most veterinary professionals' mental health studies, however, have focused on veterinarians, with very little research on mental health, burnout and compassion fatigue among veterinary technicians who work alongside veterinarians in the same work settings where they face the same potential stressors (20, 34–36).

Veterinary technicians are a critical (and growing) component of successful veterinary practices. The field of veterinary technicians is still relatively young, with the first class graduating from an animal technician program in 1963 and the first American Veterinary Medical Association (AVMA) accredited program created in 1973 (37). Growing quickly, U.S. veterinary technicians now number over 109,000 and the U.S. Bureau estimates an anticipated 19% job growth from 2018 to 2028—much faster than average. The median pay for a veterinary technician in the U.S. in 2018 was $34,420/year or $16.55/h (38). It should also be noted that this job is historically and currently predominantly held by women; recent statistics show 95% of veterinary technicians are women (39). Given women's higher propensity to suffer from burnout, compassion fatigue and suicide compared to men (16, 26), members of this female-dominated occupation may be particularly at risk.

Typical veterinary technician duties include: collecting and recording medical histories, providing nursing care and emergency first aid to recovering or injured animals, administering anesthesia, preparing both the patient and equipment for surgery as well as monitoring the animal during

surgery, administering medications, vaccines, and treatments as prescribed by the veterinarian, performing diagnostics like radiographs and laboratory tests, and restraining animals during exams and other procedures (38). Arguably one of the most important yet often challenging part of technicians' responsibilities involves client communication. The technician is often the liaison between the client and the veterinarian. To maximize veterinarians' time, technicians often collect client and patient information and answer clients' questions. A survey by The National Association of Veterinary Technicians (39) found that 79% of technicians report that as part of their job, they instruct owners on how to administer medications, 71% instruct owners on how to properly care for pets, and 56% discuss with owners how to manage their pet's pain. The tasks and communication performed by veterinary technicians is vital for the successful operation of veterinary practices. To this point, 68% of clinics schedule technician-only appointments that do not require veterinarian assistance (39).

Perhaps it is not surprising, given the technicians' job duties, that preliminary studies indicate that veterinary technicians are also at high risk for occupational stress and burnout (30, 40). One study found factors predictive of increased burnout for technicians include work load, job demands, exposure to euthanasia and contact with clients (34). Job control and social support were found to be negatively associated with their burnout levels (34). Animal technicians also have higher than average rates of turnover (39) compared to other occupations, which is another indicator of high levels of job stress and burnout. Based on the results of the NAVTA 2016 survey (39), it was concluded that turnover may result when technicians do not feel they are part of the team or that they are not working toward a common purpose (41).

As veterinary technicians continue to grow in numbers and assume more responsibilities, it is critical to better understand factors that predict burnout as well as potential mitigating circumstances. The current study was designed to identify factors that may improve veterinary technicians' work experience by mitigating burnout. As noted above, very little research has examined the extent to which veterinary technicians' work is intellectually fulfilling and rewarding or how they apply and acquire a variety of skills that they can use in complex problem solving (30).

The positive work characteristics examined in this study reflect enabling resources that may facilitate well-being and resilience among veterinary technicians (16, 24, 25). We examine four clusters of enabling resources, plus financial compensation, that may offer veterinary technicians a sense of purpose, meaning and personal growth in their work and explore how these factors relate to each of the three dimensions of burnout. Schedule control refers to the flexibility and autonomy technicians have in regards to their work schedules. Having a sense of autonomy (decision latitude) is a widely recognized resource that is positively related to well-being (16, 30). Using skills and knowledge contributes to a sense of accomplishment, personal growth and engagement. Technicians who have the opportunity to solve complex problems and contribute significantly to animal care will feel their work is more meaningful and fulfilling (27). Opportunities for learning and success are key to enhancing a sense of accomplishment and personal growth that result in meaningful engaging work (25, 26). Respect from colleagues can foster a sense of community, trust and belonging in the workplace. Those who feel connected to others may feel more supported and more likely to seek and offer assistance to one another (25).

MATERIALS AND METHODS

An online, anonymous, cross-sectional survey was developed using Qualtrics (Qualtrics, Inc.; Provo, UT, USA). The survey was designed, reviewed, and tested by the co-investigators and their colleagues. A portion of the survey consisted of the Maslach Burnout Inventory-General Survey (MBI-GS). The MBI-GS consists of 16 items divided into three scales with reported reliabilities ranging as follows: emotional exhaustion (EE) (five items; $\alpha = 0.84–0.90$), cynicism (CY) (four items; $\alpha = 0.74–0.84$) and professional efficacy (PE) (seven items; $\alpha = 0.70–0.78$) (42). The questions are scored using a seven level frequency scale from "never" to "daily." The MBI-GS was not designed to combine the scales for a single burnout scale but to assess each of the three scales separately. Examples of questions include, "I feel emotionally drained from my work" (EE); "I have become less interested in my work since I started this job" (CY); and "I can effectively solve the problems that arise in my work" (PE, reverse coded). It has been suggested that scoring can be done by using each third of the potential range of scores to indicate "low," "average," and "high" scores on burnout (43).

Many studies dichotomize results into burnout/no burnout but there is no accepted standard definition or criterion (44). Determining burnout has been done in several ways with the most common methods including a combination of high EE, high CY and low PE; high EE and/or high CY, and high levels in EE subscale only. According to the Maslach Burnout Inventory manual (43) individuals with scores of $\geq$3.2 on the EE subscale, $\geq$2.6 on the CY subscale, or $\leq$3.8 on the PE subscale can be classified as having high burnout levels for that particular scale. Other studies (45, 46) have defined severe burnout as a mean $>$ 3.0 for EE.

Additionally, the survey included the Stanford Professional Fulfillment Index (PFI) (47). This tool was recently developed, so does not have the decades of supportive research that accompanies the MBI, yet we felt it has the potential to accurately assess our population's burnout and fulfillment levels. We included the PFI to assess its validity for veterinary technicians. We correlated scores on the PFI subscales (Professional Fulfillment, Work Exhaustion, and Interpersonal Disengagement) with the scores of similar subscales on the MBI (Professional Efficacy, Emotional Exhaustion, and Cynicism, respectively). The PFI is a 16-item survey with three scales: two scales measure burnout in terms of work exhaustion (four questions) and interpersonal disengagement (six questions); and one scale that measures professional fulfillment (six questions). Response options are on a five-point Likert scale ("not at all true" to "completely true") for professional fulfillment items and

"not at all" to "extremely" for work exhaustion and interpersonal disengagement items.

Items are scored 0–4 with each dimension treated as a continuous variable. Scale scores are calculated by averaging the item scores of all the items within the corresponding scale. Higher scores on the professional fulfillment scale are viewed more favorably while higher scores on the work exhaustion or interpersonal disengagement scales are less favorable. Dichotomous burnout categories are determined from the average item score of all 10 burnout items (work exhaustion and interpersonal disengagement), using a cut-point of 1.33. Dichotomous professional fulfillment is recommended at an average item score cut-point of >3.0 (47).

Reported test-retest reliability estimates are 0.82 for professional fulfillment ($\alpha = 0.91$), 0.80 for work exhaustion ($\alpha = 0.86$), 0.71 for interpersonal disengagement ($\alpha = 0.92$), and 0.80 for overall burnout ($\alpha = 0.92$) (47). Trockel (47) reported a correlation between the PFI work exhaustion subscale score and MBI emotional exhaustion subscale score of 0.72; a correlation between PFI interpersonal disengagement score and MBI cynicism subscale score of 0.59; and a correlation between the PFI Professional Fulfillment score and MBI Professional Efficacy subscale score of 0.46.

To assess the validity of using the Stanford Professional Fulfillment Index (PFI) for veterinary technicians, scores on the PFI scales Professional Fulfillment, Work Exhaustion, and Interpersonal Disengagement were correlated with the scores of similar scales on the MBI.

Other elements of the survey included demographic questions: sex, age, and country of residence. Participants were also asked questions related to their work setting, whether they were in a supervisor/management role, years working within veterinary medicine, and years working as a veterinary technician. The work-related questions included a screening question asking if they were or were not a credentialed veterinary technician. Only those who reported they were currently a credentialed veterinary technician were included in further analysis.

Participants were asked to report their current satisfaction on a 5-point Likert scale with several enabling resources available to them in their employment setting. Five sets of enabling resources were measured that include: financial compensation, schedule control, using skills and knowledge, respect from colleagues, and learning and success. Anchor choices included 1–very unsatisfied and 5–very satisfied. They were also asked to indicate how important each of these enabling resources are to them, using a 5-point Likert scale with anchor choices including 1–very unimportant and 5–very important. **Table 3** provides a description of each of the items.

Lastly, to assess one possible intervention for veterinary technicians' burnout, additional education and credentialing questions were asked. These items are included for descriptive purposes and their responses are not included in the current analysis.

The survey was pilot tested by ten individuals for ambiguity and/or potentially missing or inappropriate response options, with revisions made based on the results of the pilot testing. The final survey and study design were approved by the Colorado State University Institutional Review Board (IRB # 086-19H). Survey respondents were recruited through social media platforms (Facebook and Twitter) between November 2018 and February 2019.

Data were analyzed using SPSS (IBM SPSS; version 25). First, descriptive statistics were used to characterize participants (see **Tables 1**, **2**). After testing that the assumptions of linear regression had been met, linear regression was used to explore the function of enabling resources in relation to the three MBI components (**Table 3**). Lastly, Pearson's correlation was used to compare scores between the subscales of the MBI to those of the PFI.

RESULTS

A total of 1,642 responses were obtained from credentialed veterinary technicians, of which 1,443 (87.9%) reported living in the United States, 170 (10.4%) in Canada, and 29 (1.8%) in other countries. This sample was primarily female (1495, 96.5%).

When asked how long they had been working in the veterinary field, almost half (775, 47.2%) of the responders reported having worked in the field for more than 10 years, and the other half (867, 52.8%) have been a credentialed veterinary technician for 10 years or less. Pertaining to their current work setting, the largest number reported currently working in a companion/small animal practice (668; 43.0%), specialty hospital (270, 17.4%) or emergency hospital (244, 15.7%) and have worked in their current setting for <3 years (663; 42.7%). The majority reported working between 31 and 40 h a week (711, 45.8%) or 41–50 h a week (624, 40.2%) and not having a supervisory or management position (1038, 66.9%). When asked about salary, about half of respondents reported earning between $16 and 20/h (690, 44.6%). Demographic data on survey respondents are summarized in **Table 1**.

MBI Scale Scores

The mean summation scores for each of the MBI scales were calculated. Results were EE scale: $X = 17.35$ ($SD = 7.2$); CY scale: $X = 12.69$ ($SD = 7.9$); and PE scale: $x = 28.97$ ($SD = 5.68$). The mean average scores were EE scale: $x = 3.47$ ($SD = 1.44$); CY scale: $X = 2.55$ ($SD = 1.58$); and PE scale: $x = 4.82$ ($SD = 0.95$). Cronbach's alpha for the EE scale for this sample was 0.91, 0.86 for the CY scale and 0.76 for the PE scale. Using the cut off scores of ≥3.2 on the EE scale, ≥2.6 on the CY scale, or ≤3.8 on the PE scale (43), these results place the participants at high levels of burnout. Looking at the mean EE scale cutoff score of 3.0, 862/1,479 (58.3%) participants scored above the burnout threshold.

PFI Scores

The mean total scores for each of the PFI scales were calculated: Work Exhaustion scale: $X = 1.93$ ($SD = 0.90$); Interpersonal Disengagement scale: $X = 1.28$ ($SD = 0.77$); and Professional Fulfillment scale: $X = 2.26$ ($SD = 0.81$). The total score for the 10 burnout questions (Work Exhaustion and Interpersonal Disengagement) was $X = 1.54$ ($SD = 0.75$).

TABLE 1 | Demographic data from all participants.

Demographics						
Country (n = 1,642)	Canada	United States	Other			
	170 (10.4)	1,443 (87.9%)	29 (1.8%)			
Years in the field (n = 1,642)	<3 years	3–5 years	6–10 years	11–15 years	16–20 years	More than 20 years
	131 (8.0%)	318 (19.4%)	418 (25.5%)	314 (19.1%)	200 (12.2%)	261 (15.9%)
Years have been a Credentialed Veterinary Technician (n = 1,551)	<3 years	3–5 years	6–10 years	11–15 years	16–20 years	More than 20 years
	346 (22.3%)	329 (21.2%)	382 (24.6%)	242 (15.6%)	139 (9.0%)	113 (7.3%)
Gender (n = 1,549)	Male	Female	Other/NA			
	46 (3.0%)	1,495 (96.5%)	8 (0.5%)			
Do you have a supervisory or management position? (n = 1,552)	No	Yes				
	1,038 (66.9%)	514 (33.2%)				
Years at current place of employment (n = 1,552)	<3 years	3–5 years	6–10 years	11–15 years	16–20 years	More than 20 years
	663 (42.7%)	411 (26.5%)	244 (15.7%)	117 (7.5%)	65 (4.2%)	52 (3.4%)

TABLE 2 | The hours worked per week and the current pay of the participants.

Work Figures											
How many hours/week? (n = 1,552)	<10	10–20	21–30	31–40	41–50	51–60	More than 60				
	16 (1.0%)	23 (1.5%)	79 (5.1%)	711 (45.8%)	624 (40.2%)	80 (5.2%)	19 (1.2%)				
Current pay (n= 1,548)	Federal min wage/h	$10/h	$10–15/h	$16–20/h	$21–25/h	$26–30/h	$31–35/h	$36–40/h	$41–45/h	$46–50/h	More than $50
	3 (0.2%)	8 (0.5%)	222 (14.3%)	690 (44.6%)	364 (23.5%)	156 (10.1%)	57 (3.7%)	23 (1.5%)	10 (0.6%)	7 (0.5%)	8 (0.5%)

Cronbach's alpha for the Professional Fulfillment scale for this sample was 0.86, 0.86 for the Work Exhaustion scale, 0.87 for the Interpersonal Disengagement scale, and 0.90 for the total Burnout score (combined scales of Work Exhaustion and Interpersonal Disengagement).

Using the suggested dichotomous burnout categories of all 10 burnout items (work exhaustion and interpersonal disengagement) of 1.33, the results of 1.54 suggest that this population exceeds the cutoff for being determined as burnout. Additionally, the mean score of 2.26 of this sample falls under the cutoff point of >3.0 for the Professional Fulfillment scale.

Correlations Between the MBI and PFI Scales

Pearson's correlations were conducted on the corresponding scales of the MBI and the PFI. These resulted in the following: MBI Work Exhaustion and PFI EE: $r = 0.80$ ($p < 0.001$; 95% CI: 0.78, 0.81); MBI CY and PFI Interpersonal Disengagement: $r = 0.61$ ($p < 0.001$; 95% CI: 0.59, 0.64); and MBI PE and PFI Professional Fulfillment: $r = 0.60$ ($p < 0.001$; 95% CI: 0.58, 0.63).

Enabling Resources and Burnout

Linear regression was used to assess the relationships between the enabling resources and the three components of the MBI (**Table 3**).

Emotional Exhaustion

The overall regression model for the MBI EE scale was significant, $F_{(14,1374)} = 53.67$, $p < 0.001$, $R^2 = 0.35$. Eight factors were unique significant predictors of participants' EE scale scores. The most important enabling resources reflect schedule control (over time at work and length of shifts) and learning and success (related to career mobility and self/professional development) and skills and knowledge (feeling of adding value to the practice). Respect from other veterinary technicians is associated with greater, rather than reduced, emotional exhaustion.

Cynicism

The overall regression model for the MBI CY scale was significant, $F_{(14,1374)} = 67.75$, $p < 0.001$, $R^2 = 0.41$. Five factors were unique significant predictors of participants' CY scale scores. Using skills and knowledge in terms of adding value to veterinary practice is by far the strongest predictor of cynicism. Learning and success also appears relevant in terms of career mobility and self-improvement or professional development that are negatively related to cynicism as well as respect from veterinarians.

Personal Efficacy

The overall regression model for the MBI PE scale was significant, $F_{(14,1374)} = 39.83$, $p < 0.001$, $R^2 = 0.29$. Six factors were unique significant predictors of participants' professional efficacy scale scores. Similar to the findings for cynicism, using skills and knowledge by significantly contributing to

TABLE 3 | Enabling resources as they relate to each component of the Maslach Burnout Inventory.

Enabling resources	Exhaustion *Beta*, *p*-value, 95% CI	Cynicism *Beta*, *p*-value, 95% CI	Professional efficacy *Beta*, *p*-value, 95% CI
Financial Rewards			
Current pay/salary	−0.03, 0.24 (−0.10, 0.03)	−0.03, 0.21 (−0.11, 0.03)	**−0.05, 0.05 (−0.09, 0.00)**
Schedule Control			
Flexibility of schedule	−0.01, 0.88 (−0.9, 0.8)	0.01, 0.78 (−0.08, 0.10)	**−0.07, 0.05 (−0.11, 0.00)**
Control over schedule (days/hours)	0.04, 0.30 (−0.5, 0.14)	−0.01, 0.80 (−0.11, 0.08)	**0.08, 0.04 (0.00, 0.12)**
Control over time at work	**−0.20, <0.001 (−0.34, −0.17)**	−0.01, 0.67 (−0.11, 0.07)	−0.03, 0.38 (−0.09, 0.03)
Control over length of shifts	**−0.20, <0.001 (−0.35, −0.20)**	**−0.10, 0.00 (−0.22, −0.06)**	0.03, 0.39 (−0.03, 0.07)
Using Skills and Knowledge			
Feeling of adding value to the practice/place of employment	**−0.12, <0.001 (−0.25, −0.10)**	**−0.30, 0.00 (−0.52, −0.34)**	**0.40, < 0.001 (0.30, 0.42)**
Proper utilization of professional skills	0.05, 0.08 (−0.01, 0.12)	−0.02, 0.44 (−0.10, 0.04)	0.05, 0.12 (−0.01, 0.08)
Feeling that the veterinarians you work with are aware of your skills	0.04, 0.30 (−0.04, 0.13)	0.06, 0.10 (−0.01, 0.16)	**0.08, 0.02 (0.01, 0.12)**
Learning and Success			
Opportunity for career mobility	**−0.15, 0.00 (−0.30, −0.12)**	**−0.15, 0.00 (−0.31, −0.13)**	0.01, 0.88 (−0.06, 0.06)
Opportunity for self-improvement and/or professional development	**−0.10, 0.00 (−0.21, −0.04)**	**−0.14, 0.00 (−0.30, −0.11)**	0.03, 0.34 (−0.03, 0.09)
Opportunity to affect change when something that could be improved/changed	−0.06, 0.07 (−0.14, 0.01)	−0.04, 0.14 (−0.13, 0.02)	**0.09, <0.001 (0.02, 0.12)**
Respect From Colleagues			
Respect from veterinarians at work	**−0.07, 0.03 (−0.17, −0.01)**	**−0.11, 0.00 (−0.22, −0.06)**	−0.00, 0.92 (−0.06, 0.05)
Respect from credentialed veterinary technicians	**0.08, 0.01 (0.03, 0.20)**	0.03, 0.40 (−0.05, 0.12)	−0.00, 0.91 (−0.06, 0.05)
Respect from other support staff	**−0.10, <0.001 (−0.20, −0.05)**	−0.04, 0.14 (−0.14, 0.02)	−0.02, 0.51 (−0.07, 0.03)

Bolded items are significantly related to that component.

veterinary practice is by far the strongest predictor of professional efficacy. Surprisingly, current pay and schedule flexibility reduce technicians' sense of efficacy rather than enhance it.

DISCUSSION

This study set out to explore burnout amongst veterinary technicians and the extent to which certain enabling resources might mitigate feelings of burnout. Participants in our survey reported high levels of burnout across all three dimensions of the MBI: high emotional exhaustion, high cynicism, and low professional efficacy. These results are corroborated by their high PFI scores on work exhaustion and interpersonal engagement and low scores on professional fulfillment. These findings signal that burnout is indeed a concern for this group of animal health care providers.

While many of the respondents have been working in the veterinary field for more than 10 years, it is interesting to note that the majority have acquired their credentials as a veterinary technician in the last 10 years. This suggests that many veterinary technicians start out in non-credentialed veterinary care positions before they train to become a licensed veterinary technician. Despite their extensive experience in the veterinary field, many technicians have only a few years of experience at their current place of employment. This pattern of results is consistent with other studies that found veterinary technicians have higher than average rates of turnover (39), which is another indicator of high rates of job stress and burnout.

This study also explored whether work-related enabling resources might mitigate against burnout. Overall, our findings suggest that these resources can be beneficial in reducing the different components of burnout. Several noteworthy findings are discussed in greater detail below.

First, greater control over work time and length of shifts are key in reducing emotional exhaustion. Having control over one's schedule may be particularly important for members of this occupation for two reasons. One is that veterinary technicians are an occupational group that generally has little autonomy and discretion over other aspects of their work as their primary function is to assist and follow instructions from veterinarians in performing patient care and technical tasks (31). Job control has a long history in the stress and burnout literature where it is argued that discretion over one's work can make achieving work goals more predictable and reduce anxiety associated with feeling overwhelmed and uncertain about work demands (48). It appears that having a sense of control over time spent at work is important in reducing emotional exhaustion for veterinary technicians. Furthermore, for this predominantly female occupation, control over the amount of time and length of shifts may be critical in minimizing work interference on their family life. Time pressures and overload at work may contribute to conflicts at home, work-family conflict and overall emotional exhaustion (16, 49, 50). Mastenbroek et al. (50) found that work-home interference was the main predictor of emotional exhaustion for both female and male veterinarians and identified work-family interferences as an obvious target for employer

intervention. Exercising control over one's work schedule can be one strategy that may help veterinary technicians cope more effectively with heavy workloads and successfully combining work with family life.

