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# Mental Wellbeing in Laboratory Animal Professionals: A Cross-Sectional Study of Compassion Fatigue, Contributing Factors, and Coping Mechanisms

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Compassion fatigue (CF) is a topic of increasing concern because it can affect the mental wellbeing of caregivers, including those caring for or using research animals. If unaddressed, compassion fatigue may adversely impact the quality of life for personnel working with animals in research settings and may influence their decision to remain in the field. This study used a cross-sectional anonymous online questionnaire to 1) examine compassion fatigue in individuals working with research animals in Canada and the US; 2) better understand how personal and work-related factors may influence feelings of CF; 3) assess coping mechanisms used to deal with CF; and 4) determine the beneficial components of a CF support program. A questionnaire was sent to laboratory animal professionals in Canada and the US via email listserves to survey the general population of laboratory animal workers and personnel working for a large North American contract research organization (CRO). A total of 422 responses were received and analyzed ( $n = 154$  from the general population,  $n = 268$  from the CRO). Most participants were female (73%, 309/422); 66% (101/154) and 69% (184/268) of the general laboratory animal science respondents and the CRO respondents, respectively, reported experiencing feelings of CF. Survey participants indicated that the most influential work-related factors associated with feelings of CF were understaffing, close relationships with experimental animals, a lack of resources for coping with CF, poor relationships with superiors, and lack of training in managing CF. Respondents indicated that the most influential personal factors contributing to feelings of CF were poor mental and physical health. The most commonly reported beneficial coping mechanisms were talking to a trusted individual, getting away from work, practicing self-care strategies, increasing opportunities for physical activity, and owning or caring for companion animals.

**Abbreviations:** CF, compassion fatigue; CRO, contract research organization; TIPI, ten item personality index

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Compassion fatigue (CF) is an important area of concern for the mental wellbeing of various caregiver professionals, such as nurses, hospice care workers, social workers, veterinarians, animal shelter workers, and individuals working with and caring for research animals.<sup>10,15,32,38</sup> The term ‘compassion fatigue’ refers to a profound state of mental and physical exhaustion caused by wanting to help those who are suffering. CF can be aggravated by not having adequate time for mental and physical recuperation, and if not addressed, may lead to a reduced ability to empathize and care.<sup>7,21,25,35</sup> CF is often discussed in conjunction with the term “burnout”. Although burnout and CF are considered separate and distinct phenomena, unresolved CF may contribute to burnout over time.<sup>10,32</sup> Although CF has been recognized in the field of laboratory animal science for over 2 decades, it remains poorly studied and documented in research animal professionals.<sup>35</sup>

Recent literature suggests that 87% of North American animal care professionals (veterinarians and veterinary technicians in

clinical practice or shelters, and animal control officers) have experienced CF at one point or another,<sup>15</sup> while an Australian study suggested that 48% of research animal technicians are at “moderate to high risk for developing feelings of CF”.<sup>36</sup> Contemporary evidence suggests that CF in nurses and animal care professionals may lead to a reduced quality of life and is associated with loss of empathy, isolation, dissociation, substance abuse, physical ailments, trouble sleeping, and feelings of anger and sadness.<sup>7,10,15,38</sup> CF also has negative implications from an institutional and economic standpoint, as it is associated with increased absenteeism, higher worker compensation costs, employee turnover, greater friction between staff and management, and reduced ability of personnel to complete tasks and meet deadlines. All of these things may contribute to economic losses for the institution and may indirectly jeopardize the quality of care provided to research animals.<sup>33,34,38</sup> In addition, the attitudes of animal care personnel toward the animals in their care may directly affect the level of care provided.<sup>9,14,19,37</sup> For example, a positive attitude toward animals is associated with wanting to provide better care for those animals.<sup>9,14,19,37</sup> In contrast, negative attitudes toward animals may lead to negative human-animal interactions, resulting in reduced quality of animal care.<sup>14</sup> Because CF may reduce empathy and negatively impact an individual’s ability to perform their job, animal wel-

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fare may be diminished if those responsible for animal care and wellbeing experience CF.<sup>9,19,25</sup>

Much of the research about the mental wellbeing of caregivers in animal-related professions has focused on euthanasia-related stress and on how workers cope and manage occupational stress, rather than directly on CF.<sup>2,4,12,15,29,31,35</sup> One study surveyed animal shelter employees who performed euthanasia regularly, and described common coping mechanisms such as venting feelings through talking and crying, altering worker emotional attachment to the animals, and coming to terms with why euthanasia may be the best option for the animal.<sup>4</sup> Another study of animal shelter and veterinary staff suggests that coping mechanisms used to deal with feelings of CF include interacting with pets, talking to others, and exercise.<sup>29</sup> That study also suggested that providing training on CF and resiliency may reduce feelings of CF.<sup>29</sup> Additional support program components include making professional help or counseling available, staff rotation for difficult roles, and hiring additional people to reduce the workload.<sup>31</sup> Specific studies about laboratory animal professionals are lacking, but are necessary given that the laboratory animal field likely poses unique challenges regarding CF and beneficial coping mechanisms.

The objectives of the current study were to examine: 1) how widespread feelings of CF are in research animal professionals working in Canada and the US, 2) how personal and work-related factors may influence CF, 3) coping mechanisms used to deal with CF, and 4) perceptions of beneficial factors for a CF support program. A cross-sectional anonymous online questionnaire was developed consisting of questions on demographics, nature of work, CF and influencing factors, coping mechanisms, and CF support programs. Because personality may predispose individuals to experience CF,<sup>20,22,44</sup> the effects of personnel personality on CF and coping mechanisms were explored by including the Ten-Item Personality index (TIPI) scale in the study questionnaire. The TIPI is an abbreviated and validated version of the Big Five Personality Index, which includes extraversion, agreeableness, conscientiousness, emotional stability, and openness to experiences.<sup>13</sup> Furthermore, we surveyed 2 separate laboratory animal workplace populations: 1) the general population of laboratory animal professionals working in Canada and the US, and 2) laboratory animal professionals working at a large multinational contract research organization in Canada and the US. We predicted that the 2 populations would show no difference in feelings of CF or coping mechanisms.

