

Compassion Fatigue and Coping Mechanisms of Laboratory Animal Professionals from Europe, China, and Japan

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Laboratory animal professionals (LAP) may experience situations that contribute to compassion fatigue (CF). The goal of this research was to better understand CF in LAP in and across employment categories. Surveys were distributed through LAP organizational listservs in the European Union (EU), China, and Japan, and results were analyzed to identify CF prevalence, personal and work-related factors, coping mechanisms, and beneficial work-support programs. Independent χ^2 -tests compared personal and work-related factors and feelings of CF. Feelings of CF and coping mechanisms were compared with personality scores using independent sample *t* tests. There were 302 respondents from the EU, 39 from China, and 77 from Japan. Over half of respondents from the EU (52%) and China (56%) reported experiencing CF (52%), with fewer (32%) reporting CF in Japan. No major differences were found based on employer type. Personality scores were significantly related to feelings of CF and preferred coping mechanisms. Work-related factors that contributed to feelings of CF in over half of respondents included staffing levels, workplace relationships, and availability of programs geared to address CF. Across regions, talking to someone, physical activity, getting away from work, and self-care were effective coping mechanisms in over 50% of respondents. Fewer than 30% of respondents indicated that their place of employment had CF support programs, and even fewer (8% to 28%) indicated that these programs were helpful. The study results suggest that to be effective, employer CF programs for LAP should consider providing quiet places at work and programs for self-care, promoting physical and mental health and social support systems, and establishing opportunities to memorialize animals.

Abbreviations: CF, compassion fatigue; CRO, contract research organization; EU, European Union; GP, general population; LAP, laboratory animal professionals

DOI: 10.30802/AALAS-JAALAS-22-000078

Introduction

Compassion can be defined as the awareness of and desire to relieve suffering in others^{6,7} and is a major reason underlying why people may choose caregiving careers. However, working in a caregiver field can also result in compassion stress, which is the need to take action to help those perceived to be suffering. Chronic compassion stress can ultimately result in compassion fatigue (CF).⁶ CF is an emotional state that results from continually caring for or observing the trauma of others and is also referred to as secondary traumatic stress, which is closely related to posttraumatic stress disorder.⁶ CF is widespread among caregiving professions, such as nurses, physicians, social workers, veterinarians, and laboratory animal care professionals (LAP).^{3,6,11,14,29,44} CF is characterized by symptoms that include, but not limited to, feelings of exhaustion, depression, frustration, anger, hopelessness, and a reduction in motivation and efficacy.^{6,11,14,33} If unaddressed, CF can contribute to feelings of burnout, a distinct condition that can occur in the absence of CF, but that can be a consequence of unmanaged CF. Burnout is considered a work-related hazard and is defined as chronic,

unmanaged workplace stress that results in exhaustion, mental distance, negative feelings, cynicism, and a lack of feeling accomplished or effective.^{18,38,39} At its most severe, CF can result in cognitive, emotional, behavioral, spiritual, interpersonal, physical impacts,^{6,29} and can also lead to suicidal thoughts.^{15,37}

LAP are those who work with animals in a research setting, and may include roles such as animal caregivers, trainers, technicians, facility managers and supervisors, necropsy personnel, and veterinarians. LAP may experience numerous stressors in their jobs, such as lack of resources, long working hours, expectations for weekend and on-call work, low compensation, and the need to euthanize animals for reasons other than terminal injury or illness.^{1,11,14,22,28,31} An additional stressors for LAP are witnessing or performing necessary research procedures that may cause pain and distress in an animals with whom the individual has developed a strong human-animal bond,¹⁴ and the moral stress of considering the ethical implications of their role.²⁸ Furthermore, the public perception of their work may be negative, and inadequate communication tools or skills may prevent LAP from openly discussing their careers with people outside of their work.^{14,21} Even at work, LAP may find it difficult to speak about feelings experienced, and speaking about negative feelings surrounding the work may not be encouraged or supported.¹⁴

CF is a serious concern in laboratory animal science with regard to both the mental and physical health implications for LAP and for research organizations. CF can lead to increased

Submitted: 01 Aug 2022. Revision requested: 07 Sep 2022. Accepted: 09 Sep 2022.

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employee turnover, absenteeism, and loss of empathy, resulting in inconsistent animal care, which introduces variability that may negatively affect reproducibility and translatability of the data.^{6,14,28} Despite the importance of this issue, few studies have investigated CF in LAP,^{8,14,21,22,25,27,34} particularly outside of North America. Previous studies have highlighted factors that are related to feelings of CF, such as social support, the apparent degree of pain and distress witnessed in research animals, the amount of choice and control surrounding participation in euthanasia activities, and participation in providing enrichment to animals.^{14,28,32} Job category may also be a factor in professional quality of life and subsequent feelings of CF. For example, doctoral level graduate students generally express a lower professional quality of life than do those in other job categories that may be unrelated to specific work with animals.⁸ People who work with research animals may experience CF differently than others due to both their positions and the research environment. Previous work comparing CF between LAP employed in the general workforce and those in contract research organizations suggested similar experiences regardless of work environment.²⁷ Cultural differences in how LAP appraise and talk about emotions and mental health may exist,^{4,7,9} complicating in understanding and addressing CF on a global scale.⁹

The objectives of the current work were to investigate a) the prevalence of CF in LAP in Europe, China, and Japan; b) the influence of personal and work-related factors on feelings of CF and the coping mechanisms that LAP use when experiencing CF, and c) inhouse support programs that are most helpful to those experiencing CF. In addition to comparing CF experiences between LAPs in different geographic regions, we surveyed 2 separate LAP populations to better understand the role of work environment on CF: 1) the general population of LAP working in the European Union (EU), China, and Japan, and 2) LAP working at a particular large multinational contract research organization in the EU, China, and Japan. We hypothesized that CF would differ across geographical regions due to cultural and emotional differences.^{4,7,9} Based on previous work comparing different populations of LAP based on work environment, we hypothesized that no difference would be detected between experiences of LAP in different work environments. The overall goal of this work was to better understand the causes and management of CF in LAP.