Second, using one's skills and knowledge, particularly in terms of making a valuable contribution to practicing veterinary medicine, is key in mitigating all three components of burnout, especially in terms of reducing cynicism and enhancing a sense of professional efficacy. Using one's specialized skills and knowledge in contributing to the care of animals is important in making work meaningful (25, 27). Recognition for individuals' efforts and contributions to the shared goal of providing the best animal care is one strategy that veterinary practices may employee to support technicians sense of value to the animal health care team.

Much of the animal nursing carried out by veterinary technicians may be classified as physically dirty work (51, 52). Veterinary technicians' care work often involves contact with various forms of bodily fluids and wastes, exposure to disease and death, and the disposal of dead animals (52). The perceptions surrounding this type of work is often transferred to those who perform it and dirty workers are usually aware of the stigma and disregard associated with their job (51). If dirty workers are able to reframe the work they do as meaningful and important, it may reduce the harmful stigmatizing effects it has on their identity and well-being. In the case of veterinary technicians, our results suggest that if they feel that using their skills, which likely involves performing dirty tasks, translates into better care for the animals being treated in their care, they are significantly less emotionally exhausted, less cynical and feel more professional efficacy in their work. Wallace (27) found that veterinarians who felt their work was fulfilling and meaningful had increased feelings of well-being. Future research might explore how workers successfully manage stigma associated with dirty work so that they reframe their work as meaningful, important and less stressful.

Third, opportunities for learning and success, particularly in terms of self-improvement, professional development and career mobility are important in mitigating emotional exhaustion and cynicism and enhancing professional efficacy. These resources are key to self actualization and achieving occupational goals (25) as well as promoting work engagement (50). Providing opportunities for professional development and career success appears to be an important route to enhancing veterinary technicians' well-being. One way employers can support these opportunities is to grant time off for technicians to take continuing education courses and reimburse them for continuing education fees. In addition, employers might discuss and plan professional development and career goals with technicians to acknowledge their value to the animal health care team and promote commitment from both parties to a long-term employment relationship.

Fourth, respect from colleagues reduces emotional exhaustion and cynicism. In veterinary practice, veterinary technicians can be considered as lower-status workers who generally work in a supportive role to the higher-status occupation of veterinary professionals (31). Managers, supervisors and colleagues can provide positive feedback, support and respect one another in dealing with difficult client and animal situations and in doing so, can alleviate feelings of strain and burnout (50). Respect can foster a sense of teamwork and belonging to the workplace and may offer an important coping resource during times of stress. Since many veterinarians and veterinary technicians work in small work settings, they may not have regular interactions with other veterinary workers (53). The small size of many veterinary practices may necessitate that animal care workers seek out supportive ties and networks outside their own employment setting. Fortunately, many professional associations, such as NAVTA, are increasingly aware of the health care issues and needs of their members and offer well-being resources in various forms (e.g., online resources, peer assistances, help-lines).

In closing, it is important to highlight the potential efficacy of some no-cost interventions for combating burnout among veterinary technicians. While monetary limitations may preclude employers from sponsoring registration fees and offering paid time off for continuing education courses, recognizing employees' contributions toward providing excellent animal care incurs no cost. This recognition can go a long way toward reducing the cynicism elements of burnout and enhancing technicians' sense of professional efficacy. Likewise, creating a culture that destigmatizes the dirty work associated with veterinary technician positions can also be accomplished with little to no financial investment. The actual cost to the practice of allowing technicians' greater control over their own schedules depends on how the system is implemented. Possible solutions include allowing the existing technician staff to select their preferred shifts, or it could require hiring extra staff to cover the clinic during off-hours. Even though salary increases would undoubtedly be appreciated, the only correlation between financial rewards and burnout was a negative association between current pay/salary and the professional efficacy scale of MBI. This finding must be interpreted cautiously, as a causal order cannot be established.

Other limitations of this study include the cross-sectional methodology, as it only captured participants' feelings/perceptions at one point in time. While the sample size of 1,642 responses was large enough to provide statistical power, there is the potential for response bias because the response rate is equivalent to ∼1.5% of the 109,000 currently employed veterinary technicians in the U.S. Finally, statistical correlation does not imply causation. Thus, we cannot conclusively state that the factors examined lead to burnout, but only that they are associated with higher burnout scores on the MBI and PFI.

Based on the findings of this study, future areas of research include the development and evaluation of technician recognition programs as a means to mitigate burnout. The relationship between salary and burnout should be explored in more detail. Finally, it might behoove veterinary practices to explore the cost of providing paid professional development opportunities as a means to enhance employee retention,

especially in comparison to the cost of recruiting and training new hires.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Colorado State University Institutional Review Board (IRB # 086-19H). Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

LK and JW conceived the study. LK, JW, PH, and MR conducted the research. LK, JW, RS-T, and PH wrote the manuscript.

ACKNOWLEDGMENTS

The authors would like to acknowledge Stephen Cital, Liz Hughston, and Casara Andre for their help in survey development and distribution and all the veterinary technicians who graciously completed the survey.

REFERENCES

1. Lemaire JB, Wallace JE. Burnout among doctors: a system level problem requiring a system level response. *BMJ*. (2017) 358:j3360. doi: 10.1136/bmj.j3360
2. Oxtoby C, Ferguson E, White K, Mossop, L. We need to talk about error: causes and types of error in veterinary practice. *Vet Rec*. (2015) 177:438–44. doi: 10.1136/vr.103331
3. Reith TP. Burnout in United States healthcare professionals: a narrative review. *Cureus*. (2018) 10:e3681. doi: 10.7759/cureus.3681
4. Rothenberger DA. Physician burnout and well-being: a systematic review and framework for action. *Dis Colon Rectum*. (2017) 60:567–76. doi: 10.1097/DCR.0000000000000844
5. Wallace JE, Lemaire J, Ghali WA. Physician wellness: a missing quality indicator. *Lancet*. (2009) 374:1714–21. doi: 10.1016/S0140-6736(09)61424-0
6. West, CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. *J Internal Med*. (2018) 283:516–29. doi: 10.1111/joim.12752
7. Hanrahan C, Sabo BM, Robb P. Secondary traumatic stress and veterinarians: human–animal bonds as psychosocial determinants of health. *Traumatology*. (2018) 24:73–82. doi: 10.1037/trm0000135
8. Figley CR, Roop RG. *Compassion Fatigue in the Animal-Care Community*. Washington, DC: Humane Society Press (2006).
9. Adams RE, Boscarino JA, Figley CR. Compassion fatigue and psychological distress among social workers: a validation study. *Am J Orthopsychiatry*. (2006) 76:103–8. doi: 10.1037/0002-9432.76.1.103
10. Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Ann Rev Psychol*. (2001) 52:397–422. doi: 10.1146/annurev.psych.52.1.397
11. Lee RT, Lovell BL, Brotheridge CM. Tenderness and steadiness: relating job and interpersonal demands and resources with burnout and physical symptoms of stress among Canadian physicians. *J Appl Soc Psychol*. (2010) 40:2319–42. doi: 10.1111/j.1559-1816.2010.00658.x
12. Moir FM, Van den Brink ARK. Current insights in veterinarians' psychological wellbeing. *N Z Vet J*. (2020) 68:3–12. doi: 10.1080/00480169.2019.1669504
13. Leiter MP, Maslach C. Areas of worklife: a structured approach to organizational predictors of job burnout. *Res Occup Stress Well Being*. (2003) 3:91–134. doi: 10.1016/S1479-3555(03)03003-8
14. Rotenstein LS, Torre M, Ramos MA, Rosales RC, Guille C, Sen S, et al. Prevalence of burnout among physicians: a systematic review. *JAMA*. (2018) 320:1131–50. doi: 10.1001/jama.2018.12777
15. Patel R, Bachu R, Adikey A, Malik M, Shah, M. Factors related to physician burnout and its consequences: a review. *Behav Sci*. (2018) 8:98. doi: 10.3390/bs8110098
16. Mastenbroek NJJM, Jaarsma ADC, Scherpbier AJJA, van Beukelen P, Demerouti E. The role of personal resources in explaining well-being and performance: a study among young veterinary professionals. *Eur J Work Organ Psychol*. (2014) 23:190–202. doi: 10.1080/1359432X.2012.728040
17. Kogan LR, Schoenfeld-Tacher RM, Carney P. On call duties: impact on veterinarians' job satisfaction, well-being and personal relationships. *J Am Vet Med Assoc*. (in press).
18. Hill EM, LaLonde CM, Reese LA. Compassion fatigue in animal care workers. *Traumatology*. (2020) 26:1:96–108. doi: 10.1037/trm0000218
19. Rohlf VI. Interventions for occupational stress and compassion fatigue in animal care professionals—a systematic review. *Traumatology*. (2018) 24:186–92. doi: 10.1037/trm0000144
20. Rohlf V, Bennett P. Perpetration-induced traumatic stress in persons who euthanize nonhuman animals in surgeries, animal shelters and laboratories. *Soc Anim*. (2005) 13:201–19. doi: 10.1163/1568530054927753
21. Mitchener KL, Ogilvie GK. Understanding compassion fatigue: keys for the caring veterinary healthcare team. *J Am Anim Hosp Assoc*. (2002) 38:307–10. doi: 10.5326/0380307
22. Gardner DH, Hini D. Work-related stress in the veterinary profession in New Zealand. *N Z Vet J*. (2006) 54:119–24. doi: 10.1080/00480169.2006.36623
23. Volk JO, Schimmack U, Strand EB, Lord LK, Siren CW. Executive summary of the merck animal health veterinary wellbeing study. *JAVMA*. (2018) 252:1231–8. doi: 10.2460/javma.252.10.1231
24. Wallace JE. Burnout, coping and suicidal ideation: an application and extension of the job demand-control-support model. *J Workplace Behav Health*. (2017) 32:99–118. doi: 10.1080/15555240.2017.1329628
25. Cake MA, Bell MA, Bickley N, Bartram DJ. The life of meaning: a model of the positive contributions to well-being from veterinary work. *J Vet Med Educ*. (2015) 42:184–93. doi: 10.3138/jvme.1014-097R1
26. Mastenbroek NJJM. The art of staying engaged: the role of personal resources in the mental well-being of young veterinary professionals. *J Vet Med Educ*. (2017) 44:84–94. doi: 10.3138/jvme.0216-041R1
27. Wallace JE. Meaningful work and well-being: a study of the positive side of veterinary work. *Vet Rec*. (2019) 185:571. doi: 10.1136/vr.105146
28. Schrijver I. Pathology in the medical profession? Taking the pulse of physician wellness and burnout. *Arch Pathol Lab Med*. (2016) 140:976–82. doi: 10.5858/arpa.2015-0524-RA
29. Dawson BF, Thompson NJ. The effect of personality on occupational stress in veterinary surgeons. *J Vet Med Educ*. (2017) 44:72–83. doi: 10.3138/jvme.0116-020R
30. Deacon RE, Brough P. Veterinary nurses' psychological well-being: the impact of patient suffering and death. *Austr J Psychol*. (2017) 69:77–85. doi: 10.1111/ajpy.12119
31. Wallace JE, Buchanan T. Status differences in interpersonal strain and job resources at work: a mixed methods study of animal health care providers. *Int J Conflict Manag*. (2019) 31:287–308. doi: 10.1108/IJCMA-08-2019-0135
32. Tomasi SE, Fechter-Leggett ED, Edwards NT, Reddish AD, Crosby AE, Nett RJ. Suicide among veterinarians in the United States from 1979 through 2015. *J Am Vet Med Assoc*. (2019) 254:104–12. doi: 10.2460/javma.254.1.104
33. Witte TK, Spitzer EG, Edwards N, Fowler KA, Nett RJ. Suicides and deaths of undetermined intent among veterinary professionals from 2003 through 2014. *J Am Vet Med Assoc*. (2019) 255:595–608. doi: 10.2460/javma.255.5.595

34. Black AF, Winefield HR, Chur-Hansen A. Occupational stress in veterinary nurses: roles of the work environment and own companion animal. *Anthrozoos.* (2011) 24:191–202. doi: 10.2752/175303711X12998632257503
35. van Soest EM, Fritschi L. Occupational health risks in veterinary nursing: an exploratory study. *Aust Vet J.* (2004) 82:346–50. doi: 10.1111/j.1751-0813.2004.tb11101.x
36. Arluke A. *Just a Dog: Understanding Animal Cruelty and Ourselves*. Philadelphia: Temple University Press (2006).
37. Tumbarello E. *History of Veterinary Technicians*. Public Domain courtesy of the US Air Force (2019). Avaliable online at: https://careertrend.com/about-5384577-history-veterinary-technicians.html (accessed April 5, 2020).
38. Bureau of Labor Statistics, US Department of Labor. *Occupational Outlook Handbook, Veterinary Technologists and Technicians*. Avaliable online at: https://www.bls.gov/ooh/healthcare/veterinary-technologists-and-technicians.htm (accessed March 12, 2020).
39. National Association of Veterinary Technicians in America (NAVTA). *NAVTA Demographic Survey Results*. (2016). Avaliable online at: https://cdn.ymaws.com/www.navta.net/resource/resmgr/docs/2016_demographic_results.pdf (accessed April 5, 2020).
40. Thompson-Hughes J. Burnout and compassion fatigue within veterinary nursing: a literature review. *Vet Nurs J.* (2019) 34:266–8. doi: 10.1080/17415349.2019.1646620
41. Larkin M. Technician shortage may be a problem of turnover instead. *JAVMA*. (2016) 249:861–3.
42. Leiter MP, Schaufeli WB. Consistency of the burnout construct across occupations. *Anxiety Stress Coping.* (1996) 9:229–43. doi: 10.1080/10615809608249404
43. Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual, 3*. Palo Alto, CA: Consulting Psychologists Press (1996).
44. Doulougeri K, Georganta K, Montgomery A. "Diagnosing" burnout among healthcare professionals: can we find consensus? *Cogent Med.* (2016) 3:1. doi: 10.1080/2331205X.2016.1237605
45. Laschinger HKS, Wong CA, Grau AL. The influence of authentic leadership on newly graduated nurses' experiences of workplace bullying, burnout and retention outcomes: a cross-sectional study. *Int J Nurs Stud.* (2012) 49:10:1266–76. doi: 10.1016/j.ijnurstu.2012.05.012
46. Leiter MP, Maslach C. Areas of worklife: a structured approach to organizational predictors of job burnout. In: Perrewe PL, Ganster DC, editors. *Research in Occupational Stress and Well-being*. Oxford: Elsevier (2004). p. 91–134.
47. Trockel M, Bohman B, Lesure E, Hamidi MS, Welle D, Roberts L, et al. A brief instrument to assess both burnout and professional fulfillment in physicians: reliability and validity, including correlation with self-reported medical errors, in a sample of resident and practicing physicians. *Acad Psychiatry.* (2018) 42:11–24. doi: 10.1007/s40596-017-0849-3
48. Bakker AB, Demerouti E, Euwema MC. Job resources buffer the impact of job demands on burnout. *J Occup Health Psychol.* (2005) 10:170–80. doi: 10.1037/1076-8998.10.2.170
49. Kleiner S, Wallace JE. Oncologist burnout and compassion fatigue: investigating time pressure at work as a predictor and the mediating role of work-family conflict. *BMC Health Serv Res.* (2017) 17:639. doi: 10.1186/s12913-017-2581-9
50. Mastenbroek NJJM, Jaarsma ADC, Demerouti E, Muijtjens AMM, Scherpbier AJJA, Van Beukelen P. Burnout and engagement, and its predictors in young veterinary professionals: the influence of gender. *Vet Record.* (2014) 174:144. doi: 10.1136/vr.101762
51. Ashforth BE, Kreiner GE, Clark MA, Fugate M. Normalizing dirty work: managerial tactics for countering occupational taint. *Acad Manag J.* (2007) 50:149–74. doi: 10.5465/amj.2007.24162092
52. Sanders CR. Working out back: the veterinary technician and "dirty work". *J Contemp Ethnogr*. (2010) 39:243–72. doi: 10.1177/0891241610366711
53. Skipper GE, Williams JB. Failure to acknowledge high suicide risk among veterinarians. *J Vet Med Educ*. (2012) 39:79–82. doi: 10.3138/jvme.0311.034R

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Veterinary Science

REVIEW
published: 29 October 2020
doi: 10.3389/fvets.2020.573106

Strengthening Workplace Well-Being in Research Animal Facilities

Judy Murray[1], *Cassondra Bauer*[2], *Nicole Vilminot*[3] *and Patricia V. Turner*[1,4]*

[1] Global Animal Welfare and Training, Charles River, Wilmington, MA, United States, [2] Laboratory Animal Medicine, Charles River, Ashland, OH, United States, [3] Veterinary Services, Charles River, Mattawan, MI, United States, [4] Department of Pathobiology, University of Guelph, Guelph, ON, Canada

In recent years, there has been an increased recognition of the potential cost of caring on the mental well-being of research animal facility personnel. While this issue is considered a normal consequence of caring for others, these stressors must be acknowledged and managed to ensure that the workplace culture remains positive and that employees are engaged. Factors that can contribute to these feelings in those working with animals in research include compassion and moral stress, issues related to staffing and scheduling of work, insufficient communication in the workplace, and public ambivalence toward the use of animals in science. The first step in developing a program is to survey facility personnel about their concerns, either formally (e.g., using a needs analysis) or informally. Two examples are provided to demonstrate different institutional approaches to assessing personnel needs and developing an internal compassion-resiliency program. The best programs are based on the needs and wants of personnel and these can be cost effective and geared at a grassroots level. Social support in the workplace, for example, through peer counseling, can be a highly effective means of helping personnel to build compassion-resiliency. Addressing mental well-being of research animal facility personnel is an important component of ensuring a positive culture of care in the workplace.

Keywords: compassion fatigue, resiliency, animal welfare, laboratory animal, mental health

OPEN ACCESS

Edited by:
Lynette Arnason Hart, University of California, Davis, United States

Reviewed by:
Susan Marie Elrod, Auburn University, United States
Sally Thompson Iritani, University of Washington, United States

***Correspondence:**
Patricia V. Turner
patricia.turner@crl.com

Specialty section:
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

Received: *16 June 2020*
Accepted: *30 September 2020*
Published: *29 October 2020*

Citation:
Murray J, Bauer C, Vilminot N and Turner PV (2020) Strengthening Workplace Well-Being in Research Animal Facilities. Front. Vet. Sci. 7:573106. doi: 10.3389/fvets.2020.573106

INTRODUCTION

Caring for and working with animals in research environments can bring great joy and pleasure to those working with them; however, it can also result in workplace stress. Promoting a culture of care or well-being within the workplace is the stated goal of many organizations (1). Within laboratory animal science, a culture of care generally refers to promoting good animal welfare practices, ensuring quality of scientific results, promoting transparency and openness about the research process, and ensuring good care and support of employees (2). Well-being of employees working in biomedical research facilities is particularly important for their long-term job satisfaction and retainment (3). Recent surveys have suggested that compassion and workplace stress and fatigue are widespread amongst laboratory animal professionals and others in support roles within the research program, such as IACUC members, security, facility management, trainers, and administrative staff in North America (3–5). Thus, developing programs that support and improve the mental well-being of personnel should be an area of concern and attention for those overseeing research animal facility administration and operations.

This review will cover factors contributing to workplace stress in laboratory animal science, assessing workplace stress in research animal environments, and considerations for developing tools and programs to promote workplace well-being and build resiliency for those working in research animal facilities. The focus is on all personnel and team members who may be working within a research animal environment, including those performing animal care, in-life, and post-life work, as well as those overseeing the research projects, working to maintain facilities, overseeing the physical plant, and managing the animal research compliance office. It is important for administrators and others to note that these work-related stressors are found in all types of animal research environments (for example, universities, government facilities, industry, not-for-profits, hospitals, etc.) and can occur regardless of the species being worked with (for example, rodents only, fish, poultry, etc.) (5). Finally, the modern research animal environment is highly regulated and inspected (6–8), and this paper starts with an assumption of personnel working in an accredited and/or inspected research facility and that the ongoing work with animals is overseen and approved by an appropriately constituted animal care and use committee or oversight body according to national or regional regulations and legislation (7).

FACTORS CONTRIBUTING TO WORKPLACE STRESS IN ANIMAL RESEARCH ENVIRONMENTS

There are a number of factors that contribute to workplace stress in research animal facilities—both work-related and -unrelated, but this review will only focus on the most significant factors specifically related to the work. Some of these factors are not unique to laboratory animal science; however, the added dimension of working with living, sentient animals creates additional responsibilities and may create additional burdens or stressors. These factors may include moral stress or distress, compassion stress or fatigue, feelings related to a lack of choice or control in the work, insufficient staffing, insufficient communication opportunities at work, and challenges in speaking about their work with others. Each of these areas will be explored further below.