## Materials and Methods

**Overview and Ethics Approval.** A cross-sectional online questionnaire was created by the research team to gather information from laboratory animal professionals in Canada and the US about feelings of CF, personal and work-related factors that may influence feelings of CF, beneficial coping mechanisms, and important factors for a support program. The study was approved by the University of Guelph Research Ethics Board (REB no. 19-06-017).

**Questionnaire Development.** The questionnaire was developed by the research team, pretested by 2 individuals with knowledge of CF issues, and administered using Qualtrics software (Qualtrics XM Software Company, Provo, UT). The survey consisted of 4 parts with a total of 30 questions: 8 questions on demographics, 13 questions on CF, 4 questions on the nature of the individual's work, and 5 questions on solutions and coping mechanisms (Figure 1, Figure S1). As part of completing the survey, participants were provided with the following definition: 'CF is profound emotional and physical exhaustion that lab animal caregivers can

develop when they are unable to refuel and regenerate because of the nature of their work. CF is a normal occurrence and is commonly seen across many professions, including individuals working with and caring for laboratory animals.' At the end of the survey, participants were given the opportunity to provide feedback on the survey and additional ideas for support programs.

**Ten-Item Personality Index (TIPI).** The TIPI<sup>13</sup> was included in the questionnaire to assess the influence of personality on CF and coping mechanisms. This index had been previously validated as a brief and suitable tool for measuring personality in research where personality is not the main focus.<sup>13,27</sup> The maximal score for each trait is 14, which strongly indicates that a particular trait is present, while the minimal score is 2.

**Inclusion Criteria.** To participate in the study, individuals must be 18 y of age or older and currently working with laboratory animals in Canada or the US.

**Distribution and Data Collection.** The questionnaire was available online via survey software (Qualtrics, Provo, UT) from July 30 to August 30, 2019. Participants were recruited using email invitations containing information on the study, recruitment posters, and a link to the anonymous survey. Email invitations for the general population were distributed throughout Canada and the US via the Canadian Association for Laboratory Animal Science, American Association for Laboratory Animal Science, and Canadian Association for Laboratory Animal Medicine email listserves. Surveys were administered separately to CRO employees through an internal company listserve. In addition, snowball sampling was initiated by recipients advertising the survey link in their departments and on their social media pages.

Participation was voluntary and anonymous. We gathered consent online prior to the start of the questionnaire. Participants were free to refuse to answer any questions, and they had the option to quit the survey at any time with no consequences.

**Data Analysis.** Statistical analysis was performed using SPSS Statistics 26 (IBM Computer Hardware Company, Armonk, NY) software. Specific questions with answers that were partially complete or incomplete were not included in analyses.

Descriptive statistics (frequencies and percentages) were conducted on personal and work-related demographic information, cases of self-reported feelings of CF, questions relating to how CF may influence job performance, personal and work-related factors influencing feelings of CF, coping mechanisms currently being used to deal with feelings of CF, and beneficial components for a CF support programs.

Independent Mann-Whitney tests were conducted to determine associations between demographic information and self-reported feelings of CF. Dependent variables such as age, gender, time in the laboratory animal field, current position, and time spent in the current position, were compared with respondent self-reported feelings of CF (independent variable). This analysis was performed separately for each population (general and CRO) due to differences in demographic summary statistics between the 2 populations.

To calculate the scores for each personality trait from the TIPI personality scale, responses from each question were scored or reverse scored and then added together according to the TIPI scoring formula.<sup>13</sup> To determine any effects of personality scores on experiencing or coping mechanisms for CF used, a series of independent sample *t* tests were conducted for equality of means with Levene test for equality of variances. An independent sample *t* test was used to examine differences between scores for extraversion, agreeableness, emotional stability, conscientiousness, and openness for respondents who responded yes or no to experiencing feelings of CF, with CF as the independent variable

### Part A – Demographics

1. What country do you work in? (please select one)
2. What gender do you identify with? (please select one)
3. Which of the following best describes your age? (please select one)
4. Which of the following best describes how long you have been working in the laboratory animal field? (please select one)
5. What type of organization do you work for? (please select one)
6. Which of the following best describes your current position within your company/institution? (please select one)
7. How long have you been in your current position? (please select one)
8. Here are a number of personality traits that may or may not apply to you. Please select an option for each statement that indicates the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

### Part B – Compassion Fatigue

9. Compassion fatigue is a profound emotional and physical exhaustion that lab animal caregivers can develop when they are unable to refuel and regenerate because of the nature of their work. Compassion fatigue is a normal occurrence and is commonly seen across many professions including individuals working with and caring for laboratory animals. Have you ever experienced compassion fatigue?
10. Which feelings do you associate with compassion fatigue? (please select all that apply)
  11. How often do you feel that compassion fatigue negatively affects your ability to do your job?
  12. How often do you feel that compassion fatigue has led you to feel apathetic towards your job (i.e.. loss of interest, lack of enthusiasm)?
  13. How often do you feel stressed at work?
  14. How often do you feel comfortable discussing your feelings in your place of work?
  15. How often do you feel comfortable discussing concerns you have regarding your work or animals in your care with your superiors?
  16. How often do you feel that there is good communication between you and your superiors?
  17. How often do you feel that your place of employment encourages employees to balance their professional lives with their personal lives?
  18. How often do you blame yourself for the suffering of an animal or group of animals in your care?
  19. How often do you feel that you alone are responsible for the well being of an animal or groups of animals in your care?
  20. To what extent do the following work-related factors influence your feelings of compassion fatigue?
  21. To what extent do the following personal factors influence your feelings of compassion fatigue?