Moral Stress

The conflicting feelings that laboratory animal science professionals and others working in research with animals may experience from time to time related to their work can be due to moral stress. These same feelings are also frequently reported by those working in nursing, human medicine, veterinary medicine, palliative care, and social work (9–13). Moral stress refers to having to act in a way that is different from what someone feels is ethically correct. The reasons underlying why this occurs in the different "caring professions" are different; however, when feelings of distress happen repeatedly over time without an opportunity to redress issues or properly recharge, it can lead to occupational "burn-out" (14). Animal euthanasia is an area of moral stress in research settings. There is genuine acceptance by most laboratory animal professionals about the importance of working with animals in science to enhance fundamental knowledge as well as to make advances in biomedical research science, particularly within a 3Rs framework (15). Most people working in research care deeply for the animals they work with, regardless of the species (5). However, euthanasia of a cohort of animals is often necessary at the end of an experiment to gather additional information about physiologic and pathologic processes from tissue or other samples. Despite understanding the need for this action, it can be challenging to conduct euthanasia of animals and the action may result in feelings of grief and moral stress. These feelings can be compounded if euthanasia is required at regular intervals, different endpoints for animals might be possible but are never discussed or considered (e.g., rehoming or adoption of animals), there is poor communication about the task or a lack of choice or opportunity to discuss ongoing feelings about the work, and individuals do not have the tools needed to be resilient. Moral sensitivity is important because it emphasizes the role of ethics and social values when working with research animals (16). However, individuals working with animals must be allowed to discuss the ethical implications of their work, including the constraints under which the work has been determined to be acceptable by the institutional animal ethics committee.

Compassion Stress and Fatigue

Compassion refers to bearing the suffering of others (16). In research settings, and following ethics committee approval, researchers may induce disease or other conditions in animals or administer treatments that intentionally induce suffering, distress or pain as a condition of the animal model being studied. Periods of discomfort or distress of animals are limited to the extent possible by means of anesthesia, analgesia, and humane endpoints or interventions [for examples, see (17–19)]. Compassion stress is the forerunner to compassion fatigue and is thought of as the emotional burden following providing care to relieve suffering of others—either human or animal (16, 20). For those who love animals, there is a cost to providing good care in research settings, which requires constant empathy and emotional investment in the animals worked with (16). Compassion is not unlimited and also can be consumed by events and activities that are indirectly experienced or witnessed, also known as secondary trauma (16). When unattended to, compassion stress can build over time to become compassion fatigue. When this occurs within the context of a demanding work environment, it can lead to burn-out; however, it is important to note that burn-out in the workplace is an occupational hazard (14) and may occur in the absence of compassion fatigue. While compassion stress and fatigue have been recognized as occupational hazards in research animal settings for over two decades, it is only recently that mental well-being of workers has been of interest and institutions have become aware of the need to provide support for their employees.

Staffing and Scheduling Factors

It has long been known that the quality and number of animal care and veterinary professional staff are critical factors in

determining the overall quality of an animal research program. Balanced with this is the notion that personnel costs can represent up to 65% of a program's costs (21). The fluctuating and uncertain nature of scientific funding in today's academic environments and the variability of sponsored studies in private industry coupled with increasingly lean operational strategies and normal attrition rates and turnover of personnel can mean that it is difficult to ever fully staff research animal facilities. This can lead personnel to experience feelings of frustration and even despair at being unable to complete their daily work, in addition to feelings of guilt when taking scheduled breaks, lunches, and vacations. In addition, research animal environments can be highly scheduled offering little perceived control and choice for workers, factors that are known to be important for improving employee performance and mood (22). Animals must be fed, cleaned, and observed at certain times, treatments and timing of sample collections are often highly proscribed, mandatory overtime (with pay) is often necessary and may be required at short notice, and the risk of an adverse outcome following an error with living animals is high. All or any combination of these factors can create job strain in those working in research animal environments as well as feelings of effort-reward imbalance (23). Effort-reward imbalance is characterized by a recurring lack of reciprocity between the efforts expended at work and the rewards—both direct and indirect—received in return (23). In similar fields with similar demands, i.e., human health care, high levels of occupational stress and effort-reward imbalances have been noted with job dissatisfaction rates reported of up to 1 in every 4 workers (24, 25). In addition to mental health effects, chronic work stress can contribute to increased risks for coronary heart disease (23). Those working in research animal facilities have not been specifically studied for rates of job dissatisfaction, but lab animal professionals commonly report feelings of stress, high workload, and burn-out (5).

Factors Related to Inadequate Communication

Good communication is essential in any workplace, but it is particularly critical when the care and lives of research animals are at stake. Those working with and caring for animals are often strongly attached to the animals in their care and invested in their well-being (26). Delays, real or apparent, in animal care, treatments or other procedures, such as weaning or endpoint decision-making, can lead to personnel distress and feelings of helplessness, as individuals become worried about the future welfare state or condition of vulnerable animals. In these situations, there may not be intentional exclusion of stakeholders concerned with animal well-being, in that veterinary and research staff may communicate about and move forward with next steps in an experiment, while neglecting to feed information back to those working directly with animals.

Similarly, an inability for those working in research animal facilities to speak openly about their questions and concerns related to animals or research, because of a lack of workplace openness, can lead to workplace stress (3, 27). In human health care fields such as nursing, a perceived lack of opportunity to discuss concerns is an important source of job stress (28). Thus, modeling good communication and encouraging openness in discussing research animal concerns are important considerations for long-term retention and satisfaction of those working in research environments.

Public Discomfort With Research Animal Experiments

In Western society, the public has an uneasy and mixed relationship to the use of animals in research (29). On the one hand, safe and efficacious treatments, vaccines and cures are demanded; however, there is an unwillingness to openly discuss exactly how these needs can be met. A lack of overwhelming support for animal research by society at large (30) can create workplace stress in research animal workers. Self-esteem and value are commonly tied to the nature of one's work (31, 32) and the inability to speak about one's work to peers, friends or family members can contribute to feelings of discomfort and shame in research animal workers (4). Regularly communicating about the importance of the research being conducted can help to increase fluency in employees about the science. Additionally, teaching employees how to speak about their work and providing opportunities for them to share aspects of their work with families and friends can result in the feeling of removing an enormous burden from individuals (4, 5).

ASSESSING WORKPLACE WELL-BEING IN RESEARCH ANIMAL FACILITIES

Given the increasing recognition of the importance of workplace well-being and that there are known factors for stress and distress in research animal environments, conducting some form of workplace needs assessment may be beneficial to identify gaps between the present and desired state in a facility. An assessment may be informal or formal, qualitative, quantitative, or use a mixture of methods (33) and the approach used may depend on the resources available at the facility. Whatever means are used, personnel should have an opportunity to express their honest feelings in a safe environment. Often, this is best accomplished by making use of a facilitator with no direct relationship to any of the employees. No matter how good the relationship with the direct supervisor, manager or administrator, it can be difficult for employees to be completely candid in their comments about challenges in their work environment.

It is beyond the scope of this paper to delve fully into how a formal workplace needs analysis is conducted and the reader is referred to other discussions on this topic (33, 34). Briefly, a needs analysis identifies the desired outcome or state for the workplace environment, describes the current situation (for example, via surveys, focus groups or interviews), describes the gaps between the two states and the causes for them, and identifies possible solutions for bridging the gaps (i.e., generation of a prioritized action plan) (34). An example of one real-life approach to a largescale facility-wide needs analysis at a large research animal facility is provided in **Box 1**.

These two examples are provided to demonstrate that successful outcomes can be achieved in research facilities using

both formal and informal approaches to needs assessments. In both cases, intentional efforts were made to engage personnel in discussions about how the workplace could be improved. Employees were given a large measure of control over how they chose to address challenges that had been identified in the workplace, contributing to buy-in and sustainability of programs.

It is important to note that compassion fatigue and moral distress are often not a constant state for personnel in research animal facilities. In resilient individuals, including those with more choice and control over their workday, these feelings may never or rarely be experienced or feelings may come and go from time to time, depending on other external factors that impinge on employees' lives. Secondary stressors, including strained relationships with partners or children, fears and concerns arising from personal and family health issues, financial health concerns, unrelated anxiety or mood disorders, etc., may exacerbate work stress (35). Working closely with research animals brings many joys for those who are attracted to being with animals, often called compassion satisfaction, because of a strong human-animal bond that may develop (26). The balance between the joy and challenges that may be experienced in research animal work is often referred to as the professional quality of life or ProQUAL (36). Institutions should strive to ensure that programs and supports are in place such that the professional quality of life experienced by laboratory animal professionals is generally positive. An online ProQUAL survey is available and can be adapted for research animal facility use with a few edits (37). This could also be used as a less formal means of gauging mental well-being of employees.

TOOLS AND PROGRAMS TO PROMOTE WORKPLACE WELL-BEING IN RESEARCH ANIMAL FACILITIES

As one more closely examines the causes of workplace stress in research animal facilities, there is clear evidence that resiliency plays an adaptive and protective role, as both a coping mechanism and a way to increase compassion satisfaction associated with the work. Resilience refers to one's ability to cope with and bounce back from stress and adversity. Resilience is not static, there may be times when one's capacity to deal with challenges ebbs and flows, but resiliency can be enhanced through intentional practice and adaptation to new situations. As mentioned, compassion stress is a component of working with animals in science. However, multiple studies have demonstrated that individuals and organizations that incorporate resiliency building into their practices promote both human and animal well-being (3, 4). Supporting implementation of the 3Rs (replacement, reduction, and refinement), empowering people to be creative problem solvers, providing opportunities to report questions or concerns, and expecting accountability at all levels, creates a work environment that values people, animals, and science (2). Refinements in handling techniques or procedures to minimize stress, providing food resources and other enrichment,

BOX 1 | Case example for conducting a formal needs assessment at a large research animal facility.

The need to initiate a program to help employees experiencing compassion fatigue was identified at a preclinical safety facility with about 1,000 employees. Concerns were expressed to site management from employees regarding their feelings during animal studies, as well as other aspects of scheduling that were contributing to job stress. The site had recently changed ownership, but these emotions were longstanding, stretching back at least 4–5 years. Senior management at the site discussed the issues brought forward and based on their concerns to improve institutional culture, determined to create a program to help support employees and prevent them from developing burn-out. Because many of the issues seemed to be longstanding, the site elected to pursue a formal needs assessment process.

As part of the needs assessment, an anonymous internal survey was developed and distributed to employees at the facility. The survey assessed employee understanding of compassion fatigue, coping mechanisms utilized, feelings about administrative support for employees, and asked respondents to rank various ideas regarding what the program should first address. The survey return rate was 14%, representing individuals from a wide variety of tenure and job skills, including those who worked with animals directly and those who did not. Additionally, an external compassion fatigue consultant was engaged to assist with assessment of the needs of the facility.

Once on site, the external consultant provided a short presentation about compassion fatigue that was open to all employees and that was repeated several times to accommodate schedules for all interested personnel. Following this, individual and group interviews were scheduled with the consultant in a private office. Employees met with the consultant to discuss their confidential concerns about work-related issues and perceived stressors as well as providing information about how they coped with job stresses. Following the consultant's visit, a report was generated and shared with site management. The report detailed aspects of workplace stress with suggestions for opportunities that would alleviate some of the stressors, as well as pinpointing individuals who were interested in helping to build an employee support program. Some of the items identified by the consultant in the report were surprising, others were known, and many had already been addressed, and yet people still referred to these past issues as sources of stress, likely because of a perceived lack of opportunity to fully discuss their concerns at the time that events occurred.

Following the consultant's visit, a second internal anonymous survey was distributed to the employees. Respondents indicated that the information presented and the opportunity to speak with the external consultant about compassion fatigue concerns were valuable. Subsequently, additional personnel were added to areas identified to have high levels of work-related stress, allowing for fewer hours engaged in challenging tasks and increased rotation through different tasks to add variety. A small compassion-resiliency committee was formed after the consultant's visit. This group solicited opinions and ideas from different business groups at the site, which were subsequently prioritized and presented to management for approval and resource allocation. Where possible, events were combined with previously scheduled staff appreciation events to maximize impact, and interests and needs of different groups were taken into account when planning activities. One example is the concept of holiday treats for animals, in which employees are given time during their working day to come together to create and distribute special themed treats for the animals in the facility (**Figure 1**). The compassion fatigue program has grown slowly over time, gaining traction and interest among many employees as it develops.

A second real-life example of a more informal approach to a needs assessment for a large research animal facility is provided in **Box 2**.

FIGURE 1 | An example of the holiday treats for animals program. Facility personnel come together to create and then distribute healthy treats for animals in the facility. In this example, there is air-popped popcorn for rodents, green pepper Christmas trees for rabbits, apple rings for pigs, peanut butter cookies for dogs, and Santa hats (strawberries and yogurt) and treat bags for primates.

and opportunities to interact closely with animals are shown to have a positive effect, increasing compassion satisfaction and professional quality of life (4). All these activities help employees adapt and overcome challenges discussed previously, building their resiliency in the process.

A Compassion Fatigue Resiliency (CFR) model was recently developed by a group of researchers (38) as a tool to determine the level of risk for individuals to experience compassion fatigue or to develop levels of resilience that subsequently reduced the impact of compassion fatigue. The model uses 12 variables

BOX 2 | Case example for conducting an informal needs assessment at a large research animal facility.

The years following the 2008 economic decline in the U.S. were difficult ones for this preclinical safety facility. Budget cuts had resulted in numerous employee lay-offs, personnel morale was at a low point, and spending for non-essential projects was discouraged. Serendipitously, a small victory was achieved when funding was donated for a tribute garden for the animals. The concept of a tribute garden was approved by site management and personnel were given paid time to develop the project with a lasting, significant impact for staff. The garden marked the start of the entire compassion-resiliency program at the facility. Publicly celebrating the human-animal bond wasn't something that employees at the site were accustomed to, but once staff were encouraged to open up about their relationships with the animals they worked with, the organization saw increased openness and engagement of employees That openness empowered the creation of several additional programs, such as an adoption program and an "art of compassion" program. This latter program allows personnel to request a portrait of an animal that they have developed a special bond with (**Figure 2**). Employees who are accomplished artists volunteer to draw or paint the animal as a keepsake for the requesting technician. Whereas, the site used to discourage and deny the bonds that are formed with animals are being cared for, they now celebrate and encourage them. While the artwork directly impacts those requesting it, the site also discovered that the success of the program reaches far beyond the vivarium walls. By displaying the artwork around the facility, an important and lasting celebration of the human-animal bond can be made with all employees as well as site visitors. When people see a visual representation of the bonds between employees and the animals, it fosters an environment in which everyone feels valued for what they do.

The compassion-resiliency program at the facility is ever-evolving. Initially those helping to organize the program were excited simply to be able to implement projects that resonated well with employees, but they've since evolved into thinking about the program through a long-term lens. While personnel have been recruited as ambassadors within the facility to help develop projects that will keep staff engaged, the program also focuses on management awareness and employee education. The program organizers are trying to validate the emotions that employees encounter when working closely with not only animals, but each other. By doing this, they hope to foster an environment in which people will be encouraged to express their own ideas of what they need. The ultimate goal of the program is to positively impact the overall culture of the facility.

as predictors of CFR related to empathy, secondary traumatic stressors, and compassion fatigue resilience. These and other authors have indicated that building resilience depends largely on nurturing positive practices of self-care, developing some degree of detachment or respite from work-related stresses, enhancing a sense of satisfaction or fulfillment, and developing strong social supports (4, 38–40). This concept of resilience and how it can be used to increase employee resiliency is fundamental for strengthening workplace well-being in research animal facilities.

Coping with challenges in the research animal environment must be approached in a multi-pronged fashion, with changes aimed at both individual and institutional levels. As individuals, building compassion-resilience is focused on behaviors, thoughts, and attitudes that support physical and mental health (41). Sleep, nutrition, exercise, and mindfulness practices (e.g., yoga, journaling, meditation) help recharge energy and provide a break from work stresses. A recent survey has found that all of these self-care methods are seen as valuable stress relievers (5). Helping others, through volunteering or supporting a friend or family member in need, helps people to find purpose and fulfillment. Embracing a "growth mindset" and learning to reframe challenges and setbacks as opportunities to learn and grow can help individuals to adapt and thrive when facing adversity (41). Social connection is one of the best ways to build resiliency. While connecting with others outside of the workplace is helpful, developing a support system within family and friends also reduces the risk of social isolation and is reported to decrease feelings of compassion fatigue (3). Connecting with co-workers offers another form of social support and reminds employees that they are not alone, are heard, and helps to validate their feelings (4, 17–19). A recent study found that increased social support for research animal workers was related to higher compassion satisfaction, reduced perceptions of animal stress or pain, and improved human-animal interactions (4).

At an organizational level, the first step in addressing workplace challenges within research animal facilities is acknowledging that compassion stress and fatigue are normal aspects of caring for others and that this occurs in many occupations. Institutions want people who are compassionate and empathetic when working with animals, dedicated to providing the best care possible. There is abundant research on the importance for organizations to provide education and training on recognition of compassion stress and fatigue, and to establish emotional support programs and resources for personnel (3, 4, 42). Well-being and resiliency education should start early after an employee has been hired to work in a research animal facility. People entering the field are at higher risk of anxiety incurred from animal use, particularly in those with <2 years of experience (43). Organizations can increase feelings of satisfaction and fulfillment for employees by reminding employees of the importance of their individual contributions to the advancement of science and improvement of societal quality of life. Assuring that personnel are well-trained can reduce stress and increase confidence in employees' technical skills, increasing job satisfaction, and compassion satisfaction.

Acknowledging the value of the human-animal bond, which brings both compassion stress as well as compassion satisfaction, and encouraging open dialogue regarding animal research, euthanasia and the accompanying moral stresses can help to build resiliency. Providing choice for personnel to participate in euthanasia events for animals they have cared for is also an important means of addressing workplace stress (4). Another important area for reducing workplace stress is enhancing communications so that personnel are aware of the work being done with animals and are apprised of changes and updates in experimental plans can provide significant relief from workplace stress. When animals are no longer needed for research projects, a priority should be placed on retiring, rehoming or adopting these animals out to a forever home, when possible. While this may require additional effort and resources to prepare animals for their new life outside the research facility (e.g., IACUC review and approval, vaccinations, neutering, etc.), personnel are generally excited to support the process. Developing internal recognition programs for those who exceed expectations in their

FIGURE 2 | An example of a painting from an Art of Compassion program. Courtesy of T. Custard.

daily care of animals or who develop new 3Rs approaches for working with or replacing animals in science is also important as it encourages employees to do their best at work each day. Finally, it is imperative that institutions foster opportunities for connection, engagement and social support as these are foundational to building resilience in research animal facility employees. Nurturing ways for personnel to find satisfaction in their work contributes to enhanced mental wellness and a deep appreciation and care for the animals they work with.

With the change in workforce demographics, early career employees are increasingly focused on personal fulfillment, engagement, support, and well-being in the workplace (43, 44). While compassion stress and compassion fatigue are not new to this field, awareness of their impact on animal welfare, the welfare of the employee, their teams and the science they support is gaining attention. One model for proactively addressing the cost of caring in research animal facilities is to develop a compassion-resiliency building program that provides at its core strong social supports, some level of choice or control for the employee, and the means to respect the human-animal bonds that enhance compassion satisfaction and resilience. As every facility is different, with a different work focus, set of species

worked with, culture, and employee needs, each program should be developed by using grassroots methods and listening to employee needs and wants. Examples of two possible approaches for this were provided in **Box 1** and **2**, one using a formal needs assessment and the other demonstrating organic growth from one idea that was meaningful to employees. A summary of areas and tools that might be considered as part of an institutional compassion-resiliency building program is found in **Table 1**.

Having senior leadership and human resources support for this type of program is essential as there are operational and financial resources needed as well as employee needs and possible synergies with other wellness programs at the local level. Some awareness training may be needed for institutional administrators and researchers who are far removed from animal work. While many institutions subscribe to an Employee Assistance Plan service that provides confidential short-term support for employees experiencing personal difficulties, individuals working within these services often do not have knowledge or experience of the various challenges associated with working with animals in research. A more permanent and ongoing, low cost support system may be needed. Within organizations, there are often a few sympathetic individuals whom others feel comfortable talking with or seeking advice from. These are empathetic employees who are often peers of those working directly with animals, who understand the nature of the work and the emotions that accompany it. Engaging the support of these individuals as peer counselors in the workplace can create opportunities for employees to informally talk about their work, building sustainable social support locally (4, 44).

Having a compassion-resiliency program in place across a research animal institution supports a healthy work environment, reflects values and ethics related to a culture of care, and demonstrates institutional commitment to employee engagement and mental well-being.

DISCUSSION

Workplace stress has been a topic of discussion in research animal facilities for decades, yet remains in the shadows for many working inside and outside the vivarium (27). This lack of awareness can leave caring and compassionate people feeling alone, anxious, and unsupported. Bringing the discussion about work stressors and mental well-being of employees into the open requires addressing concerns of management, human resources, legal and other stakeholders regarding possible effects on their workforce. Focusing on positive outcomes of resiliency building is recommended rather than negative attributes such as compassion or moral stress. Efforts at building awareness within employees is also needed. There can be workplace stigma associated with speaking about mental health, which further emphasizes the need for educating supervisors, managers, and administrators. Without their support, work cultures will not easily change. Workplaces that promote mental well-being see reductions in absenteeism and increased productivity (2, 14).

Sustaining a compassion-resiliency building program over time requires commitment at the organizational as well as local level. The program should also not just focus on promoting self-care and resilience but acknowledge and address the other risk

TABLE 1 | Examples of activities and programs that support resiliency in research animal facilities.

Category	Activities and programs supporting resiliency
Social supports	Peer counseling
	Staff engagement activities
	Invitations for researchers to discuss their work with facility personnel, e.g., "meet the researcher" lunches
	Ongoing communications about animal experiments with in-life personnel
Acknowledging human-animal bond	Animal naming
	Providing tributes to animals
	Scheduling time for human-animal interactions, e.g., animal grooming, dog walking, gentling
	Providing choice for animal euthanasia events
Regular assessment of animal behavior and welfare	Comprehensive animal behavioral management programs
	Implementation of animal welfare assessment programs for all species
Strong 3Rs programs	Advocacy for animal replacements and refinements
	Animal retirement, adoption and rehoming programs
	Internal 3Rs awards
Promoting self-care	In-house fitness facilities or reimbursement for fitness programs
	Wellness programs, e.g., nutrition support, mindfulness training
	Yoga and meditation classes
Learning and development	Regular CE regarding 3Rs and animal welfare
	Compassion fatigue and resiliency building training for management and personnel
	Ongoing technical skills development and assessment for proficiency for animal work
Personnel recognition programs	Animal welfare specific awards
	Institutional participation in Biomedical Research Awareness Day (BRAD)
Service to the community	Public outreach regarding biomedical research

factors that impact human and animal well-being. Addressing staffing levels, workload, mandatory overtime, training, available resources, choice or control over daily tasks and schedules, etc., are all areas the organization can look at to address sources of workplace stress. Creating infrastructure for the program at the outset will ensure that it is a sustainable model that grows organically, meets personnel needs most effectively, and provides resources for people in crisis that Employee Assistance programs are not always equipped to handle.

CONCLUSION

Workplace stress can be a significant issue for those working in research animal facilities and is a normal consequence for individuals working in a caring profession. The current emphasis on mental well-being in the workplace provides an ideal opportunity for institutions to develop programs of support and to critically appraise expectations for those providing care and working with animals in science. An important means of addressing this issue is to develop a grassroots compassion-resiliency program that has at its core an emphasis on social support for employees in the workplace. Ensuring that personnel are well-supported and resilient contributes to a positive culture of care in the workplace, increased job satisfaction and personnel retention, and enhanced care and well-being of animals.

AUTHOR CONTRIBUTIONS

All authors contributed to conception and design of this paper. JM and PT developed the paper outline and all authors contributed to the first draft of the manuscript. All authors revised the manuscript, and read and approved the submitted version.

FUNDING

Publication of this manuscript was paid for by Charles River.

ACKNOWLEDGMENTS

The authors acknowledged Ms. Leanne Silvis for technical support.

REFERENCES

1. Braithwaite J, Herkes J, Ludlow K, Testa L, Lamprell G. Association between organisational and workplace cultures, and patient outcomes: systematic review. *BMJ Open*. (2017) 7:e017708. doi: 10.1136/bmjopen-2017-017708
2. Robinson S, Sparrow S, Williams B, Decelle T, Bertelsen T, Reid K, et al. The European Federation of the Pharmaceutical Industry and Associations' Research and Animal Welfare Group: assessing and benchmarking 'Culture of Care' in the context of using animals for scientific purpose. *Lab Anim*. (2020). doi: 10.1177/0023677219887998. [Epub ahead of print].
3. Newsome JT, Clemmons EA, Fitzhugh DC, Gluckman TL, Creamer-Hente MA, Tambrallo TJ, et al. Compassion fatigue, euthanasia stress, and their management in laboratory animal research. *J Am Assoc Lab Anim Sci*. (2019) 58:289–92. doi: 10.30802/AALAS-JAALAS-18-000092
4. LaFollette MR, Riley MC, Cloutier S, Brady CM, O'Haire ME, Gaskill BN. Laboratory animal welfare meets human welfare: a cross-sectional study of professional quality of life, including compassion fatigue in laboratory animal personnel. *Front Vet Sci*. (2020) 7:114. doi: 10.3389/fvets.2020.00114
5. Randall MS, Moody CM, Turner PV. Mental wellbeing in laboratory animal professionals: a cross-sectional study of compassion fatigue, contrbuting factors, and coping mechanisms. *J Am Assoc Lab Anim Sci*. (2021) 60:000039. doi: 10.30802/AALAS-JAALAS-20-000039
6. Thulin JD, Bradfield JF, Bergdall VK, Conour LA, Grady AW, Hickman DL, et al. The cost of self-imposed regulatory burden in animal research. *FASEB J*. (2014) 28:3297–300. doi: 10.1096/fj.14-254094
7. Mohan S, Huneke R. The role of IACUCs in responsible animal research. *ILAR J*. (2019) 60:43–9. doi: 10.1093/ilar/ilz016
8. Brown MJ, Symonowicz C, Medina LV, Bratcher NA, Buckmaster CA, Klein H, et al. Culture of care: organizational responsibilities. In: Weichbrod RH, Thompson GA, Norton JN, editors. *Management of Animal Care and Use Programs in Research, Education, and Testing*. 2nd ed. Boca Raton, FL: CRC Press/Taylor & Francis (2018). p. 11–26. doi: 10.1201/9781315152189-2
9. Whitehead PB, Herbertson RK, Hamric AB, Epstein EG, Fisher JM. Moral distress among healthcare professionals: report of an institution-wide survey. *J Nurs Scholarsh*. (2015) 47:117–25. doi: 10.1111/jnu.12115
10. Traudt T, Liaschenko J, Peden-McAlpine C. Moral agency, moral imagination, and moral community: antidotes to moral distress. *J Clin Ethics*. (2016) 27:201–13.
11. Lev S, Ayalon L. A typology of social workers in long-term care facilities in Israel. *Soc Work*. (2018) 63:171–8. doi: 10.1093/sw/swy002
12. Arbe Montoya AI, Hazel S, Matthew SM, McArthur ML. Moral distress in veterinarians. *Vet Rec*. (2019) 185:631. doi: 10.1136/vr.105289
13. Maffoni M, Argentero P, Giorgi I, Hynes J, Giardini A. Healthcare professionals' moral distress in adult palliative care: a systematic review. *BMJ Support Palliat Care*. (2019) 9:245–54. doi: 10.1136/bmjspcare-2018-001674
14. World Health Organization. *Burn-Out An "Occupational Phenomenon": International Classification of Diseases*. (2020) Available online at: https://www.who.int/mental_health/evidence/burn-out/en/ (accessed June 15, 2020).
15. MacArthur Clark J. The 3Rs in research: a contemporary approach to replacement, reduction and refinement. *Br J Nutr*. (2018) 120:1–7. doi: 10.1017/S0007114517002227
16. Figley CR. Compassion fatigue: psychotherapists' chronic lack of self care. *Psychother Pract*. (2002) 58:1433–41. doi: 10.1002/jclp.10090
17. Workman P, Aboagye EO, Balkwill F, Balmain A, Bruder G, Chaplin DJ, et al. Guidelines for the welfare and use of animals in cancer research. *Br J Cancer*. (2010) 102:1555–77. doi: 10.1038/sj.bjc.6605642
18. Nemzek JA, Xiao HY, Minard AE, Bolgos GL, Remick DG. Humane endpoints in shock research. *Shock*. (2004) 21:17–25. doi: 10.1097/01.shk.0000101667.49265.fd
19. Collymore C, Kent L, Ahn SK, Xu W, Li M, Liu J, et al. Humane endpoints for guinea pigs used for *Mycobacterium tuberculosis* vaccine research. *Comp Med*. (2018) 68:41–7.
20. Forster D. Rethinking compassion fatigue as moral stress. *J Eth Mental Health*. (2009) 4:1–4.
21. National Research Council (US) Committee on Cost of and Payment for Animal Research. *Strategies That Influence Cost Containment in Animal Research Facilities*. Washington, DC: National Academies Press (US) (2000). Available online at: https://www.ncbi.nlm.nih.gov/books/NBK105416/ (accessed June 12, 2020).
22. Veitch J, Gifford R. Choice, perceived control, and performance decrements in the physical environment. *J Env Psychol*. (1996) 16:269–76. doi: 10.1006/jevp.1996.0022
23. Dragano N, Siegrist J, Nyberg ST, Lunau T, Fransson EI, Alfredsson L, et al. Effort-reward imbalance at work and incident coronary heart disease: a multicohort study of 90,164 individuals. *Epidemiol*. (2017) 28:619–26. doi: 10.1097/EDE.0000000000000666

24. de Sousa CC, de Araújo TM, Lua I, Gomes MR. Occupational stress and job dissatisfaction with health work. *Psicol Reflex Crit*. (2019) 32:18. doi: 10.1186/s41155-019-0132-5
25. McHugh MD, Kutney-Lee A, Cimiotti JP, Sloane DM, Aiken LH. Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Aff*. (2011) 30:202–10. doi: 10.1377/hlthaff.2010.0100
26. Chang FT, Hart LH. Human-animal bonds in the laboratory: how animal behavior affects the perspectives of caregivers. *ILAR J*. (2002) 43:10–8. doi: 10.1093/ilar.43.1.10
27. Arluke A. Trapped in a guilt cage. *New Sci*. (1992) 134:33–5.
28. Pishgooie AH, Atashzadeh-Shoorideh F, Falcó-Pegueroles A, Lotfi Z. Correlation between nursing managers' leadership styles and nurses' job stress and anticipated turnover. *J Nurs Manag*. (2019) 27:527–34. doi: 10.1111/jonm.12707
29. Mervis J. How much does the public support animal research? *Science*. (2015). Available online at: https://www.sciencemag.org/news/2014/09/how-much-does-public-support-animal-research-depends-question (accessed June 9, 2020).
30. Khoo SY. Justifiability and animal research in health: can democratisation help resolve difficulties? *Animals*. (2018) 8:28. doi: 10.3390/ani8020028
31. Karanikola M, Doulougeri K, Koutrouba A, Giannakopoulou M, Papathanassoglou EDE. A phenomenological investigation of the interplay among professional worth appraisal, self-esteem and self-perception in nurses: the revelation of an internal and external criteria system. *Front Psychol*. (2018) 9:1805. doi: 10.3389/fpsyg.2018.01805
32. Takase M, Maude P, Manias E. Impact of the perceived public image of nursing on nurses' work behaviour. *J Adv Nurs*. (2006) 53:333–43. doi: 10.1111/j.1365-2648.2006.03729.x
33. Bellot J. Defining and assessing organizational culture. *Nurs Forum*. (2011) 46:29–32. doi: 10.1111/j.1744-6198.2010.00207.x
34. Scott T, Mannion R, Davies H, Marshall M. The quantitative measurement of organizational culture in health care: a review of the available instruments. *Health Services Res*. (2003) 38:923–45. doi: 10.1111/1475-6773.00154
35. Tempest EL, English National Study on Flooding and Health Study Group, Carter B, Beck CR, Rubin GJ. Secondary stressors are associated with probable psychological morbidity after flooding: a cross-sectional analysis. *Eur J Public Health*. (2017) 27:1047. doi: 10.1093/eurpub/ckx182
36. Hunsaker S, Chen HC, Maughan D, Heaston S. Factors that influence the development of compassion fatigue, burnout, and compassion satisfaction in emergency department nurses. *J Nurs Scholarsh*. (2015) 47:186–94. doi: 10.1111/jnu.12122
37. *Professional Quality of Life Measure ver 5*. (2020) Available online at: https://proqol.org/ProQol_Test.html (accessed June 14, 2020).
38. Ludick M, Figley CR. Toward a mechanism for secondary trauma induction and reduction: reimagining a theory of secondary traumatic stress. *Traumatol*. (2017) 23:112–23. doi: 10.1037/trm0000096
39. Lerias D, Byrne MK. Vicarious traumatization: symptoms and predictors. *Stress Health*. (2003) 19:129–38. doi: 10.1002/smi.969
40. Sonnentag S, Bayer U. Switching off mentally: predictors and consequences of psychological detachment from work during off-job time. *J Occupation Health Psychol*. (2005) 10:393–414. doi: 10.1037/1076-8998.10.4.393
41. Bhui K, Dinos S, Galant-Miecznikowska M, de Jongh B, Stansfeld S. Perceptions of work stress causes and effective interventions in employees working in public, private and non-governmental organisations: a qualitative study. *BJPsych Bull*. (2016) 40:318–25. doi: 10.1192/pb.bp.115.050823
42. Brannick EM, DeWilde CA, Frey E, Gluckman TL, Keen JL, Larsen MR, et al. Taking stock and making strides toward wellness in the veterinary workplace. *J Am Vet Med Assoc*. (2015) 247:739–42. doi: 10.2460/javma.247.7.739
43. Kang M, Han A, Kim DE, Seidle T, Lim KM, Bae S. Mental stress from animal experiments: a survey with Korean researchers. *Toxicol Res*. (2018) 34:75–81. doi: 10.5487/TR.2018.34.1.075
44. McKenna KM, Hashimoto DA, Maguire MS, Bynum WE, 4th. The missing link: connection is the key to resilience in medical education. *Acad Med*. (2016) 91:1197–9. doi: 10.1097/ACM.0000000000001311

Conflict of Interest: The authors declare that the manuscript was prepared in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Veterinary Science

REVIEW
published: 08 November 2021
doi: 10.3389/fvets.2021.731003

Caring for the Animal Caregiver—Occupational Health, Human-Animal Bond and Compassion Fatigue

J. Preston Van Hooser[1]*, *Cynthia Pekow*[2], *Holly M. Nguyen*[3], *Dominic M. D'Urso*[4], *Sara E. Kerner*[5] and *Sally Thompson-Iritani*[6]*

[1] Office of the Animal Welfare, University of Washington, Seattle, WA, United States, [2] Veterans Affairs Puget Sound Health Care System, Seattle, WA, United States, [3] Department of Urology, School of Medicine, University of Washington, Seattle, WA, United States, [4] Yerkes National Primate Research Center, Emory University, Atlanta, GA, United States, [5] Department of Comparative Medicine, School of Medicine, University of Washington, Seattle, WA, United States, [6] Office of Research, University of Washington, Seattle, WA, United States

OPEN ACCESS

Edited by:
Mitsuaki Ohta,
Tokyo University of Agriculture, Japan

Reviewed by:
Shelly L. Volsche,
Boise State University, United States
Krishna Prasad Acharya,
Department of Livestock Services, Nepal

***Correspondence:**
J. Preston Van Hooser
jpvh@uw.edu
Sally Thompson-Iritani
sti2@uw.edu

Specialty section:
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

Received: 25 June 2021
Accepted: 11 October 2021
Published: 08 November 2021

Citation:
Van Hooser JP, Pekow C, Nguyen HM, D'Urso DM, Kerner SE and Thompson-Iritani S (2021) Caring for the Animal Caregiver—Occupational Health, Human-Animal Bond and Compassion Fatigue. Front. Vet. Sci. 8:731003. doi: 10.3389/fvets.2021.731003

Laboratory Animal Professionals experience many positive and rewarding interactions when caring for and working with research animals. However, these professionals also may experience conflicting feelings and exhaustion when the work is stressful due to factors such as limited resources, making end of life decisions, dealing with conflicting priorities, and negotiating animal care priorities with colleagues. These stresses may be further complicated by each individual's self-understanding and emotional investment in the human-animal bond. The term used for this type of complex emotional conflict and exhaustion is Compassion Fatigue. Compassion Fatigue in the Laboratory Animal Science setting is a combination of physical, emotional and psychological depletion associated with working with and caring for animals and their well-being in a research environment. The University of Washington has developed a Compassion in Science Program called Dare2Care which emphasizes self-care and helps Laboratory Animal Professionals identify stress factors and work toward a personal solution to relieve stress. The first step in developing a resiliency program is to assess the current culture and needs of the organization. At an institutional level we identified that we needed increased communication concerning study endpoints, as well as identified individuals with whom affected personnel can talk about personal concerns. We also implemented community events to reflect on the positive aspects of this field of work. We improved the physical work environment, and provided outlets established for personnel to express feelings via written word or artistically. Lastly, we started working with our Center for One Health to encompass a holisitic approach to the occupational health of our animal caregivers. One health is the relationship and interplay between people, animals and the environment and we needed to include emotional well-being in our assessment of the health of our personnel. A question was added to our occupational health screening form to include additional health or workplace concerns (e.g., Compassion Fatigue) not covered by the questionnaire, and we added a component of Compassion Fatigue awareness in our

training program. Here we review the importance of identifying Compassion Fatigue in the animal research setting, focus on developing a compassion resiliency culture and provide tools and coping strategies to validate and strengthen the human-animal bond with research animals and to sustain the care that is necessary for both people and research animals.

Keywords: compassion fatigue, compassion resiliency, human-animal bond, Dare2Care (D2C), laboratory animal professionals, occupational health, animal caregivers

ANIMAL RESEARCH IS STILL NECESSARY

The term "animal research" encompasses a broad range of scientific undertakings. Translational studies, where what is learned from animals can be directly applied to the situation in man or other animals often comes to mind. However, many studies are directed to understanding basic biology and mechanisms of disease, to provide fundamental knowledge, which in turn can lead to advancements in science or medicine. In the US, there are laws and regulations governing the use of research animals that include ethical oversight of laboratory animal care, training of personnel who will work with the animals, and a detailed write up of each research protocol. At the center of this ethical oversight is a benefit vs. harm analysis, in which the value of what is hoped to be gained from the research is weighed against the costs of that work which may include loss of animal life; the possibility that animals may experience pain or distress; and the use of resources including time, money, and good will. A discussion of the merits of research animal use and ethical oversight is beyond the scope of this article. Rather, the recommendations provided here are applicable to people working with research animals who understand the importance of ethically and scientifically justified research that uses animal models to further scientific advancement, but who grapple at a personal level with the costs (1).

COMPASSION FATIGUE AND ITS IMPACT ON THE LABORATORY ANIMAL SCIENCE COMMUNITY

Compassion Fatigue (CF), also known as secondary traumatic stress (STS), is a condition characterized by a deep physical and emotional exhaustion and pronounced change in the ability to feel empathy (2). CF is common among those who work directly with trauma victims (Health Care Professionals) and was first diagnosed in the 1950's in individuals working as human health care professionals. For Laboratory Animal Professionals (LAPs), CF can be defined as a combination of physical, emotional and psychological depletion associated with working with and caring for animals used in research. CF can result from repeated exposure to emotionally challenging and stressful situations that call for empathy and compassion toward another person or animal. LAPs may be at high risk for CF due to the care they provide, often for months or years, for research animals that may ultimately become sick or be euthanized for study objectives. Symptoms of CF range from depression, anxiety, cynicism and chronic physical ailments to isolation, absenteeism, hopelessness, denial, nightmares, substance abuse, and even suicide (3).

Other individuals involved in laboratory animal science including members of the Institutional Animal Care and Use Committee (IACUC), administrative support staff, trainers, behavioral management staff, cage wash teams, vendors, and facilities services personnel may also experience CF related to their support for an animal care program. The full impact and extent of CF in the lab animal community is difficult to assess and it is expected that personnel may be impacted at different times throughout their career. There is limited data from surveys that recognize CF is a problem (4, 5). To think that people can work in laboratory animal science and not be impacted emotionally by the work at some level is unrealistic. A quote that sums this thought well is "The expectation that one can be immersed in suffering and loss daily and not be touched by it is as unrealistic as expecting to be able to walk through water without getting wet" (6).

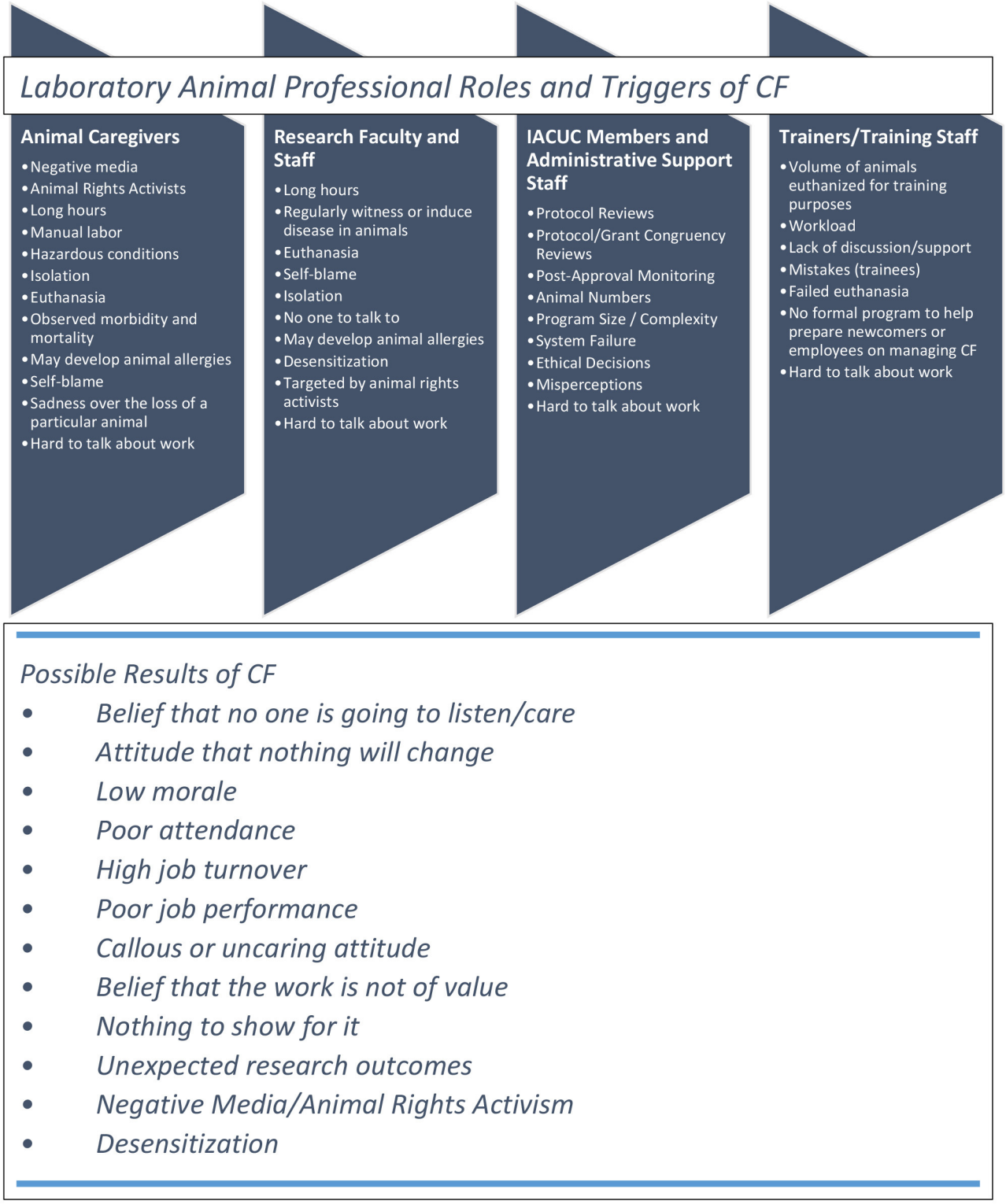
Acknowledging that compassion fatigue exists and providing support in the workplace are important, but many members of the laboratory animal science community feel unable to talk about their work due to the societal stigma around the use of animals in laboratory science. This means that they are reluctant to share the sorrows of their work and that they also rarely share the joys of important new discoveries with their families, communities, or even with colleagues.