### Part C – Nature of Work

22. Do you feel that you have received adequate training and resources to do your job properly?
23. Which of the following types of species do you currently work with? (please select all that apply)
24. Are there any species that you find particularly challenging to work with in regards to compassion fatigue issues? (please list these species in the space provided) (Open ended)
25. Which of the following procedures do you perform regularly? (please select all that apply)

### Part D – Solutions and Coping Mechanisms

- 26.a) Does your place of employment have a compassion fatigue support program of any kind in place?
- 26.b) How often do you feel that this program is helpful to you? (Question only displayed if answer was “yes” to 26.a)
27. Have you ever had any form of self-care or resiliency training through your place of employment?
28. Which of the following coping mechanisms do you currently use for dealing with feelings of compassion fatigue? (please select all that apply)
29. How often are your current coping mechanisms effective at alleviating your feelings of compassion fatigue?
30. Which of the following programs would be beneficial to have in your place of work to help with compassion fatigue? For each section, please rank the options from most beneficial to least beneficial with #1 being the most beneficial.

To rank each option, click and drag the phrases into the order you want them (with #1 being the top spot). If you do not think that any of the listed programs would be beneficial, please indicate this by using the “None of these” option and ranking it as #1.

#### Physical:

#### Mental/Emotional:

#### Social:

#### Work Management:

Please specify any other compassion fatigue support program ideas in the space provided:  
(Open ended)

Figure 1. Abbreviated version of the compassion fatigue questionnaire used in the study.

and personality trait score as the dependent variable. The same test was used to compare TIPI personality scores (dependent variable) between respondents who reported yes or no to using each of the following coping mechanisms (independent variables)

for dealing with CF: talking to someone, self-care strategies, seeking professional help, getting away from work, physical activity, mindfulness practices, owning and caring for pets, religion, recreational use of alcohol/drugs/smoking cigarettes, emotional

**Table 1.** Demographic summary of survey respondents for both general and CRO laboratory animal professionals ( $n = 422$ ).

Variable	General n (%)	CRO n (%)
<b>Total Respondents (<math>n = 422</math>)</b>	154 (37)	268 (64)
<b>Country</b>		
Canada	101 (66)	19 (7)
USA	53 (34)	249 (93)
<b>Gender</b>		
Female	122 (79)	187 (70)
Male	32 (21)	75 (28)
Prefer not to answer	0 (0)	3 (1)
Other	0 (0)	3 (1)
<b>Age</b>		
18–25	16 (10)	72 (27)
26–35	51 (33)	87 (33)
36–45	45 (29)	50 (19)
46–55	29 (19)	36 (13)
56–65	10 (7)	22 (8)
>65	3 (2)	1 (0)

eating, releasing emotions after work, emotionally detaching from the job, and seeking further education. Tests were performed separately for each population (general and CRO).

## Results

**Demographic Information.** We received a total of 422 survey responses, 154 (36%) from the general population and 268 (63%) from the CRO (Table 1). The majority of general lab animal respondents worked in Canada (101/154, 66%), while most CRO participants worked in the US (249/268, 93%). Overall, the majority of participants were female (general: 122/154, 79%; CRO: 187/268, 70%). A large proportion of general participants (96/154, 62%) were between 26 to 45 y old, whereas the CRO group was slightly but significantly younger, with most respondents aged between 18 to 35 (159/268, 59%) years old. Half of the general respondents (50%, 77/154; Table 2) had worked in the laboratory animal field between 0 to 10 y, while the majority of CRO participants had worked for 0 to 5 y (145/268, 54%). Most of the general population was employed by academic institutions (83/154, 54%). A large portion of the general respondents indicated that their current position was animal care (53/154, 34%) or veterinary support staff (38/154, 25%), while CRO participants primarily indicated their current position was animal care (67/268, 25%) or technical research staff (80/268, 30%).

The personality trait with the highest average score for each population was conscientiousness (general: 12.4, range 5.0 to 14.0; CRO: 12.2, range 7.0 to 14.0), followed by openness (general: 11.0, range 5.0 to 14.0; CRO: 10.9, range 5.0 to 14.0), agreeableness (general: 10.8, range 6.0 to 14.0; CRO: 10.4, range 3.0 to 14.0), emotional stability (general: 9.6, range 5.0 to 14.0; CRO: 9.9, range 2.0 to 14.0), and extraversion (general: 8.7, range 5.0 to 14.0; CRO: 8.4, range 2.0 to 14.0).

Study participants reported working mainly with rodents and rabbits (general: 151/154, 98%; CRO: 241/267, 90%) and large animals (not primates) (general: 61/154, 40%; CRO: 177/267, 66%), while CRO respondents also worked with nonhuman primates (153/267, 57%). Participants from both groups indicated that they found dogs the most difficult species to work with regards to feelings of CF (general: 32/140, 23%; CRO: 64/186, 46%), followed

by rodents and rabbits (37/140, 26%) for general respondents, and nonhuman primates (47/186, 34%) for CRO respondents.

**Compassion Fatigue.** The majority of respondents from both populations reported having experienced CF at some point in their career (general: 66%, 101/154; CRO: 69%, 184/268), while significantly fewer indicated they never had (general: 15%, 23/154; CRO: 16%, 42/268) or were unsure if they had (general: 19%, 30/154; CRO: 16%, 42/268). Feelings most commonly associated with CF, and experienced by more than 50% of respondents in the general population, were exhaustion (83%), apathy (76%), sadness (71%), depression (64%), anxiety (64%), frustration (64%), and guilt (60%). The most common feelings associated with CF experienced by CRO participants were exhaustion (83%), frustration (69%), apathy (68%), sadness (62%), depression (57%), and anxiety (51%). In both groups of respondents who reported experiencing CF, 51% said that they were always or often stressed at work, 68% felt that CF often or sometimes led them to feel apathetic toward their job, and 61% thought that CF often or sometimes negatively affected their ability to do their job (Table 3).