Laboratory Animal Professionals can benefit from learning self-care strategies to maintain personal health and perspective to function effectively in the essential work that involves caring for animals, humans and for science.

EVALUATING STRESSORS THAT PROMOTE COMPASSION FATIGUE

A Laboratory Animal Professionals must establish ways to cope with the stressors that promote CF. Beyond knowledge and skill, empathetic and caring personnel provide humane and respectful care. Allowing appropriate outlets for expression can reinforce the integrity of the human-animal bond. Compassionate animal care is a foundation of good science (7).

If we evaluate current training requirements for personnel that work with laboratory animals we can see that there is a well-warranted emphasis on physical safety which includes: bites, scratches, kicks, physical trauma; ergonomic injury, hearing damage; zoonoses, allergens, blood-borne pathogens; caustic, infectious, radioactive, toxic agents; sharps, hot surfaces,



physical hazards; public safety, facility and computer security; disaster plans, fire, flood, bomb threat; and harassment, discrimination, and whistleblower protection. What is not covered is mental health training on emotional involvement and how this can be impacted by working with and caring for laboratory animals. The emotional toll that can occur when working with research animals should also be named as a work-related occupational health hazard and addressed proactively for all Laboratory Animal Professionals. We recommend each institution's hazard-prevention and safety training should

include Compassion Resiliency training, an understanding in recognizing CF, and strategies to prevent it.

Any institution, regardless of size or structure can, and should, implement a well-being program that focuses on building compassion resiliency among the laboratory animal science community, with the goal of identifying relevant tools, processes, and lessons learned that could help cope with CF when and if it occurs.

DEVELOPING AND IMPLEMENTING A SUSTAINABLE COMPASSION FATIGUE WELL-BEING PROGRAM

Compassion fatigue can be a normal consequence of caring. Therefore, development and implementation of a CF well-being program should be designed to assist all members of the research team and community in understanding and coping with this common concern by managing the emotional challenges resulting from the care and use of laboratory animals.

Leadership buy-in: Communication at all levels is essential to developing a sustainable Compassion Resiliency program to support an organization. Informing leadership up front of the goals and objectives of the process are important before beginning the first step. Current increases in literature are helpful in demonstrating that this is a recognized hazard in our industry (4, 5). A proposal that includes a measure of outcomes is important if possible but is currently lacking. Possible indicators of success can include an increase in worker satisfaction and an increased referral rate to the resources that the program offers. A well-stated quote for programs of support "It is better to have a support program and not need it than to need a support program and not have one (*Anthony "Tony" Gray, D2C Committee member, personal quote*). The value of having a program when it is needed cannot be understated.

The first step in developing a CF well-being program is to identify the problem. This might seem an obvious statement but, quite often, problems will have an impact for some time before they are recognized or brought to the attention of someone who can help. In many organizations, it is possible to set up formal systems of communication so that problems are reported early on, but such systems do not always work.

As a second step, once the problem has been identified, its exact nature needs to be determined: what are the goals and barrier components of the problem? Some of the main elements of the problem can be outlined, and an attempt at defining the problem should be made. This definition should be clear enough for one to be able to easily explain the nature of the problem to others.

The third step is to gather information relative to some goal; the quality and attainability of the goal then sets the stage for what will follow. The discrepancy between the current condition and wanted condition must be measured to appropriately identify the need. The need can be a desire to improve current performance or to correct a deficiency (8).

The needs assessment can look at resource allocation; the current culture, including values, and any hidden culture; what factors may be causing compassion fatigue; how is it impacting staff; how prevalent is it in the community; does compassion fatigue contribute to higher turnover and burnout in our profession; and what is currently being offered to promote well-being as well as whether employees are happy with those offerings? Direct measurements of well-being, such as surveys or interviews open to individuals from all aspects of laboratory animal care and use within the institution, as well as indirect measures such as error rates, can all help a program determine its needs.

The University of Washington has a research animal program and environment of great size and complexity. Rather than utilize an established survey method, the University of Washington proposed a novel observational approach—the first of its kind in lab animal science—in order to develop a program to give one another and their community emotional support and explore ways to combat CF. We wanted lab animal professionals to feel comfortable opening up and discussing personal feelings with an objective professional, without fear of reprisal or ridicule. To meet this need, we utilized the services of CopePlus, a small bureau specializing in compassion fatigue support programs for people working with laboratory animals (9). This involved individual conversations and assessments with personnel and identification of areas for resiliency support. Anonymity of the individual participants was guaranteed, to promote candor. Participants were all volunteers.

Based on the initial observations/feedback, a concept map was created using the information we were seeing to visualize the overlapping areas and potential commonalities. A concept map starts with an initial key concept, then links are made to main ideas and other related ideas that can lead to proposed actions (see **Figure 1**). This also allows for prioritization to tackle the high priority items first and ensure that all items are addressed over time.

As a next step, decisions are made on implementation of the proposed actions. Some concepts may be prioritized and actions may be accomplished quickly, while other ideas may be scheduled when possible or when higher priority items are completed. For example, if grief over the loss of laboratory animals is identified as a recurring concept, there may be related sub-concepts, such as needing to know in advance when animals will be euthanized. Possible actions or ways to notify persons of impending animal euthanasia dates link to that sub-concept.

After the concept map is constructed, strategies to implement the findings can then be pursued. It was clear, for the University of Washington's research community, those areas identified as causing CF would require more than a single person to manage. A committee was formed and given a name, Dare2Care (D2C). The D2C members took action to develop a well-being program with the aims of providing one another and their community emotional support, as well as exploring ways to provide tools for resiliency and coping in areas identified as causing compassion fatigue at the University of Washington (see **Figure 2**).

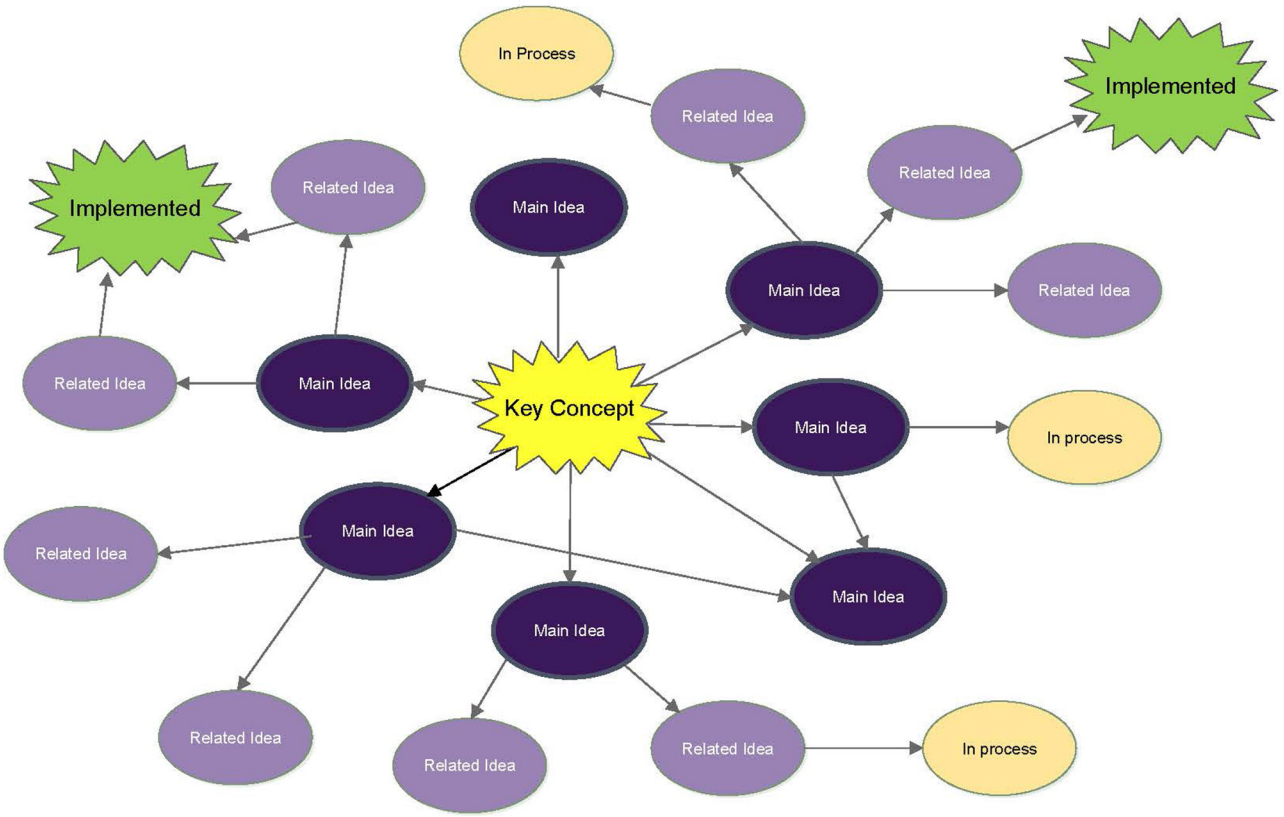


FIGURE 1 | Example concept map.

Dare2Care's Oath

As a member of the University of Washington's Dare2Care Compassion in Science Committee, I will uphold our committee's professional and ethical standards of respect, integrity, and honesty towards my fellow lab animal professionals. I am equally committed to the ethical care, health, well-being and positive environment of our research animals. I will attempt to help personnel affected by compassion fatigue by providing resources and/or listening with care to their concerns, and if I am unable to help, I will refer them to my fellow D2C members or to other UW resources as needed.

PROGRAM COMMITTEE

The University of Washington's (UW) Dare2Care (D2C) Compassion in Science Committee is comprised of volunteer UW employees. D2C members include animal caregivers, behavioral management staff, researchers, veterinarians, veterinary technicians, Institutional Animal Care and Use Committee (IACUC) members, and managerial administrators within the Office of Animal Welfare (OAW), the Washington National Primate Research Center (WaNPRC), the Department of Comparative Medicine (DCM), and the School of Medicine (SOM).

PROGRAM MISSION STATEMENT

Devising a mission statement took into account that this is a new program and a relatively new way of thinking. The program reflects a significant cultural evolution. The UWs Compassion in Science D2C mission statement is "To assist all

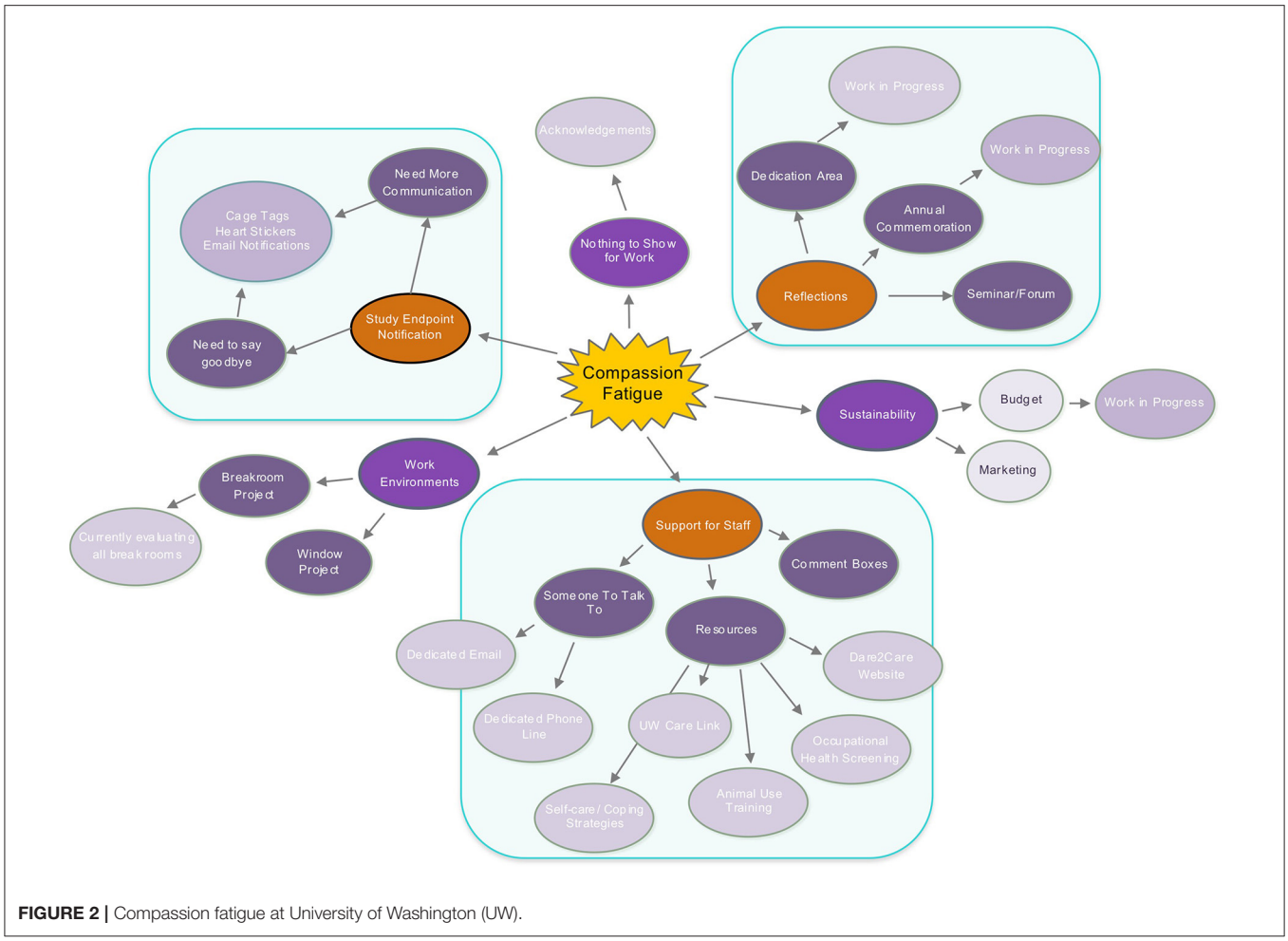


FIGURE 2 | Compassion fatigue at University of Washington (UW).

members of the research team to recognize compassion fatigue, raise awareness, and provide tools, strategies, and resources for managing human emotions in working with and caring for laboratory animals."

IDENTIFY INITIAL TARGET OBJECTIVES AND OTHER PROGRAM RELATED OBJECTIVES

At the University of Washington the D2C identified the following areas of emphasis:

- Study Endpoint Notification
- Support for Staff
- Reflections
- Recognition (Animal Caregivers)
- Work Environment/Breakroom Enhancements (Animal Caregivers)

Study Endpoint Notification

A theme heard repeatedly was that study endpoint notification is important to allow people to prepare for the end of their relationship with specific research animals. LAPs could go away on vacation, or even the weekend, and then return to find an animal they had been taking care of had reached study endpoint while they were away. It was evident that individuals wanted to be able to say goodbye to animals in their care before the animals reached their study endpoint and were euthanized. Prior endpoint notification can help people prepare emotionally for the fact that a particular study will be ending, and that the animals associated with it will be euthanized.

- Need to Say Goodbye: Gold heart euthanasia stickers that can be placed on a cage card were created and offered for use to research staff, to alert animal caregivers when animals are scheduled to be euthanized. Communication between researchers and animal caregivers can be difficult, as work hours may differ and people are busy. Additionally, some animal caregivers work in the same areas consistently, while others are shifted between areas and facilities. Our request is that the researcher will place a sticker on the cage card days or weeks before animals reach study endpoint. These gold, heart shaped stickers allow space to write an expected euthanasia date. We strive to make this simple to achieve. Our goal is to allow animal care staff time to emotionally prepare for the loss of animals with which they may have developed a bond, and offer the opportunity to acknowledge or say goodbye as

they need. This small action can assist with helping to curb compassion fatigue among our staff.

- Need More Communication: A study endpoint notification email template was created which incorporates an acknowledgment of the high levels of humane care the animals had received and the greater purpose the animals served for medical research. This email template is designed to be personalized and distributed to the care staff by the researcher prior to study endpoints.

Support for Staff

We identified personnel to talk to if someone needed support.

- Someone To Talk To: Having someone to talk to can help one feel better and can help improve their mental health (10). It is important to emphasize that they need someone to talk to who can relate to what they are going through. This is where providing opportunities for peer-to-peer support can be extremely helpful. When individuals experience grief, anxiety, or bereavement associated with animal loss, it is important to acknowledge that these feelings exist and provide support in the workplace. Addressing this need in a safe and supportive environment allows individuals to feel validated and strengthen their coping mechanisms. The goal is to create an open atmosphere and encourage staff to acknowledge feelings, free from shame or embarrassment of emotional reactions. Allowing appropriate outlets for expression can reinforce the integrity of the human-animal bond.
- Dedicated D2C Phone Line and Email: A dedicated phone line and email account were set up and answered by members of the D2C committee who have experience with compassion fatigue. This is not meant to substitute for professional help when it is needed and it is emphasized that referrals and additional resources should always be offered to someone that reaches out to talk. Personnel both within and outside of the University of Washington have used this valuable resource regularly.
- Resources: Making resources available to both the institutional staff and the broader community has been well-utilized as summarized below.
    - Dare2Care (D2C) Website: This is an open access website with resources, links and success stories that can be viewed at any time (11).
    - Occupational Health (OH) Screening: The University of Washington's EH&S Occupational Health (OH) screening now mentions compassion fatigue and emotional well-being as part of the lab animal users Annual Health Assessment as compassion and caring can be incorporated into our daily jobs and improve worker satisfaction (12).
    - Dedication Area/Annual Commemoration: This can be as simple as creating a memorial garden with rocks, trees or plants dedicated to special memories or by placing a bench outside where staff can sit quietly. Lab animal communities can hold an annual commemoration to come together and pay tribute to the research animals, and each other.
    - Training: CF training and awareness is now being included as part of the initial animal user training and specialized training modules across the university. CF is currently referenced, and as knowledge is gained, the training will be expanded.
    - Self-Care/Coping Strategies: There are several resources available that can help one develop self-care and coping strategies that will work for the individual (see links on the D2C site; Julie Squires). It is essential that individuals take responsibility for identifying their unique needs and what works for them in terms of self-care. Taking care of one's mental health includes managing the physical, emotional and intellectual well-being, which can be different for everyone. People can share their self-care with pictures or comments on a common sharing site (2).
    - Employee Assistance Program (EAP): Involve Employee Assistance Program (EAP) personnel in the Compassion Fatigue Support Program by offering them opportunities to learn about the unique aspects of CF in laboratory animal science. One way to promote this understanding is to invite designated EAP representatives to observe for a day in an animal facility, side-by-side with laboratory animal caregivers. This experience can assist both the EAP personnel and the animal care staff. EAP personnel gain improved understanding of the workplace and its particular challenges. Laboratory animal employees may feel more comfortable talking to a professional who has seen and has some understanding of the particular challenges of a research animal workplace.
- Institutional Specific Activities: Below are some examples of activities at the UW.
    - Comment Boxes: The Box Project is an outlet for LAPs to express themselves, anonymously if so wished, when they may not feel comfortable reaching out directly to another person. Cards and pens are provided for LAPs to write letters, poetry, farewell notes, or to make drawings as an expression of grief over the loss of an animal; these items could be deposited in the boxes (see **Figure 3**).

Reflections

A need to provide ways to better understand the benefits that come out of research conducted at the institution was also identified.

- Seminars: This quarterly series offers a forum for faculty and guest speakers staff to present their research and to describe how the knowledge gained relied on the use of laboratory animals and recognize the important role of animal models in medical breakthroughs and the role of the care provided by animal care staff. The seminar is open to all animal caregivers, research faculty and staff, and administrative support staff.