Analyses showed that women were generally more likely to self-report having experienced feelings of CF, in comparison to men (general:  $U = 868.0$ ,  $P = 0.005$ ; CRO:  $U = 3040.0$ ,  $P = 0.0060$ ). No other demographic factors tested showed significant findings. Analyses of participant personality and feelings of CF showed that higher scores of emotional stability were associated with respondents who did not self-report having experienced feelings of CF for both the general ( $t = -4.643$ ,  $P < 0.001$ ) and CRO ( $t = -4.468$ ,  $P < 0.001$ ) groups. General respondents who did not self-report experiencing feelings of CF had higher scores of openness ( $t = -2.026$ ,  $P = 0.045$ ) and extraversion ( $t = -2.419$ ,  $P = 0.017$ ) than did those who reported feelings of CF.

**Factors Influencing Compassion Fatigue.** The top work-related factors reported as influencing feelings of CF to an extreme or moderate degree, as rated by >60% of general respondents, were feeling understaffed, having good relationships with animals, a lack of resources for coping with CF, poor relationships with superiors, and lack of training and awareness about CF (Figure 2). Similarly, CRO respondents reported that feelings of CF were

**Table 2.** Summary of work-related demographic information for the general ( $n = 154$ ) and CRO ( $n = 268$ ) respondents (total  $n = 422$ ).

Variable	General n (%)	CRO n (%)
<b>Years working in laboratory animal field</b>		
0–5	45 (29)	145 (54)
6–10	32 (21)	30 (11)
11–15	28 (18)	28 (11)
16–20	30 (20)	30 (11)
>20	12 (12)	35 (13)
<b>Type of organization worked for</b>		
Academic	83 (54)	0 (0)
Hospital	24 (16)	0 (0)
Government	17 (11)	1 (0)
Contract research	6 (4)	202 (75)
Industry	8 (5)	46 (17)
Not-for-profit	9 (6)	0 (0)
Prefer not to answer	1 (1)	6 (2)
Other	6 (4)	11 (4)
Did not answer	0 (0)	2 (1)
<b>Current Position</b>		
General animal care staff	53 (34)	67 (25)
Veterinary support	38 (25)	17 (6)
Veterinarian	27 (18)	27 (10)
Research staff	16 (10)	80 (30)
Study director	0 (0)	11 (4)
Necropsy technician/supervisor	1 (1)	29 (11)
Pathologist	1 (1)	1 (0)
Other	18 (12)	36 (13)
<b>Years spent in current position</b>		
0–5	77 (50.0)	196 (73.1)
6–10	41 (26.6)	24 (9.0)
11–15	21 (13.6)	20 (7.5)
16–20	7 (4.6)	13 (4.9)
>20	8 (5.2)	15 (5.6)

triggered by feeling understaffed, a lack of resources for coping with CF, and having poor relationships with superiors. For general respondents, the top personal factors (> 60% of participants) considered to significantly or moderately influence feelings of CF were poor mental health, poor physical health, and good mental health, whereas CRO respondents reported poor mental health as being the most influential (Figure 3).

**Coping Mechanisms and Support Programs.** Both groups used similar coping mechanisms for dealing with CF: talking to someone (general: 127/154, 82%; CRO: 207/265, 78%; Figure 4), getting away from work (general: 108/154, 70%; CRO: 178/265, 67%), self-care strategies (general: 99/154, 64%; CRO: 148/265, 56%), physical activity (general: 93/154, 60%; CRO: 121/265, 46%), and owning/caring for pets (general: 88/154, 57%; CRO: 148/265, 56%). Coping mechanisms used least by both groups were seeking professional help (general: 28/154, 18%; CRO: 36/265, 14%) and turning to religion (general: 19/154, 12%; CRO: 36/265, 14%). In general, respondents indicated that the coping mechanisms currently in use were often or sometimes effective (general: 82%, 125/152; CRO: 80%, 210/263).

In the general population, participants with high extraversion scores were more likely to use talking to someone ( $t = -2.315, P =$

$0.025$ ) and engaging in physical activity ( $t = -2.286, P = 0.024$ ) as coping mechanisms. Participants with higher emotional stability scores were more likely to use self-care strategies ( $t = -3.290, P = 0.001$ ), and less likely to use emotional eating ( $t = 3.703, P < 0.001$ ) and releasing emotions (that is, crying, yelling;  $t = 3.767, P < 0.001$ ) as coping mechanisms. Those with high openness scores were more likely to seek further education ( $t = -2.703, P = 0.008$ ) as a coping mechanism for CF, and those with high conscientiousness scores were less likely to use emotional eating ( $t = 3.568, P = 0.001$ ) as a coping mechanism.

CRO participants with high agreeableness scores were more likely to talk to someone ( $t = -2.107, P = 0.036$ ), use self-care strategies ( $t = -2.880, P = 0.004$ ), getting away from work ( $t = -2.570, P = 0.011$ ), physical activity ( $t = -2.194, P = 0.029$ ), and seeking further education ( $t = -2.380, P = 0.018$ ) as coping mechanisms, and less likely to use alcohol/drugs/smoking ( $t = 2.362, P = 0.019$ ). Those with high emotional stability scores were more likely to use self-care strategies ( $t = -2.211, P = 0.028$ ), and less likely to seek professional help ( $t = 2.993, P = 0.003$ ), use alcohol/drugs/smoking ( $t = 2.253, P = 0.026$ ), emotional eating ( $t = 4.720, P < 0.001$ ), and releasing emotions ( $t = 5.509, P < 0.001$ ) as coping mechanisms. Participants with

**Table 3.** Summary of responses for compassion fatigue feelings in the workplace, populations combined.

Question	How often do you feel:	Experienced					n	
		Compassion Fatigue	Always (%)	Often (%)	Sometimes (%)	Rarely (%)		Never (%)
Compassion fatigue negatively affects your ability to do your job	Yes		1.1	13.0	48.1	31.2	6.7	285
	No/Unsure		0.0	2.9	21.2	42.3	33.6	137
Compassion fatigue has led you to feel apathetic toward your job	Yes		2.8	22.5	45.3	23.9	5.6	285
	No/Unsure		0.7	6.6	22.6	40.1	29.9	137
Stressed at work	Yes		8.8	41.8	39.3	9.8	0.4	285
	No/Unsure		4.4	21.2	47.4	24.1	2.9	137
Comfortable discussing your feelings at work	Yes		7.4	20.8	40.1	22.9	8.8	285
	No/Unsure		8.0	25.5	34.3	23.4	8.8	137
Comfortable discussing concerns regarding your work or animals in your care with your superiors	Yes		18.2	28.4	29.1	17.2	7.0	285
	No/Unsure		23.4	30.7	25.5	17.5	2.9	137
There is good communication between you and your superiors	Yes		11.6	36.8	33.0	16.8	1.8	285
	No/Unsure		22.6	36.5	27.7	10.2	2.9	137
Your workplace encourages employees to balance professional life with your personal life	Yes		9.1	26.3	34.7	22.5	7.4	285
	No/Unsure		17.5	35.8	26.3	17.5	2.9	137
You blame yourself for the suffering of an animal or group of animals in your care	Yes		4.9	10.9	34.4	34.7	15.1	285
	No/Unsure		0.7	11.0	25.7	36.0	26.5	136
You alone are responsible for the wellbeing of an animal or groups of animals in your care	Yes		12.3	25.7	26.1	25.7	10.2	284
	No/Unsure		6.6	19.0	23.4	26.3	24.8	137

high openness scores were more likely to use self-care strategies ( $t = -2.631$ ,  $P = 0.009$ ), seek professional help ( $t = -2.324$ ,  $P = 0.024$ ), use physical activity ( $t = -3.709$ ,  $P < 0.001$ ), and seek further education ( $t = -4.923$ ,  $P < 0.001$ ) as coping mechanisms. Those with high extraversion scores were more likely to use alcohol/drugs/smoking ( $t = -2.211$ ,  $P = 0.028$ ) as a coping mechanism for dealing with feelings of CF.

When asked about CF programs at their current workplace, few respondents (general: 22%, 34/154; CRO: 18%, 49/268) indicated they had an institutional CF program. Of those respondents with CF programs, 32% and 18% felt that their facility program was always or often helpful to them from the general and CRO respondents, respectively. In addition, 29% (45/154) of the general population and 12% (33/268) of CRO respondents reported having ever received self-care or resiliency building training.

The top-ranked beneficial physical factors for a CF support program were monetary reimbursement for physical activities (general: 28%, CRO: 35%), followed by place and time to exercise at work (general: 30%, CRO: 27%), and activity groups at work (general: 29%, CRO: 22%). The top-ranked beneficial mental and emotional factors for a CF support program were having a quiet place to reflect (general: 38%; CRO: 35%), followed by self-care training (general: 21%, CRO: 22%) and having a therapist on site (general: 14%, CRO: 18%). The top-rated social factors for a CF support program by general respondents were having peer support groups at work (26%), followed by building and strengthening relationships with coworkers (19%), and lunch time activities (18%). In contrast, CRO respondents indicated recreational activities outside of work (25%) as most beneficial, followed by lunchtime activities (20%), and support groups at work (19%). Finally, the top-ranked work management factors by general participants were rehoming animals instead of euthanizing (25%) as the most beneficial, followed by paid leave from work (20%) and enforcing strict workday hours (18%). The majority of CRO participants ranked paid leave from work (30%) as the most

beneficial component, followed by rehoming animals (20%) and enforcing strict workday hours (17%).