Recognition

Many people commented that they work long, difficult, and isolating days, and have nothing to show for their work.

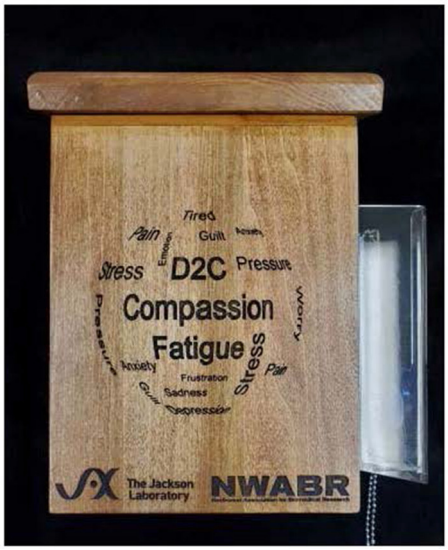


FIGURE 3 | Ken Gordon, Executive Director of the Northwest Association for Biomedical Research (NWABR; Seattle, WA) generously created 20 wooden boxes for this project. Jackson Laboratory (Bar Harbor, ME) donated funds to cover costs of laser engraving. These boxes were laser engraved by Zot Laser Cutting and Engraving (Greenwood, WA) with the D2C Compassion Fatigue Program Logo as well as NWABR and Jackson Laboratory logos. Boxes were polyurethane sealed and are currently in use in vivaria across the University of Washington.

- Acknowledgments: To address this need, D2C encourages researchers to acknowledge the contributions of animal caregivers their publications.

Work Environments

The Breakroom and Window Project is dedicated to providing brighter, more private, and more personal breakrooms in vivaria at the University of Washington, to provide a place for quiet self-reflection among Animal Caregivers. The University of Washington's newest state of the art vivarium boasts two secure, private underground floors and totaled over 142 million dollars to build. Even with the most advanced technological features, the breakroom for the laboratory animal professionals remain windowless due to the nature of the facility. Other vivaria on the UW campus were built well over 50 years ago and not only host the same windowless environments, but also exhibit the less desirable features of half century old buildings.

Research animal spaces at UW are inspected by the IACUC annually with the majority inspected at least twice a year. Conversely, LAP breakrooms are never inspected and therefore issues developing within are rarely reported, not to mention repaired.

One of the first UW breakrooms D2C enhanced had a multitude of unacceptable matters which included easily tripped circuit breakers delaying already short lunch breaks, a non-functioning clock, and shelves which were proving to be physical hazards for the tall LAPs. Many other breakrooms follow the same suite as this and D2C is striving to better the breakrooms through the Breakroom Project and the Window Project.

- Breakroom Project: The Breakroom Project was initiated to beautify breakrooms, which are typically windowless environments. Many, if not the majority, of animal caregivers do not leave the vivarium during the workday. Lunches and breaks are spent in breakrooms. Physical enhancements to the breakrooms, including such things as better appliances, lighting, furniture and paint are part of the project. An enhanced environment demonstrates to animal care staff that they are valued members of of the research team.
- Window Project: Antique window frames from weathered churches and buildings with decades of character were used to frame photos of the wilderness or animals to decorate and brighten the breakroom walls. These frames can give an illusion that the room has an actual window that is providing light. Additionally, some breakroom interior windows have had an adhesive opaque vinyl picture placed on them, which offers a slight, yet necessary curtain of privacy in addition to brightening the breakroom.

Sustainability

One important step in developing a compassion fatigue program is to ensure it sustains. The D2C committee meets monthly to discuss and review progress, establish new goals, and evaluate needs. Continuing to monitor the program and ensure that the actions are impactful is essential. Examples for measuring effectiveness include engagement [people show up], discussion [people talk about it], inquiries [people reach out when they need help] and attention [website hits]. As of October 2021, the UW Compassion in Science D2C website has had 16,754 page views from 84 countries and 1,450 cities. Reevaluation of the compassion fatigue well-being program should be considered on an ongoing basis.

Institutions should recognize that the need for a CF program may ebb and flow depending on external and internal factors; having a committee ready to act is essential to sustaining the program. CF committee members must be open-minded and willing to change the program focus depending on the needs of the personnel and with the understanding that some efforts may not result in a useful impact.

Resources including funding and personnel available to support the program are of course helpful; however, such resources may take time to establish, so planning for actions that can be taken when resources are limited is important. Continue to emphasize and justify the need to the institution, so that support can be encouraged and sustained. **Figure 4** illustrates an example D2C Toolkit.

SUMMARY

Compassion fatigue can be a normal consequence of caring. However, we can learn ways to provide and improve a support system within the laboratory animal workplace, to help personnel

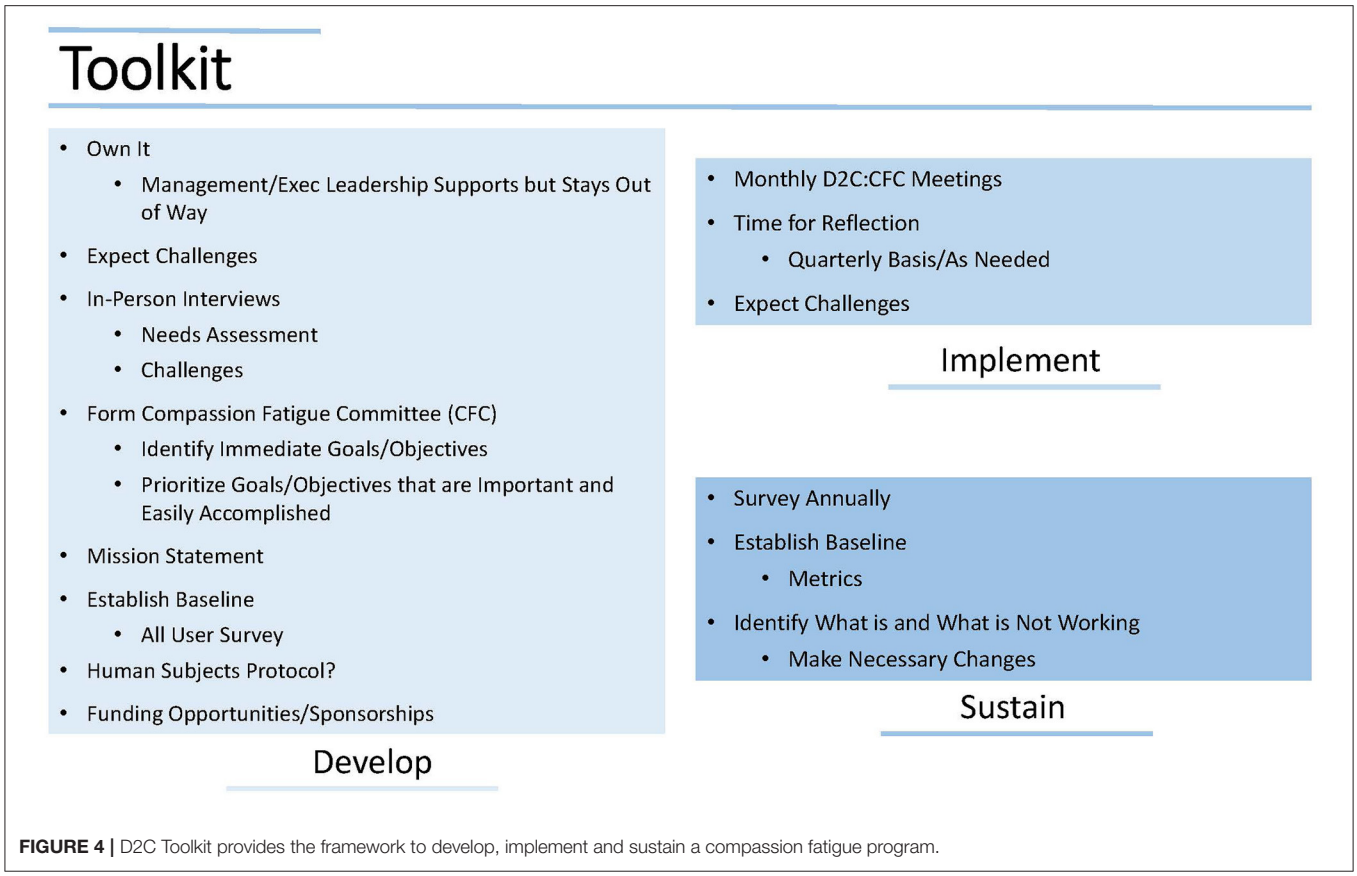


FIGURE 4 | D2C Toolkit provides the framework to develop, implement and sustain a compassion fatigue program.

become more resilient and to avoid becoming overwhelmed, shutting down, or leaving the animal care profession altogether. Such support helps to maintain a healthy and productive climate in lab animal science for humans, and future studies are needed on *how* improving CF in caregivers may help benefit the animals. The earlier an individual can recognize symptoms of concern that may indicate impending CF, the easier CF may be avoided. LAPs should not only keep a watchful eye on themselves, but also on colleagues. In addition, managers and executive leadership should be aware of warning signs such as an increased rate of employee absenteeism, friction between co-workers, understaffing, increases in mistakes, inability to complete assignments or to respect and meet deadlines, or negativity toward management.

Acknowledging that CF exists and providing support is key. When emotions are addressed appropriately, people can feel validated and their coping mechanisms will be strengthened. Ability to sustain and to form new bonds will also be reinforced. It is important to note that as our program evolved it transitioned from recognition of CF to a concentrated effort on compassion resiliency and ensuring that we have appropriate resources to support our staff going forward. The Covid-19 pandemic additionally brought to light that having a program in place to support staff that had to remain physically distanced and continue their regular work schedule was relied on for positive support for the teams.

We believe that recognizing compassion fatigue as it relates to laboratory animal science is the first step in addressing it. Providing the proper tools on managing compassion fatigue will help the laboratory animal staff and the research team as well as the animals. Ideally, every animal care and use program can develop and sustain a Compassion Resiliency Program, with the knowledge that compassionate care for research animals and people is a necessary component of humane research. In the best case, the leadership team within each laboratory animal use program recognizes the potential for compassion fatigue among all the staff, and supports and develops processes to identify and ameliorate CF.

Future studies need to include an overall assessment of the relationship and interplay between people, animals and the work environment to better support personnel—surveys should include an evaluation of whether this information can help improve health outcomes for personnel that support animal research. Additionally, looking for metrics or ways to assess how improved well-being of the humans affects the laboratory animal well-being can provide evidence linking this effort to the One Health concept. We have started working with our Center for One Health to encompass a holisitic approach to the occupational health of our animal caregivers. One health is the relationship and interplay between people, animals and the environment and we needed are including emotional well-being in our assessment of the health of our personnel (13).

DEFINITIONS

[a]In this document, the term Laboratory Animal Professionals (LAPs) includes all of those involved in the care and use of research animals in the laboratory, from animal care husbandry staff, veterinarians and veterinarian technicians, IACUC members, administrative support staff, research faculty and staff, behavioral management staff, cage wash staff, trainers, vendor and facilities services personnel.

[b]In the context of this article, the research environment is defined as the animal research facility, also known as the vivarium, which is a specially designed building type that accommodates exquisitely controlled environments for the care and maintenance of laboratory research animals. Animal research facilities are related to but distinct from research laboratories. The facilities are complex, and expensive to build and to operate, but they are vital to the support of a proper, safe, and humane research effort (14).

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

FUNDING

This work was supported by the NIH Grant No. P51 OD010425.

ACKNOWLEDGMENTS

The authors would like to thank our DCM and WaNPRC Animal Care Staff and our Veterinarians and Vet Tech Staff. We also thank the D2C Compassion in Science Committee and leadership at the University of Washington for their support, and Anneke Keizer, co-owner and founder of CopePlus.

REFERENCES

1. American Association for Laboratory Animal Science. *Cost of Caring: Recognizing Human Emotions in the Care of Laboratory Animals*. Memphis, TN: AALAS (2013).
2. Figley CR. *Compassion Fatigue in the Animal-Care Community*. Washington, DC: Humane Society Press (2006).
3. Smith P, Madrigal IP. *Stress, Compassion Fatigue and Burnout Handling in Veterinary Practice*. Palm Beach Garden, Florida: Grupo Asis Edra (2020).
4. LaFollette MR, Riley MC, Cloutier S, Brady CM, O'Haire ME, Gaskill BN. Laboratory animal welfare meets human welfare: a cross-sectional study of professional quality of life, including compassion fatigue in laboratory animal personnel. *Front Vet Sci*. (2020) 7:114. doi: 10.3389/fvets.2020.00114
5. Murray J, Bauer C, Vilminot N, Turner PV. Strengthening workplace well-being in research animal facilities. *Front Vet Sci*. (2020) 7:114. doi: 10.3389/fvets.2020.573106
6. Remen RN. *Kitchen Table Wisdom: Stories That Heal*. New York, NY: Riverhead Books (1996).
7. Nevalainen T. Animal husbandry and experimental design. *ILAR J*. (2014) 55:392–8. doi: 10.1093/ilar/ilu035
8. Kizlik B. *Needs Assessment Information (Wants determine needs). ADPRIMA*. https://www.adprima.com (accessed October 16, 2010).
9. CopePlus. Available online at: http://copeplus.com
10. Pennebaker JW, Kiecolt-Glaser JK, Glaser R. Disclosure of traumas and immune function: health implications for psycotherapy. *J Consult Clin Pshycol*. (1988) 56:239–45. doi: 10.1037/0022-006X.56.2.239
11. University of Washington Compassion in Science Program. *Dare2Care (D2C)*. Available online at: https://sites.uw.edu/d2c
12. Trzeciak S, Mazzarelli A. Compassionomics: the revolutionary scientific evidence that caring makes a difference. Pensacola, FL: Studer Group (2019).
13. King LJ, Anderson LR, Blackmore CG, Blackwell MJ, Lautner EA, Marcus LC, et al. Executive summary of the AVMA one health initiative task force report. *J Am Vet Med Assoc*. (2008) 233:259–61. doi: 10.2460/javma.233.2.259
14. Stark S, Petitto J, Darr S. *Animal Research Facility*. New York, NY (2017). Available online at: http://www.hlw.com/HLW_International_LLP

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Veterinary Science

REVIEW
published: 10 November 2021
doi: 10.3389/fvets.2021.734396

Social Workers in Animal Shelters: A Strategy Toward Reducing Occupational Stress Among Animal Shelter Workers

Janet Hoy-Gerlach[1]*, *Mamta Ojha*[1] *and Phil Arkow*[2]

[1] School of Social Justice, University of Toledo, Toledo, OH, United States, [2] National Link Coalition, Etowah, NC, United States

Animal shelter workers (ASWs) are at disproportionate risk of moral injury, secondary trauma, compassion fatigue, and burn-out. While there is an emerging body of literature developing on understanding the nuances of these experiences for ASWs, little work has been done on developing strategies to ameliorate occupational stressors and the negative effects of such for ASWs. Within this paper, occupational risks and protective factors for ASWs are summarized, and the emergence of social work within animal shelter settings as one strategy for helping to ameliorate the occupational stress experienced by ASWs is delineated.

Keywords: animal shelter staff, occupational stress, veterinary social work, compassion fatigue, human animal support services

OPEN ACCESS

Edited by:
Sally Thompson Iritani, University of Washington, United States

Reviewed by:
Heather Fowler, National Pork Board, United States
Joy Verrinder, Animal Welfare League Qld, Australia

***Correspondence:**
Janet Hoy-Gerlach
janet.hoy@utoledo.edu

Specialty section:
This article was submitted to Veterinary Humanities and Social Sciences, a section of the journal Frontiers in Veterinary Science

Received: *01 July 2021*
Accepted: *18 October 2021*
Published: *10 November 2021*

Citation:
Hoy-Gerlach J, Ojha M and Arkow P (2021) Social Workers in Animal Shelters: A Strategy Toward Reducing Occupational Stress Among Animal Shelter Workers. Front. Vet. Sci. 8:734396. doi: 10.3389/fvets.2021.734396

INTRODUCTION

Estimates suggest that ∼6.3 millions companion animals enter animal shelters every year in the U.S. and about 920,000 of them are euthanized (1). While there are tremendous rewards involved in working with shelter animals, individuals who do such work are also exposed to animal suffering and death and are at disproportionate risk of negative mental health outcomes. Individuals engaged in animal shelter-related work are at a disproportionately high risk of secondary trauma (2), and have a five times greater risk of developing Post-Traumatic Stress Disorder as compared to the national average (3). Individuals who worked as animal control workers were in the highest risk occupational risk group—along with police officers and other protective workforce roles (excluding armed forces/military) for workplace suicide (4).

Given the disproportionately high mental health risks faced by animal shelter workers—henceforth referred to as ASWs—there is a dire need to develop multiple strategies that mitigate these risks and mobilize protective factors for ASWs. ASWs are not the only occupation involving work with animals that are at disproportionate risk of experiencing such negative occupational effects. Similar to ASWs, veterinarians experience compassion fatigue (2, 5, 6), moral stress, moral distress or moral injury (7–9), secondary traumatic stress (10, 11), and burnout (2, 7), and are at a disproportionately high risk of suicide compared to the general population (12, 13). Specifically, veterinarians were found to be two to three times more likely to complete suicide as compared to the national average (12). Due to such occupational risks experienced by veterinarians, social workers have been increasingly incorporated into veterinary practice, and Veterinary Social Work has emerged as a unique area of social work practice (14).

Having a mental health provider or a social worker on staff for consultations, sessions, or de-briefs could similarly support the needs of ASWs (15). The risk factors and negative outcomes

faced by ASWs are multi-faceted and necessitate a range of responses; a small number of animal welfare organizations in the United States and Canada have begun to incorporate social workers on staff or as interns in an attempt to ameliorate these adverse situations. For example, the Arizona Humane Society added a social worker to staff as a "resource navigator" to elevate its intervention efforts to assist pet owners in crisis with sustainable, long-term solutions that would prevent them from unnecessarily surrendering their animals. "We learned early on that we can't care for pets if we don't care for those on the other end of the leash as well… the people," said Dr. Steven Hansen, President and CEO. The Resource Navigator also works closely with admissions and field rescue teams to provide crisis support and training to staff assisting on the front lines during crisis situations such as homelessness, financial hardships and domestic violence (16).

Social work offers one potential resource for ASW entities in helping to address both individual- and organization-level risk factors for occupational stress and related negative outcomes. The purpose of this article is two-fold: to explore how incorporation of social work is emerging as one potential strategy within animal welfare organizations to help mitigate the occupational stress experienced by ASW staff; and to offer specific approaches for expanding the presence of social workers in ASW settings.

OVERVIEW OF OCCUPATIONAL STRESSORS AND PROTECTIVE FACTORS IN ANIMAL SHELTER WORK (ASW)

Occupational Stressors in ASW

The occupational stressors experienced by ASWs put them at disproportionately high risk for a group of interrelated negative outcomes: moral injury; secondary trauma stress; burnout; compassion fatigue; lower job satisfaction; and job turn-over (3, 5, 17, 18). There is speculation that the core factor among these is what Andrukonis et al. (19) referred to as "moral distress," defined as that which "…occurs when a person engages in, bears witness to, fails to prevent, or learns about acts that transgress the individual's moral code…" (p. 2). The ASW—often drawn to this occupation due to caring about animals—may find it difficult to justify killing and suffering of shelter animals on moral grounds, resulting in experiences of psychological distress identified in the literature as *moral distress* or *moral injury* (8, 20). ASWs who directly participated in euthanizing animals were at significantly higher moral injury rates, suggesting that proximity to the incidence and decisions that rest solely on employees are likely to increase the incidence of negative impact on workers (3).

In addition to moral distress/injury, ASWs are disproportionately exposed to primary and secondary trauma. Performing/witnessing euthanasia can be a source of primary trauma for ASWs. Most ASWs enter shelter work because they care for animals, and their engagement in and exposure to euthanasia of healthy animals has been identified as a "caring-killing paradox" (17, 21, 22) that can induce perpetration-induced traumatic stress in these workers, and they are at a higher risk for developing Post-Traumatic Stress Disorder (23). In their seminal work, Reeve et al. (17) conducted an exploratory study to examine euthanasia-related strain among ASWs. Data was collected in two waves and results suggested that direct ASW involvement in shelter animal euthanasia caused significant stress and had a significant impact on their well-being and ability to function. This job-related stress among ASWs in the study was also associated with increased work-to-family conflict and somatic complains as well as lower levels of job satisfaction (17).

ASWs are also frequently exposed to animals who have been neglected, injured and abused; this comprises a form of secondary traumatic stress. Figley (24) defined secondary traumatic stress as the "natural and consequential behaviors and emotions resulting from knowing about a traumatizing event experienced by a significant other [animal] and the stress resulting from helping or wanting to help a traumatized or suffering person [or animal]" (p. 7). Simply put, secondary traumatic stress is a reaction an ASW can have upon being exposed to an animal's trauma; the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM 5) recognizes exposure to secondary trauma as a valid stressor criterion in diagnosing Post-Traumatic Stress Disorder (25).

In addition to negative outcomes related to animal harm exposure, burnout is related to chronic organizational/work life stressors that result in exhaustion, cynicism, and inefficacy (19). Leiter and Maslach (26) identified six areas of work life that are associated with burnout that have informed much of the subsequent research in this area: workload, control, reward, community, fairness, and values. Poor working conditions in many animal shelter environments put high physical and psychological job demands on ASWs (15), resulting in a higher incidence of stress among them (3). Conflicts with supervisors and low pay have also been identified as organizational stressors for ASWs (27).