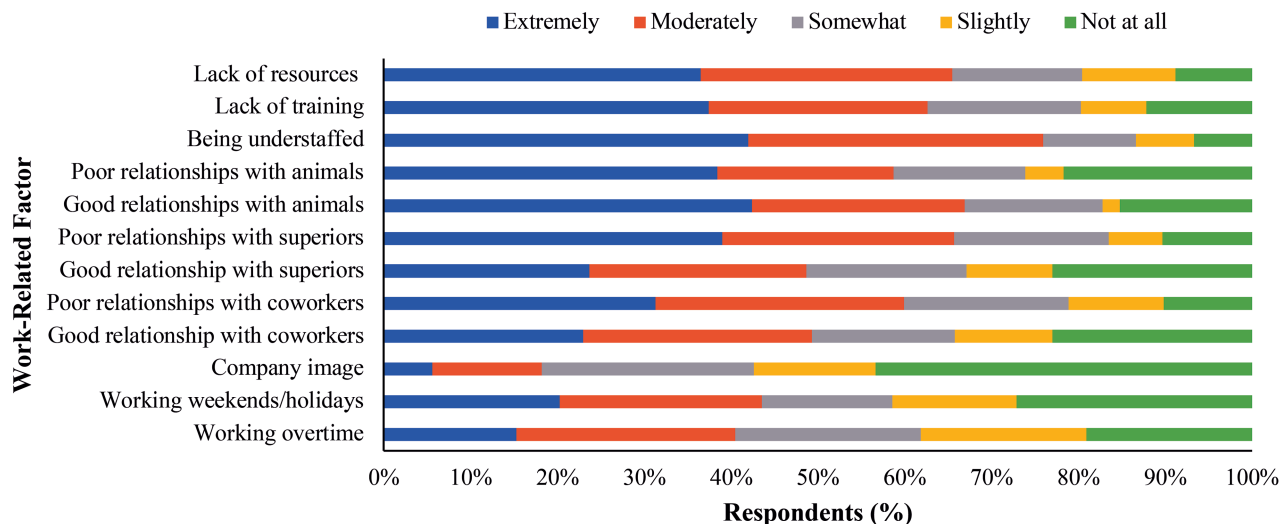
## Discussion

The results of this study indicate that CF is a prevalent issue among North American laboratory animal professionals, with 2 thirds of individuals experiencing it at some point in their career, regardless of where they work. This number is lower than those found by others, who estimated that 87% of animal care professionals (those working in veterinary clinics and animal shelters) in the US experience CF,<sup>15</sup> but higher than another study in which 48% of Australian research animal technicians surveyed reported moderate to high risk for developing feelings of CF.<sup>36</sup> CF may have been under-reported in our study, due to social desirability bias and stigma around mental health issues.<sup>5,6</sup> However, CF may be transient in those with good resiliency and self-care skills, so numbers will likely vary somewhat between different research participants. For example, in nurses, in which CF has been well studied, prevalence of CF ranges from 0 to 86% depending on the department and country in which the research was performed.<sup>16,23,40</sup> In our study, women were more likely to self-report feelings of CF than were men. This finding is consistent with gender bias in graduates from veterinary professional programs.<sup>26</sup>

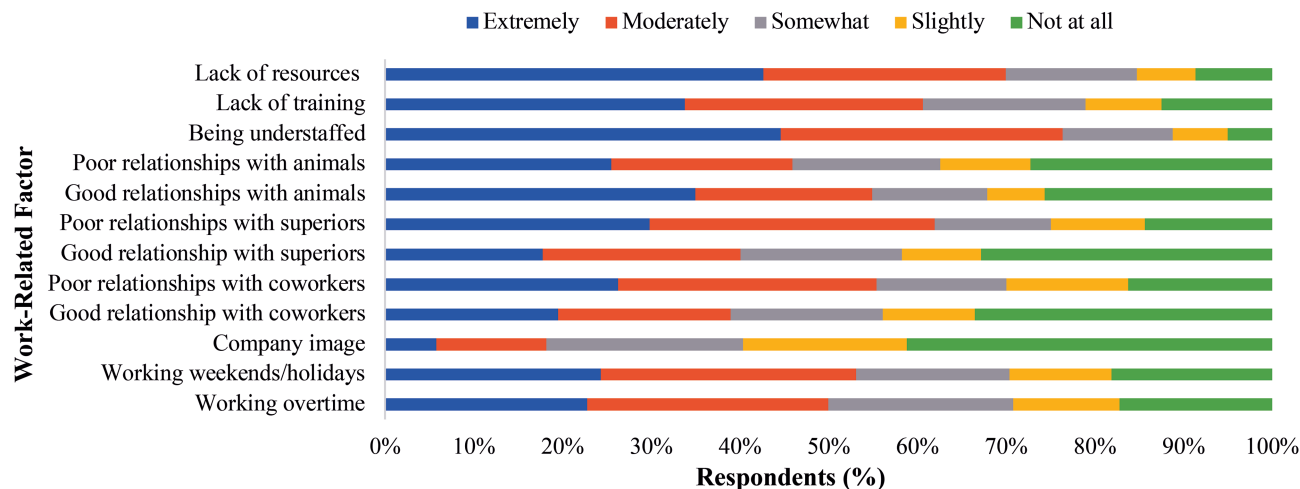
As predicted, no major differences were detected in the responses of the general population and contract research organization participants to the survey questions. However, some demographic differences were detected between the populations. The majority of CRO participants were younger and worked in the US compared with the majority of general population participants who were older and worked in Canada. Although the 2 populations were not formally compared statistically, general trends in the data were the same for the 2 groups.

Overall, 30% of respondents reported uncertainty about experiencing CF, suggesting a lack of understanding of the condition and highlighting the need for improved CF education in the

A)



B)



**Figure 2.** Percentage rankings of work-related factors influencing feelings of compassion fatigue for the general (A) and CRO (B) respondents (general:  $n = 154$ , CRO:  $n = 268$ ;  $n = 422$ ).

workplace. Self-recognition and recognition in others is important to ensure individuals can take action to prevent and manage feelings of CF. Feelings most commonly associated with CF were exhaustion, apathy, sadness, depression, anxiety, frustration, and guilt, similar to those established by other studies.<sup>2</sup> Our results show that higher scores of emotional stability, openness, and extraversion were associated with respondents who reported not having experienced CF. Other work also suggests that openness and conscientiousness personality traits are associated with compassion satisfaction, which are feelings of pleasure derived from doing caregiving work.<sup>44</sup> To the best of our knowledge, no other attempts have been made to examine the effects of personality on CF among those working in other animal caregiving professions.

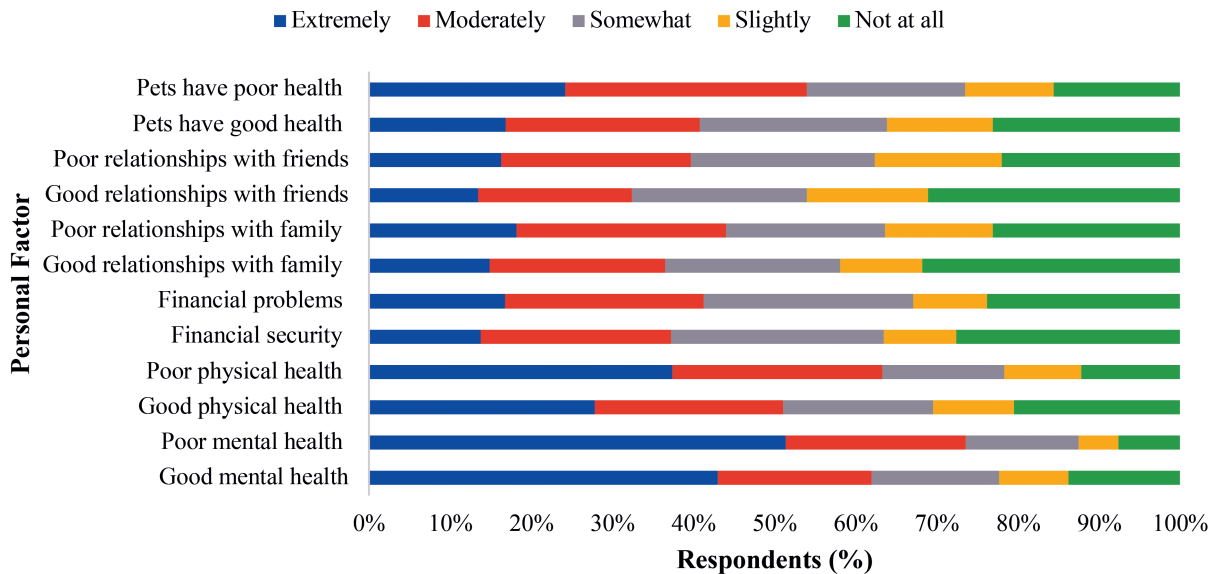
In terms of beneficial factors for a CF support program, incorporating physical activity at work was one of the top components chosen by respondents. This finding is important, given that exercise has been shown to improve overall mental and physical wellbeing.<sup>11,41</sup> A recent study also suggests that added physical and psychosocial benefits arise when exercising with coworkers.<sup>17</sup> A laboratory animal facility in Sweden has had positive feedback on

a program that permits employees one paid hour each week for exercise, reflection or another activity of their choice that helps with their mental wellbeing.<sup>18</sup> This facility also reimburses personnel for the cost of a fitness membership.<sup>18</sup> Another beneficial factor highlighted by respondents was the availability of self-care training through work and peer support groups to share feelings and stories. Although empirical evidence on the subject is lacking, peer support groups have shown some promise in helping with addiction and mental health, given that a supportive social environment may be important for recovery and healing.<sup>8,39</sup> Other evidence indicates that robust self-care strategies may be beneficial in both preventing and combatting feelings of CF.<sup>1,29</sup> Although self-care is a personal practice in which each individual has to discover what works best for them, practicing good self-care needs include finding a balance between work and personal life and setting firm boundaries between work and home life.<sup>24</sup> Although every facility and team is unique, these results provide a starting point for developing and implementing institutional CF support programs.

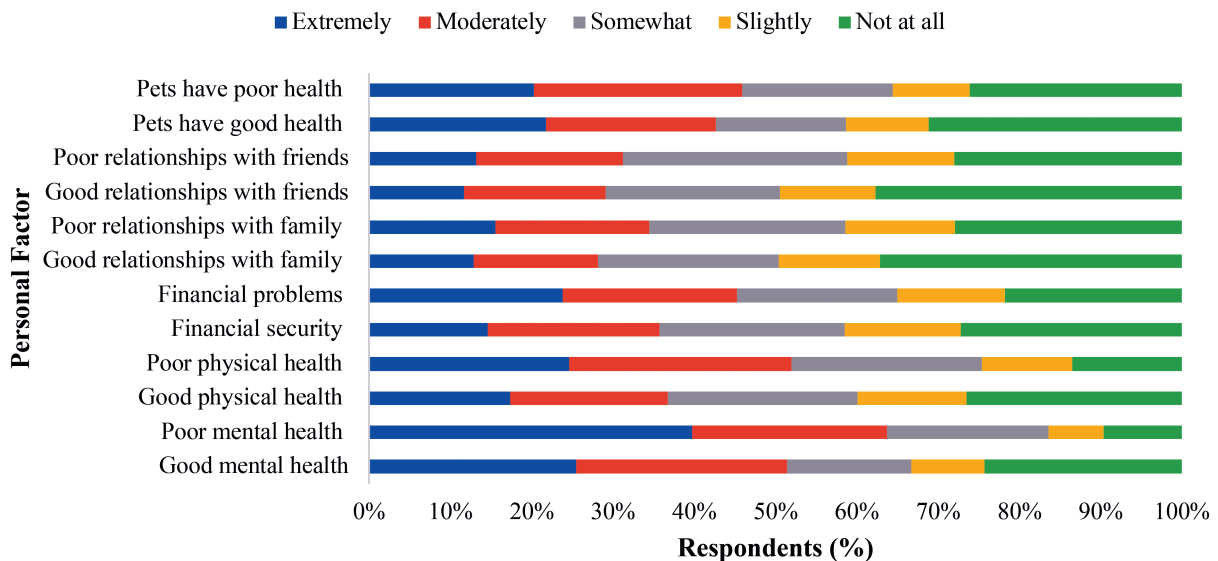
Few respondents indicated that their workplace had a CF support program in place, with even fewer reporting that the



A)



B)