While burnout is related to feeling apathetic and hopeless due to chronic organizational stressors, compassion fatigue pertains to the physical, emotional, and spiritual exhaustion from taking in the difficulties and suffering of others (28). Compassion fatigue encompasses both burnout and trauma and is a phenomenon frequently present in those in occupations that involve caring for others (19, 28). Andrukonis et al. (19) define compassion fatigue as "…a state of emotional dysregulation, comprising secondary traumatic stress and burnout, that negatively influences individuals in caring professions…" (p. 2). Euthanasia-related stress and degree of exposure to cruelty and neglect cases have been identified as the strongest risk factors for compassion fatigue among ASWs (2).

Protective Factors and Strategies to Reduce Risk in ASW

Research on protective factors against occupational stressors in ASW has been limited. Increased live release rates (LRR)—identified as the percent of animals that leave shelters with a positive outcome—were positively associated with lower moral injury among ASWs (3). LRR were also associated with compassion satisfaction, a concept linked inversely to

compassion fatigue and relating to feeling satisfied, competent, and supported by peers and management in the work of caring for others (28). However, LRR were also associated with secondary trauma, moral injury, and burnout among ASWs, suggesting that while more positive outcomes in shelters are associated with increased job satisfaction, there may also be associated stress involved in obtaining such (3).

An intrinsic motivation to help animals, affinity with animals in general, and attachment to shelter animals have been identified as resiliency factors against compassion fatigue among ASWs (29). ASWs who identified their work as meaningful and felt that it helped them to make a difference in these animals' lives appeared to have protective effects from the negative impacts of stressful situations at work (29). Study participants also reported social support from animal shelter workers as a resiliency factor and recognized the need for ongoing self-care (29).

Social support from other ASWs as an important resource in mitigating stress for ASWs was initially suggested by Baran et al. (27) who identified seeking conversations, interactions and relationships with "insiders"/other employees within one's occupation group as an important supportive resource in coping with occupational stressors, particularly when one's occupation entailed "dirty" tasks such as euthanasia that are stigmatized by the public. Anecdotally, the lead author of this publication observed the importance of "insider support" when arranging a self-care and stress reduction training for ASWs by their employee assistance provider. Numerous ASWs reported in their evaluations of the training that they felt the employee assistance provider presenter could not understand their stressors because she hadn't experienced things like the volume of unwanted cats occurring annually during the Spring "kitten season" and performing euthanasias. The following year, a similar training was offered at the request of ASWs, but the presenter for the second training was a Veterinary Social Worker from a busy veterinary teaching hospital who had been present for many animal trauma cases and euthanasias. While the basic content of the two trainings was very similar, the ability of the trainers to connect with the ASWs was dramatically different, as evidenced by comments in the training evaluations. Multiple evaluations from the second training had comments indicating that the attendees felt much more understood and effectively supported by the Veterinary Social Work presenter.

Rank et al. (30) identified a reluctance among at-risk individuals in animal-caring professions, including animal control and animal shelter employees, to seek interventional support for compassion fatigue. These employees are often unable to articulate their needs or give narrative to their experiences which include traumatic histories of their patients, bleak working conditions, high demands, minimal resources to cope with an endless stream of homeless animals, conflicts in the workplace and at home, and a lack of empathy from the public. They described a three-phase "training-as-treatment" protocol that was found to be both statistically and clinically effective in helping professionals lessen symptoms of compassion fatigue and enhance their resilience. Results of a study of 57 professionals found the protocol had a sustained ameliorative effect upon respondents' compassion satisfaction, burnout, trauma recovery, and state and trait anxiety. The intervention was said to offer "an ounce of prevention and a pound of cure to the symptom-saturated population of non-human-animal care professionals" (p. 55) and deemed to be worthy of further study.

In their "training-as-treatment" study, Rank et al. (30) described numerous implications for social work practice; training-as-treatment was conceptualized as a therapeutic intervention that social workers can utilize to reach more professionals such as ASWs who are at risk for compassion fatigue and who may be reticent to present for treatment otherwise. Rank et al. (30) concluded that social workers can play a major role in helping ASWs cope with compassion fatigue related to their stressors. Examples of such stressors include but are not limited to: witnessing animal suffering, awareness of euthanasia, having a responsibility for life, working with distressed and abusive clients, receiving negative public perceptions particularly *vis-à-vis* open-admission shelters, and having intense attachments to animals under their care.

Given the parallels between the occupational stressors experienced in veterinary settings and those experienced in ASW, and the positive impact Veterinary Social Workers have reportedly had in helping to ameliorate occupational stressors in veterinary practices (14), it is worth exploring how to expand the Veterinary Social Work model to include animal care and control professionals.

Trends in Veterinary Social Work That Are Applicable to ASW

The recognition of needs and opportunities for applying a social work model to assist professionals who work with animals was initiated with the notion of Veterinary Social Work, which entails training social workers to attend to human needs in veterinary clinics and hospitals (31). Such work generally revolves around four primary activities: grief and bereavement counseling for clients whose pets have died or are facing euthanasia; therapeutic animal-assisted interventions; addressing links between abuse of animals and potential co-occurring child maltreatment, domestic violence or elder abuse; and compassion fatigue and conflict management for staff (31). Veterinary Social Workers work on the individual one-on-one level, or on a larger scale working with communities or influencing public policy, and facilitate problem-solving, decision-making and psychoeducation about issues that involve animals to improve circumstances for the people involved, thereby benefiting the animals as well (32). All of these have potential applications as well in the animal shelter environment (33, 34).

Through having a knowledge base and intervention skill set in the facilitation of planned wellness-focused change at both the individual- and organization/social environment-levels, social workers have increasingly collaborated with veterinary professionals to help alleviate occupational stressors and risk factors over the past two decades (14). Veterinary Social Work has emerged as a specialized area of social work practice that specifically addresses the human issues that emerge within the human-animal relationship.

In 2002, under the leadership of social worker Dr. Elizabeth Strand, The University of Tennessee College of Veterinary Medicine and College of Social Work collaboratively established the first Veterinary Social Work certificate program within the graduate social work program—as a credential for practicing social workers—within the United States. (14). The Veterinary Social Work certificate program is completed by social workers who have MSWs and are currently working within the social work field.

The recognition of a need for Veterinary Social Workers within veterinary settings has continued to expand since the formalization of Veterinary Social Work Education (14). While there is no official count of the number of practicing Veterinary Social Workers, the University of Tennessee's Veterinary Social Work program has a mailing list of about 1,000 individuals (34, 35). Many Veterinary Social Workers have worked in private clinics and particularly in veterinary teaching hospitals, including Colorado State University, the University of Georgia, Michigan State University, the University of Minnesota, North Carolina State University, the Ohio State University, the University of Pennsylvania, Purdue University, the University of Tennessee, Tufts University, the Virginia-Maryland College of Veterinary Medicine and the University of Saskatchewan. Their role generally is two-fold: to address compassion fatigue among veterinary staff, and to address emergent psychosocial issues with human clients who are bringing their animals for treatment (36) , by providing expertise in these areas they enable staff to focus on their expertise in practicing veterinary medicine.

Private emergency and specialty veterinary practices are similarly increasingly hiring Veterinary Social Workers to address such issues (14). For example, the Veterinary Social Work team at BluePearl Specialty and Emergency Pet Hospitals, a veterinary provider organization with over 100 veterinary hospitals across the United States, developed a Wellness Ambassadors Program as a strategy to help mitigate occupational stressors and mental health risks among veterinary staff, create trained wellness champions across the organization, and promote a culture of health and well-being (37). Wellness Ambassadors will be trained in Mental Health First Aid, an evidence-based public education program similar to physical first aid in how it is conceptualized. Peer "insider support" from other veterinary staff members is a crucial component.

There is now international recognition of Veterinary Social Work being cast as not just limited to veterinary practices, but rather as an area of social work practice that supports and strengthens interdisciplinary partnerships that attend to the intersection of humans and animals (38). The International Association of Veterinary Social Work was formed in 2020 and serves as the professional organization for social workers across the globe who are engaged in this broad definition of veterinary social work, which is inclusive of social workers who address human-animal interaction issues across a wide range of practice settings and contexts (38). The organization's mission is to support and promote professionals who tend to the human needs that arise in the relationship between humans and animals by creating and maintaining professional standards, encouraging research, and advocating for a better world for all species (38). This broad conceptualization of Veterinary Social Work is inclusive of social work practice with humane societies and animal shelter settings.

Historical and Current Applications of Social Work in ASW

The addition of social workers to animal shelter environments represents a return to the historical connections linking social work-based child protection and animal protection (34); the first child abuse cases in the U.S. were handled by humane organizations and led to the founding of the first society for the prevention of cruelty to children, connecting an encompassing concern for equity and social justice in an attempt to use new Darwinian thought to lessen the distance between humans and animals (39). From the 1870s onward, child welfare and animal welfare work often overlapped: pioneering social reformer Jacob Riis (40) described the American Humane Association (AHA), organized in 1877 as a federation of local organizations, as protecting "the odd link that bound the dumb brute with the helpless child in a common bond of humane sympathy" (p. 150). Child protection closely aligned the fledgling animal protection movement with other social reform and social justice movements concerned with cruelty, violence and the social order (41, 42). For example, the Illinois SPCA (Society for the Prevention of Cruelty to Animals), founded in 1869, changed its name in 1877 to the Illinois Humane Society to more accurately represent an expanded focus that had come to include the prevention of cruelty to children (43). By 1922, 307 of the AHA's 539 animal protection organizational members also protected abused children as part of the same humanitarian continuum of care (44). Until the Great Depression, more humane societies operated orphanages than ran animal shelters, usually as a secular alternative to the work long done by religious organizations and the infamous public workhouses described by Dickens. The Connecticut Humane Society, the last humane society to handle child protective services in lieu of a government agency, did not relinquish that role until 1966 (45).

An emerging movement in animal sheltering work referred to as Human Animal Support Services (HASS) is revisiting the interconnectedness of human and animal welfare service provision. A coalition of 37 pilot shelters in the U.S. and Canada is implementing a community collaborative model that entails partnering with local human service providers to keep animals in their homes and communities, rather than in shelters (46). This aim is accomplished through empowering pet owners to find solutions for common human-animal challenges, uncovering the root causes of animal problems while conducting field services, and building community partnerships that treat people and animals as a family unit (46). HASS shelters offer case management (a social work function) that provides resources and support for struggling pet owners, such as pet food banks, affordable veterinary care, mental health care, temporary foster care for pets when owners are in a health or economic crisis, and housing help (46). These likewise are all within the sphere of traditional social work activities.

Many animal shelter jobs, though not specifically designated as a social work position, lend themselves to individuals with social work training and perspective. These include positions in human resources, adoption counseling, grief counseling, client support services, community assistance services, foster care placement, volunteer coordination, and staff training, as well as senior management positions in executive leadership and development. Many shelters offer foster care for pets displaced by owners who are homeless, victims of disasters or survivors of domestic violence who need counseling and support. Numerous larger animal shelters have veterinary departments specializing in animal shelter medicine for their own animals, and low-cost services for the public, where social workers can easily assume the same responsibilities and functions as Veterinary Social Workers who work within in private practices and university teaching hospitals.

A handful of animal care and control shelters across the United States and Canada have begun to formally incorporate social work roles, to support people coming to shelters for assistance and, to a lesser extent, to address the occupational stress related to ASW. In addition to the previously-mentioned "resource navigator" at the Arizona Humane Society, other social work and community caseworker positions and internships have reportedly opened up at organizations (47) including: Animal Haven in New York City; the Animal Humane Society in Minneapolis; the Animal Rescue League of Iowa; the Denver, Colo. Animal Shelter; the Denver, Colo. Dumb Friends League; the Houston SPCA; the KC Pet Project in Missouri; the Lawrence, Kans. Humane Society; the Lifeline Animal Project in Georgia; the Oregon Humane Society; the Pima County, Ariz. Animal Care Center; the Royce-Hurst Humane Society in Colorado; and the Santa Cruz County, Calif. Animal Shelter, among others. A few similar positions and internships have been reported anecdotally in Canada and Australia. The Toledo Humane Society in Ohio has had graduate level social work interns since 2010, with one of the primary internship tasks being to address staff wellness and amelioration of occupational stressors (34).

Opportunities to Integrate Social Work Into ASW

Despite a history of interconnection, non-profit animal welfare and governmental animal control agencies have often operated in isolation outside the purview of human services agencies (48). Consequently, interagency cooperation, and cross-training have been minimal, and cross-reporting of animal abuse by child protection workers and of child maltreatment by humane agents and animal control officers, though required or permitted by several states' laws, has been sporadic (49).

The isolation of animal care and control from other social service agencies creates situations where ASWs are often unaware that their counterparts in human services experience similar stressors and that there are social work and mental health resources available to assist them. This lack of knowledge and coordination among community systems constricts the potential for creative and effective collaborations and can increase the risk of harm to people and animals in situations where both human and animal abuse co-occur.

Formally integrating social work into animal care and control shelters would not only continue the historical precedent and solidify the emerging collaborative relationships forming through HASS endeavors, but would also create a new linkage between humane and human services that could reduce a silo effect in which cross-disciplinary and trans-species community collaborations rarely occur.

Social workers can facilitate bridging these segregated service delivery systems through the profession's longstanding commitment to community-level action, intervention and change. Social workers can work through animal shelters to organize species-spanning community coalitions, link organizational champions, and connect consumers and professionals for the well-being of underserved and at-risk individuals and family members (50).

Animal control and humane officers frequently have access to pet owners' homes in the course of their investigations, and in the process may observe conditions detrimental to the welfare of children, youth and others. In addition, cruelty investigations which result in the removal of animals from a home could be an additional stressor on the family system and could lead to increased risk for vulnerable family members. Social workers can train shelter personnel on the intersectionality of animal abuse and human violence and the procedures for making referrals to social services agencies (33). They could also play crucial roles in the investigation of animal hoarding cases and the creation of multidisciplinary animal hoarding task forces (51).

Some animal shelters, often working with juvenile and adult detention centers, have implemented animal-assisted therapy interventions where individuals who have offended, or who are at risk, train dogs with behavior problems who are at risk of being euthanized. Using positive reinforcement techniques, these programs teach teamwork, non-violent conflict resolution and collaboration skills to save animals' lives and modify the behaviors of abusive and traumatized individuals (52).

Other untapped social work opportunities in animal shelters might include:

- strengthening collaborations with domestic violence shelters and mobile meals programs;
- directing and Expanding pet visitation programs into long-term care facilities and animal-assisted interventions for at-risk populations;
- developing pet loss grief support groups;
- developing safety net supportive programming for individuals who experience a medical, economic or housing crisis that temporarily makes it difficult to keep an animal;
- defusing contentious confrontations with shelter clients by resolving customers' complaints and needs for services; and
- connecting pet owners with community resources, such as low-cost pet and veterinary services, animal behavioral counselors, pet food banks, and social services agencies (33).

Social work support offers promise as a resource in animal shelter settings. Animal shelters appear poised for such systemic

change. The service philosophy in the animal shelter community is evolving to recognize that treating the symptoms of animal welfare problems, such as animal homelessness, abuse and neglect, is only a stopgap solution: to be truly effective, underlying community and family stressors must be addressed (53). Identification and intervention with community and family stressors lies squarely within the scope of practice of social work, and social workers can thus readily help to address such issues in ASW.

Building a Framework to Incorporate Social Workers Into ASW

In order to implement these concepts and incorporate social workers into the animal shelter environment, several key developments must occur to make what is currently a novel and unevaluated concept into a more widely recognized and supported area of social work practice. These include but are not limited to:

- Developing and expanding human-animal bond content in social work education programs;
- Establishing Veterinary Social Work as a specialty area of social work practice;
- Encouraging social work field placements and internships at animal shelters;
- Encouraging the development of social work internships in animal shelter environments;
- Expansion of human-animal interaction content in social work continuing education; and
- The promotion of social work positions in animal shelter settings by national animal care and control organizations.

Development of Human-Animal Interaction-Related Curriculum Content in Social Work Degree Programs

A serious gap exists in the professional training of social workers with regards to recognizing the bonds and challenges that emerge in the relationships people have with animals (51). According to the American Pet Products Association (54) annual demographic survey—the largest demographic survey of those with companion animals in the United States−70% of U.S. households report having at least one companion animal. The majority of clients encountered by social workers in the United States are thus likely to have one or more companion animals. As of this writing, the National Link Coalition (55) has identified only 27 schools of social work, out of 889 accredited BSW and MSW programs in the U.S., where human-animal interactions are formally addressed in the curriculum. While social workers are trained to honor diverse client definitions of family, more professional training is needed to acquaint traditionally humancentric social workers in working with multi-species families and the resources that support them. The Council on Social Work Education, as the national accreditation body for social work programs in the United States, could develop and provide resources to support the development of human-animal interaction content for infusion into schools' curriculum.

Expanding awareness of the impact of animals and animal-related work in people's lives across social work settings can begin with something as simple as routinely including questions about pets in intake forms, assessments, and definitions of family support systems (51, 56, 57). As assessing clients' needs is an important step in developing the best plan to solve clients' problems, including pet protective factors in clients' ecologies should be considered a relevant environmental factor in social work practice theory (58). Collecting information about all the pets and humans in a family communicates interest and concern for the whole family and demonstrates an integrated approach to care in planning appropriate interventions and preventive care. By routinely considering human-animal relationships in interventions and assessments and working collaboratively with community resources—such human-animal support services at animal shelters and accessible veterinary services—that can help resolve clients' animal-related concerns, social workers can be more holistic and effective in resolving clients' needs and challenges and in preventing further abuse of vulnerable members of families and communities (33, 51). Such inclusion of human-animal interaction considerations within routine social work practice may also help to prevent surrenders of pets to animal shelters due to lack of resources by proactively linking people with the supports needed to keep their companion animals, ultimately helping to mitigate this aspect of ASW occupational stress.

Establishment of Veterinary Social Work as a Specialty Area of Social Work Practice

In addition to expanding human-animal interaction content as foundational knowledge in social work degree programs, Veterinary Social Work needs to be established as a specialty area of practice. The establishment of the International Veterinary Social Work Association in 2020 was an important first step in creating a specialty practice area focused on developing professional expertise related to addressing human needs that emerge in human-animal interaction.

Educational opportunities for post-graduate specialization in Veterinary Social Work also need to be expanded. Currently only one school—the afore-mentioned certificate program at the University of Tennessee—explicitly specializes in Veterinary Social Work. The University of Tennessee Veterinary Social Work program encompasses a broad conceptual view of Veterinary Social Work, primarily focusing on practice in veterinary settings but acknowledging a wide range of settings in which human needs intersect with animal health and welfare. The vision of VSW-CP [Veterinary Social Work-Certificate Program] is at the University of Tennessee is "to produce professional social workers knowledgeable in the practice and skills necessary to help people through human animal relationships in a variety of settings [emphasis added] and through a variety of micro and macro practice methods" (59). This program could be expanded to have more explicit content on emerging opportunities in animal shelters and could be replicated through partnerships with social work programs across the United States.

Encouraging Social Work Field Placements and Internships at Animal Shelters

As part of an expanded inclusion of human-animal relationships in general social work education and the establishment of Veterinary Social Work as a practice specialty, field placement directors in social work programs could recommend community animal shelters as fruitful venues for field placements and internships. Some schools of social work are already recognizing field placement opportunities for MSW candidates working with veterinary facilities, animal shelters, agencies encountering animal hoarding and other traumatic situations, and people working with animals in domestic violence facilities, schools and human healthcare agencies (60).

Since 2010, graduate social work students have completed internships for academic credit at the Toledo Humane Society in Ohio to help reduce staff occupational stress, and to help address the human issues emergent in the provision of animal welfare services (34). The interns, using the social work change facilitation skill set, built relationships with ASWs and developed and implemented numerous interventions aimed at ameliorating occupational stress and risk factors, including:

- Shadowing staff and participating in shelter departments to learn shelter operations and organizational culture and build relationships with ASWs;
- Assessing with shelter staff their stressors and strengths and what they felt would be most helpful in reducing stress;
- Based on staff input and feedback, planning, implementing and evaluating a "Wellness Week" at the shelter that entailed a lunch and daily stress-reducing group activities that included donated lunches, therapeutic massage, painting instructors, and creating spaces for staff to connect with each other and provide informal peer support;
- Working toward building a culture of wellness through crafting and sending weekly emails which incorporated ASWs' strengths, interests, and ideas;
- Supporting shelter staff as needed or requested with interactions with the public;
- Providing consultation and psychosocial support to staff as needed or requested;
- Providing information and referrals to address human needs that emerged in their interactions with the public; and
- Collaborating with social services entities to help train human service professionals on cross-reporting of animal cruelty, child abuse, and elder abuse (particularly relevant based on recent legislation in Ohio that mandates cross-reporting).

Expansion of Human-Animal Interaction Content in Social Work Continuing Education

Continuing education programming that encompasses human-animal support content for practicing social workers can be expanded and provided through entities that provide ongoing continuing education credits, such as the National Association of Social Workers (NASW) and its state chapters. There is already some momentum in this area; NASW state chapters in New York and Ohio have ongoing active working groups that offer continuing education workshops and other resources to support the practice of social work that is inclusive of human-animal interaction issues. Such trainings better equip social workers to provide quality care and support for humans who have companion animals in their social systems (30), as well as for those working in animal health or welfare who face disproportionate health risks due to occupational stressors.