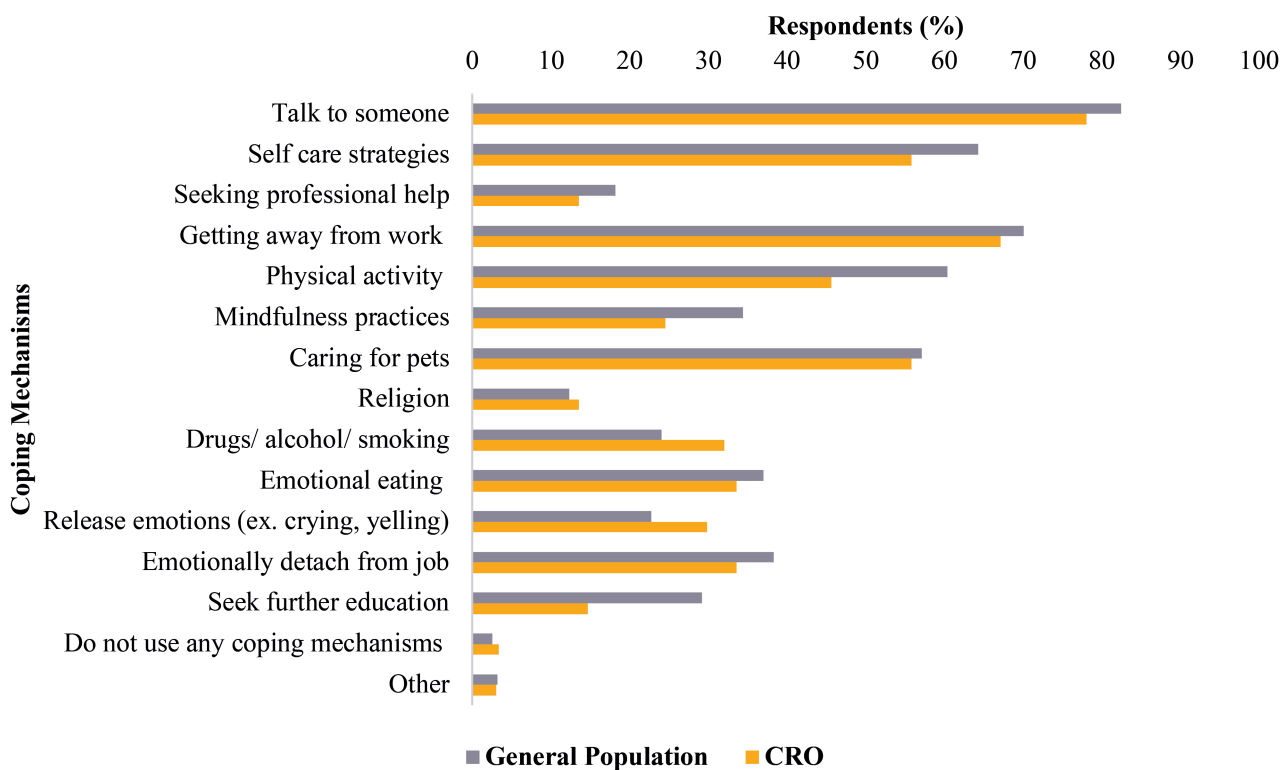


**Figure 3.** Percentage rankings of personal factors influencing feelings of compassion fatigue for the general (A) and CRO (B) respondents (general:  $n = 154$ , CRO:  $n = 268$ ;  $n = 422$ ).

program was helpful for relieving feelings of CF. However, respondents were potentially not aware that they had access to support programs through their place of employment. In this case, employers must place more effort in making employees aware of support programs, and employees should explore and use resources offered by their workplace. Because the majority of participants reported having experienced feelings of CF at some time in their career, all workplaces should establish a support program and ensure that staff are aware of it. Introduction of a CF support program may also be important for creating a culture of care in the work environment. Creating a supportive community of laboratory animal professionals will allow open communication, trust, and a shared responsibility for promoting good mental health among members.<sup>3,30,42</sup>

Most respondents that reported feelings of CF also reported that CF sometimes negatively affected their ability to do their job and that CF sometimes or often led them to feel apathetic toward their work. Those who reported feelings of CF also reported feeling stressed at work more often. Not only does this negatively affect employee wellbeing but may also lead to reduced quality of animal care. Research in the nursing profession suggests that CF negatively influences patient care among nurses, and this could also occur in laboratory animal professionals.<sup>34,43</sup> In addition, animal care professional's attitudes toward the animals in their care may negatively influence the level of care that animals receive and therefore, may reduce welfare for laboratory animals.<sup>9,14,19,37</sup>

Study limitations include a small sample size. Thus, the sample may not be representative of attitudes of all laboratory



**Figure 4.** Percentage rankings of coping mechanisms for compassion fatigue for the general (A) and CRO (B) respondents (general:  $n = 154$ , CRO:  $n = 268$ ;  $n = 422$ ). Participants were asked to select all that apply.

animal professionals across Canada and the US. However, the sample was widespread and diverse, reflecting a considerable number of industry and non-industry professionals. Another potential limitation was our decision to not use a standardized quality of life scale, such as the Professional Quality of Life measure (ProQOL).<sup>28</sup> Instead, the prevalence of CF was assessed by asking participants to self-report their experiences. We used this method to keep the survey short and to improve the response rate. We also explored other important questions, such as desirable factors in a support program. We also investigated the perceptions of participants and whether they believed they had ever experienced feelings of CF at any point in their lives. Because the ProQOL survey is designed for professionals working with other people, modification would have been necessary for its use with laboratory animal professionals and would only allow the assessment of CF at the time of survey completion. Participants were given a definition of CF before they responded to any questions relating to CF; however, participants may have confused CF with burnout or secondary trauma, resulting in nondifferential misclassification bias. Thus, our estimates of CF may reflect a combination of respondent feelings of CF, burnout, and secondary trauma.

Future studies could explore how CF changes laboratory animal professionals' perspectives of animals in their care. Given the abundance of research on euthanasia stress, another interesting study would be to focus future research on examining euthanasia stress in laboratory animal care professionals and to determine how it compares to CF. Another important area to assess is the impact of CF programs in the workplace as this area of employee support matures.

In conclusion, CF is widely experienced by laboratory animal professionals working in Canada and the US, based on self-reporting. While some individuals have developed helpful self-care strategies to cope with feelings, many indicate that they would appreciate receiving more support for dealing with CF from

their workplace. This information may be useful as institutions develop internal CF and resiliency building support programs.

## Supplementary Material

**Figure S1.** Compassion fatigue questionnaire for study.

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