Promotion of Social Work Positions in ASW Through National Animal Care and Control Organizations

Recognizing stressors (61) and high suicide rates among the veterinary profession, (62) the American Veterinary Medical Association has taken a leadership role in promoting self-care and well-being in the workplace. This campaign, which includes animal shelter veterinarians, could be adapted and modified to meet the needs of animal shelters. It could be promoted by the various national organizations which provide training and best-practice guidelines for animal shelters, such as the ASPCA, the Association for Animal Welfare Advancement, the Association of Shelter Veterinarians, Humane Society of the U.S., and the National Animal Care and Control Association.

Such an emphasis on wellness could easily include the addition of full- or part-time or contracted social work services. Given the chronic budget constraints faced by local animal shelters, such programs would conceivably require external funding sources from the philanthropic sector. Charitable organizations dedicated to the promotion of human and/or animal welfare could be made aware of the potential for animal shelter social work to save lives and help make humane societies' working environments truly humane.

Additional Research Needs

There is admittedly an unfortunate paucity of research that targets occupational stressors inherent to animal welfare organizations (15). The limited literature that does exist regarding animal shelter workers is primarily focused on the assumption that euthanasia is the predominant source of occupational stress (17, 27). There is more literature on the occupational stressors impacting veterinarians, including challenging clients with unrealistic demands, low pay, long and irregular work schedules, insufficient staffing levels, voluminous caseloads, negative public perceptions, physical risks from aggressive animals, and frequent contact with death and dying (13, 62–65). It may be surmised that many of these same conditions can apply to ASWs and additional research is needed to examine these conditions in the animal shelter environment, their impact on employee satisfaction, and the potential for social work to alleviate resulting problems.

Moral injury has become an emerging topic in the animal care community. Future studies should evaluate potential moral stressors specific to animal care work. A better understanding of the causes of ASW distress will allow for better-informed intervention methods (3).

Staff inclusion in decision-making by management related to euthanasia has been identified by frontline staff as a way to decrease euthanasia-related occupational stress (66). However, in a later study, there was not a reduction in euthanasia-related

stress among ASWs who identified having significant decision-making input related to euthanasia (3). These findings suggest a more nuanced investigation relating to decision-making input and support is likely necessary to determine how these may serve as protective factors for ASWs.

While most social workers in animal shelter settings have not as yet primarily focused on occupational stress reduction of ASWs, it is likely that preventing animal intakes by linking people with resources to keep their pets may have an ameliorating effect on ASW occupational stress; this is an area needing future research.

The effectiveness of the limited number of Veterinary and Animal Shelter Social Workers has never been adequately evaluated. Research is needed to evaluate the effectiveness of such positions using such metrics as employee retention, job satisfaction, client satisfaction with services, number of grief support and counseling sessions conducted, and other empirical indicators.

CONCLUSION

If we care about the animals, we must also care about the workers who care for them and take steps to ameliorate ASW occupational stress (67). Given the multi-faceted nature of the high risks and level of stress endured in ASW, and the value of the work they do in safeguarding the well-being of animals in our society, it is crucial that a range of strategies are put into place to help ameliorate the risks to the well-being of ASWs. While knowledge is building on the nature of these occupational stressors and their negative outcomes, development of approaches for reducing them has been slower.

Incorporating social work practice within animal shelter settings has numerous applications for alleviating suffering and promoting well-being for humans and animals (51). Arkow (33) described Veterinary Social Work as the human side of veterinary medicine and the animal side of social work. Extrapolating from how social workers in veterinary settings are helping to ameliorate occupational stress for veterinary staff, the role of social workers in humane societies and animal shelters is a potential strategy that needs to be investigated and refined as a support for ASWs. Veterinary Social Workers could assist animal shelters whose staff are trained in animal welfare and behavior but are less familiar with the problems existing at "the other end of the leash."

To maximize the potential of social work as a stress alleviating strategy in ASW, a framework for incorporating social work in ASW settings must be created. Specific components of such a framework include but are not limited to:

- Developing and expanding human-animal bond content in social work education programs;
- Establishing Veterinary Social Work as a specialty area of social work practice;
- Encouraging social work field placements and internships at animal shelters;
- Encouraging the development of social work internships in animal shelter environments;
- Expansion of human-animal interaction content in social work continuing education; and
- The promotion of social work positions in animal shelter settings by national animal care and control organizations.

Through direct supportive work with ASWs and ASW organizations, as well as systems-level coalition/policy work and reducing human client-related issues *via* provision of HASS services/referrals which may serve to indirectly reduce ASW stress, social workers offer promise as a stress-reducing presence in the lives of ASWs.

AUTHOR CONTRIBUTIONS

JH-G: developed concept for this paper and overall outline and writing of introduction, social work and veterinary social work sections, editing of literature review, and integration of all sections. PA: provided substantive revisions with broadening of article scope, strengthened literature review, and added/expanded content on social work contributions to animal shelter work. MO: researched and wrote preliminary literature review on concepts (compassion fatigue, burn out, etc.), and occupational stressors of animal shelter workers. All authors contributed to the article and approved the submitted version.

REFERENCES

1. ASPCA. *Pet statistics*. (2021). Available online at: https://www.aspca.org/helping-people-pets/shelter-intake-and-surrender/pet-statistics (accessed August 27, 2021)
2. Hill EM, LaLonde CM, Reese LA. Compassion fatigue in animal care workers. *Traumatology*. (2020) 26:96–108. doi: 10.1037/trm0000218
3. Andrukonis A, Protopopova A. Occupational health of animal shelter employees by live release rate, shelter type, and euthanasia-related decision. *Anthrozoös*. (2020) 33:119–31. doi: 10.1080/08927936.2020.1694316
4. Tiesman HM, Konda S, Hartley D, Chaumont-Menéndez C, Ridenour M, Hendricks S. Suicide in U.S. workplaces, 2003–2010: A comparison with non-workplacesuicides. *Am J Prevent Med*. (2015) 48:674–82. doi: 10.1016/j.amepre.2014.12.011
5. Figley CR, Roop RG. *Compassion Fatigue in the Animal-care Community*. Washington, DC: The Humane Society of the United States Press. (2006).
6. Rohlf VI. Interventions for occupational stress and compassion fatigue in *animal* professionals—A systematic review. *Traumatology*. (2018) 24:186–92. doi: 10.1037/trm0000144
7. Foote A. Moral distress, compassion fatigue and burnout in veterinary practice. *Veterinary Nurse*. (2020) 11:292–5. doi: 10.12968/vetn.2020.11.7.292
8. Montoya AI, Hazel S, Matthew SM, McArthur ML. Moral distress in veterinarians. *Veterinary Rec*. (2019) 185:631–631. doi: 10.1136/vr.105289
9. Rollin, B. Euthanasia and moral stress. In: DeBellis R. editor. *Loss, Grief and Care*. New York, NY: Howorth Press. (1986) 115–126.
10. Hanrahan C, Sabo BM, Robb P. Secondary traumatic stress and veterinarians: Human–animal bonds as psychosocial determinants of health. *Traumatology*. (2018) 24:73–82. doi: 10.1037/trm0000135
11. Ouedraogo FB, Lefebvre SL, Hansen CR, Brorsen BW. Compassion satisfaction, burnout, and secondary traumatic stress among full-time

veterinarians in the United States (2016–2018). *J Am Vet Med Assoc.* (2021) 258:1259–70. doi: 10.2460/javma.258.11.1259
12. Tomasi SE, Fechter-Leggett ED, Edwards NT, Reddish AD, Crosby AE, Nett RJ. Suicide among veterinarians in the United States from 1979 through 2015. *J Am Veterinar Med Assoc*. (2019) 254:104–12. doi: 10.2460/javma.254.1.104
13. Witte TK, Spitzer EG, Edwards N, Fowler KA, Nett RJ. Suicides and deaths of undetermined intent among veterinary professionals from 2003 through 2014. *J Am Veterinary Med Assoc.* (2019) 255:595–608. doi: 10.2460/javma.255.5.595
14. Cima G. Social work expands in veterinary hospitals: emergency, specialty practices hiring to counsel staff members, clients. *J Am Veterinar Med Assoc.* (2020) 256:1310–14.
15. Dunn J, Best C, Pearl DL, Jones-Bitton A. Occupational stressors and desired changes for wellness amongst employees at a Canadian animal welfare organization. *Canad Veterinar J.* (2019) 60:405–13.
16. Arizona Humane Society. *Social Worker Joins Arizona Humane Society's pet Resource Center*. (2020). Available online at: https://www.azhumane.org/2020/05/social-worker-pet-resource-center/ (accessed August 26, 2021).
17. Reeve CL, Rogelberg SG, Spitzmüller C, DiGiacomo N. The caring-killing paradox: euthanasia-related strain among animal-shelter workers. *J Appl Soc Psychol.* (2005) 35:119–43. doi: 10.1111/j.1559-1816.2005.tb02096.x
18. Scotney RL, McLaughlin D, Keates HL. A systematic review of the effects of euthanasia and occupational stress in personnel working with animals in animal shelters, veterinary clinics, and biomedical research facilities. *J Am Vet Med Assoc.* (2015) 247:1121–30. doi: 10.2460/javma.247.10.1121
19. Andrukonis A, Hall N, Protopova A. The impact of caring and killing on physiological and psychometric measures of stress in animal shelter employees: a pilot study. *Int J Environ Res Public Health.* (2020) 17:9196. doi: 10.3390/ijerph17249196
20. Williamson V, Stevelink SA, Greenberg N. Occupational moral injury and mental health: systematic review and meta-analysis. *Br J Psychiatr.* (2018) 212:339–46. doi: 10.1192/bjp.2018.55
21. Arkow P. The humane society and the human-companion animal bond. *Veterinar Clinic NA Small Anim Pract.* (1985) 15:455–66. doi: 10.1016/S0195-5616(85)50317-4
22. Arluke, A. Managing emotions in an animal shelter. In: Manning A, Serpell J. editors. *Animals and Human Society* New York, NY: Routledge (1994). p. 145–65.
23. Bennett P, Rohlf V. Perpetration-induced traumatic stress in persons who euthanize nonhuman animals in surgeries, animal shelters, and laboratories. *Soc Anim.* (2005) 13:201–20. doi: 10.1163/156853005492 7753
24. Figley CR. Compassion fatigue: Toward a new understanding of the costs of caring. In: Stamm BH. editor. *Secondary Traumatic Stress: Self-care Issues for Clinicians, resEarchers, and Educators.* Derwood, MD: The Sidran Press (1995). p. 3–28.
25. American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders, DSM-5* (5th *ed.).*
26. Eiter M, Maslach C. Areas of worklife: a structured approach to organizational predictors of job burnout. In: Perrewe PL, Ganster DC, editors, *Research in Occupational Stress and Well-being*. London: Elsevier. (2004). p. 91–134.
27. Baran BE, Rogelberg SG, Lopina EC, Allen JA, Spitzmüller C, Bergman M. Shouldering a silent burden: the toll of dirty tasks. *Hum Relat.* (2012) 65:597–626. doi: 10.1177/0018726712438063
28. Stamm, B. H. (2002). Measuring compassion satisfaction as well as fatigue: Developmental history of the Compassion Satisfaction and Fatigue Test. In C. R. Figley (Ed.), *Treating Compassion Fatigue* (pp. 107–119). Brunner-Routledge.
29. Levitt AL, Gezinski LB. Compassion fatigue and resiliency factors in animal shelter workers. *Soc Anim.* (2020) 28:633–50. doi: 10.1163/15685306-12341554
30. Rank MG, Zaparanick TL, Gentry JE. Nonhuman-animal care compassion fatigue: training as treatment. *Best Pract Ment Health.* (2009) 5:40–61.
31. Veterinary Social Work. *Attending to Human Needs at the Intersection of Veterinary and Social Work Practice*. (2021). Available online at: https://vetsocialwork.utk.edu/ (accessed August 26, 2021).
32. Poe B. Veterinary social workers. (2020). Available online at: https://ivcjournal.com/veterinary-social-workers/ (accessed August 26, 2021).
33. Arkow P. Human–animal relationships and social work: opportunities beyond the veterinary environment. *Child Adolesc Soc Work J.* (2020) 37:573–88. doi: 10.1007/s10560-020-00697-x
34. Hoy-Gerlach J, Delgado M, Sloane H, Arkow P. Rediscovering connections between animal welfare and human welfare: creating social work internships at a humane society. *J Soc Work.* (2019) 19:216–32. doi: 10.1177/1468017318760775
35. Neumann J. *Need to Make Tough Decisions About Your Pet? A Veterinary Social Worker Can Help. Washington Post*. (2019). Available online at: https://www.washingtonpost.com/lifestyle/wellness/need-to-make-tough-decisions-about-your-pet-a-veterinary-social-worker-can-help/2019/09/13/ce8090c8-d4c4-11e9-86ac-0f250cc91758_story.html (accessed August 26, 2021).
36. Holcombe TM, Strand EB, Nugent WR, Ng ZY. Veterinary social work: practice within veterinary settings. *J Hum Behav Soc Environ*. (2016) 26:69–80. doi: 10.1080/10911359.2015.1059170
37. BluePearl Media. *BluePearl Launches Wellness Ambassador Program Nationwide*. (2021). Available online at: https://bluepearlvet.com/press-releases/bluepearl-pet-hospital-launches-first-ever-wellness-ambassador-program-to-promote-health-and-well-being-in-its-practices-nationwide (accessed October 25, 2021).
38. International Association of Veterinary Social Work. *About IAVSW*. (2021). Available online at: https://veterinarysocialwork.org/ (accessed October 25, 2021).
39. Costin LB. Unraveling the Mary Ellen legend: origins of the "cruelty" movement. *Soc Serv Rev.* (1991) 65:203–23. doi: 10.1086/603834
40. Riis JA. *The Children of the Poor*. Charles Scribner's Sons. (1892).
41. Unti B, DeRosa B. Humane education past, present, and future. In: Salem DJ, Rowan AN. editors *The State of the Animals II 2003*. Humane Society of the United States (HSUS) (2003).
42. Arkow, P. Humane education: an historical perspective. In: Kaufmann ME editor. *Progress in Humane Education*. American Humane Association. (1992). p. 2–3.
43. Hubbard FM. *Prevention of cruelty to animals in the states of Illinois, Colorado and California*. Henry Bergh Foundation for the Promotion of Humane Education. (1916).
44. Shultz, W. J. (1924). *The humane movement in the United States*. Columbia University Press.
45. Arkow P. "Humane criminology": An inclusive victimology protecting animals and people. *Spec J Edn Hum Anim Interact Issues Crim Just Tow Hum Criminol.* (2022) 90:335. doi: 10.3390/socsci10090335
46. Human Animal Support Services. *Elements of HASS* (2021). Available online at: https://www.humananimalsupportservices.org/about/elements-of-hass/ (accessed August 27, 2021).
47. Human Animal Support Services. *The New Work of Animal Welfare.* (2021). Available online at: https://www.humananimalsupportservices.org/toolkit/the-new-work-of-animal-welfare/ (accessed August 27, 2021).
48. Becker F, French L. Making the links: child abuse, animal cruelty, and domestic violence. *Child Abuse Rev.* (2004) 13:399–414. doi: 10.1002/car.878
49. National Link Coalition. Cross reporting by reporter. (2021). Available online at: https://nationallinkcoalition.org/wp-content/uploads/2021/06/Cross-Reporting-by-Reporter-2021-06-30.pdf (accessed August 27, 2021).
50. Long DD, Kulkarni SJ. Cross-reporting of interpersonal violence and animal cruelty: the charlotte project. *J Sociol Soc Welf* . (2013) 40:131–48.
51. Hoy-Gerlach J, Wehman S. *Human-Animal Interactions: A Social Work Guide*. Mew York, NY: NASW Press. (2017).
52. Arkow P. *Breaking the Cycles of Violence: A Guide to Multi-Disciplinary Responses for Domestic Violence, Child Protection, Adult Protection, and Animal Care & Control Agencies*. 3rd ed. Latham Foundation (2019).
53. PetLynx *2010 national urban animal report*. Edmonton, AB, Canada: Author. (2011).
54. American Pet Products Association. *2021–2022 APPA National Pet Owners Survey Statistics: Pet Ownership and Annual Expenses*. (2021) Available online at: https://www.americanpetproducts.org/press_industrytrends.asp
55. National Link Coalition. *Schools of Social Work With Human-Animal Interactions in Curriculum*. (2021). Available online at: https://nationallinkcoalition.org/wp-content/uploads/2021/08/Schools-of-Social-Work-with-HAI-5-2021.pdf (accessed October 25, 2021).

56. Risley-Curtiss C. Social work practitioners and the human companion animal bond: A national study. *Soc Work*. (2010) 55:38–46. doi: 10.1093/sw/55.1.38
57. Hodgson K, Darling M. Pets in the family: practical approaches. *J Am Anim Hosp Assoc*. (2011) 47:299–305. doi: 10.5326/JAAHA-MS-5695
58. Sato A. *Social workers' attachments to their pets, organizational structures, and their impact on professional assessment regarding the roles pets play in clients' lives* (Doctoral Dissertation) (2011). Available online at: https://opencommons.uconn.edu/dissertations/AAI3504777 (accessed October 25, 2021).
59. Veterinary Social Work Certificate Program. *UT MSSW/VSW Certificate Program*. (2021). Available online at: https://vetsocialwork.utk.edu/veterinary-social-work-certificate-mssw-students/ (accessed October 25, 2021).
60. Webb A. *Caring for the people who care for animals: Pursuing a certificate in veterinary social work. Boise State University School of Social Work*. (2019). Available online at: https://www.boisestate.edu/socialwork/2019/12/04/caring-for-the-people-who-care-for-animals-pursuing-a-certificate-in-veterinary-social-work/ (accessed August 26, 2021).
61. American Veterinary Medical Association. *Wellbeing*. (2021). Available online at: https://www.avma.org/resources-tools/wellbeing (accessed August 26, 2021).
62. Moutier C, Mortali M, Brandt J, Rose R, Hoffman L. *After a suicide: A guide for veterinary workplaces. American Foundation for Suicide Prevention/American Veterinary Medical Association/ National Association of Veterinary Technicians in America/ Veterinary Hospital Managers Association/ Veterinary Medical Association Executives*. (2020).
63. Nett RJ, Witte TK, Holzbauer SM. Risk factors for suicide, attitudes toward mental illness, and practice related stressors among U.S. *veterinarians. J Am Vet Med Assoc*. (2015) 247:945–955. doi: 10.2460/javma.247.8.945
64. Vande Griek OH, Clark MA, Witte TK, Nett RJ, Moeller AN, Stabler ME. Development of a taxonomy of practice-related stressors experienced by veterinarians in the United States. *J Am Vet Med Assoc*. (2018) 252:227–233. doi: 10.2460/javma.252.2.227
65. Foster SM, Maples EH Occupational stress in veterinary support staff. *J Veterinary Med Educ*. (2014) 41:102–110. doi: 10.3138/jvme.0713-103R
66. Rogelberg SG, DiGiacomo N, Reeve CL, Spitzmuller C, Clark OL, Teeter L, et al. What shelters can do about euthanasia-related stress: An examination of recommendations from those on the front line. *J Appl Anim Welfare Sci*. (2007) 10:331–47. doi: 10.1080/10888700701353865
67. Schneider M, Roberts J. Shelter-specific occupational stress among employees in animal shelters. *Human-Anim Interact Bull*. (2016) 4:19–38.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

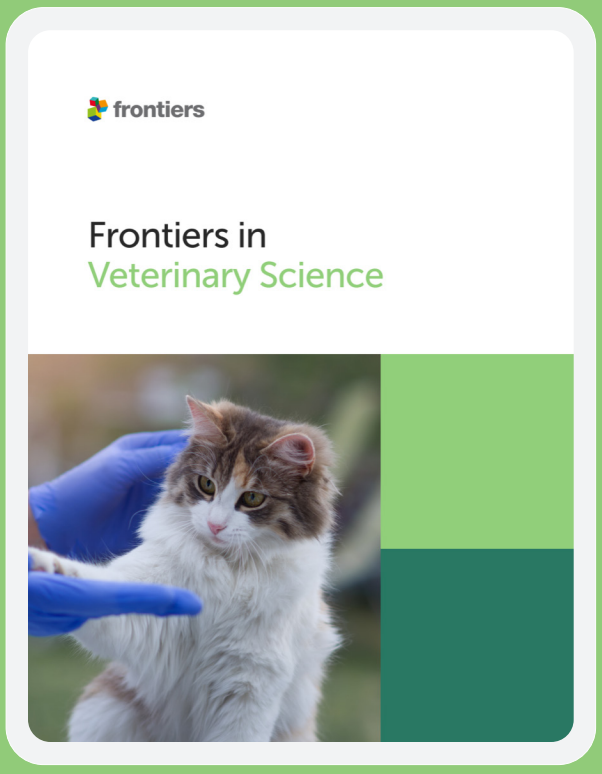
Frontiers in Veterinary Science

Transforms how we investigate and improve animal health

The third most-cited veterinary science journal, bridging animal and human health with a comparative approach to medical challenges. It explores innovative biotechnology and therapy for improved health outcomes.

Discover the latest Research Topics

See more →



Frontiers

Avenue du Tribunal-Fédéral 34
1005 Lausanne, Switzerland
frontiersin.org

Contact us

+41 (0)21 510 17 00
frontiersin.org/about/contact