Materials and Methods

The study was approved by the University of Guelph Research Ethics Board (REB# 19-06-017). The methods used were described previously²⁷ and the same research group conducted the current study. The research team developed a cross-sectional questionnaire designed to gather information from LAP in the EU, China, and Japan about feelings of CF, work-related and personal factors that are related to feelings of CF, preferred coping mechanisms, and work-support program factors that could benefit those feeling CF. CF was defined as profound emotional and physical exhaustion that personnel can develop due to the nature of their work. CF occurs in many professions including LAP. To maintain consistency between the studies, the same survey that was used previously was also used for the current study, except when asking which country participants were from. The survey contained 30 questions and had 4 parts: Part A: demographics; Part B: CF; Part C: nature of work; Part D: solutions and coping mechanisms (Figure 1).

Distribution and data collection. The EU survey was administered using Qualtrics survey software (Qualtrics XM Software

Company, Provo, UT) and the China and Japan surveys were administered using SurveyMonkey software (SurveyMonkey, San Mateo, CA). For China and Japan, the survey was translated into the respective languages and proofread by native speakers. Participation in the survey was entirely voluntary, no incentives were provided, and responses were entirely anonymous. At the start of the questionnaire, participants provided consent to participate and could choose not to answer any question or to end the survey at any time without consequence.

Participant inclusion criteria included current LAP in the EU, China, and Japan who were 18 y of age or older. Data were collected from the general population (GP) of LAP in the EU, China, and Japan, and from a global contract research organization (CRO) with sites in these regions.

EU survey. The online questionnaire was made available to EU LAP between June 22nd to July 28th, 2020. To recruit individuals, email invitations were distributed through the European Society of Laboratory Animal Veterinarians, the Federation of European Laboratory Animal Science Associations, the Laboratory Animal Veterinary Association, and Animaux de Laboratoire. At the time this survey was conducted, the United Kingdom was still a part of the EU, and results have been reported accordingly.

China and Japan survey. The online questionnaire was made available to LAP in China and Japan between November 19th to December 19th, 2020. Participants were recruited through email invitations distributed through the Asian Federation of Laboratory Animal Science Associations, the Chinese Association for Laboratory Animal Science, the Japanese Association for Laboratory Animal Science, and the Japanese Association for Laboratory Animal Medicine.

Recruitment of the CRO employees used an internal company email listserv. Snowball sampling also occurred as participants were encouraged to share the survey within their organization and on social media.

Ten-Item Personality Index (TIPI). A modified Ten-Item Personality Index (TIPI)¹⁰ was included in the questionnaire, as described in a previous study.² This index is used to evaluate personality in studies for which personality is not the primary focus.^{10,23} Participants rate themselves on a Likert scale of 1 (strongly disagree) to 7 (strongly agree) on 5 personality dimensions (extraverted, agreeable, dependable, emotionally stable, and openness).¹⁰

Data analysis. All statistical analyses were performed using R Studio.²⁶ Descriptive statistics were summarized for personal and work-related demographic factors, self-reported feelings of CF, the effects of CF on job performance, factors that influence feelings of CF, preferred coping mechanisms for dealing with CF, and effective CF support programs.

To determine associations between demographic information and self-reported feelings of CF, independent χ^2 -tests were performed due to the variables being categorical. Dependent variables included age, gender, time as a LAP, current position, time spent in current position, and personality dimensions. Self-reported feelings of CF were used as the independent variable.

Questions related to personality traits were scored and summarized as in a previous study.¹⁰ Independent sample *t* tests with a Bonferroni correction were conducted to compare differences between personality scores and reported feelings of CF and preferred coping mechanisms. Normal distribution of personality scores was assessed using visual inspection of the quantile-quantile plot and the Shapiro-Wilks test for normality. A Levene test was also conducted to ensure equality of variance in response data.

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 described 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 include 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 group 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?
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/Environment:

Social:

Work Management:

Please specify any other compassion fatigue support program ideas in the space provided:

(Open ended)

Figure 1. The compassion fatigue questionnaire.

Results

Demographic Information. Demographic information from questionnaire participants is summarized in Table 1. A total of 302 responses were submitted for the EU survey (GP: 79%; CRO: 21%), 39 for China (GP: 62%; CRO: 38%), and 77 from Japan (GP: 63%; CRO: 37%). Work-related demographic information is summarized in Table 2. Most respondents across countries and employer categories worked as veterinarians, research personnel, or animal care personnel. GP respondents primarily worked in academia, industry, or other contract research organizations. Rodents and rabbits (mice, rats, guinea pigs, rabbits, etc.) were the most common species worked with across countries and employer category, followed by large mammals (dogs, cats, pigs, cows, etc.).

Prevalence of compassion fatigue. The prevalence of CF in participants from the EU, China, and Japan is shown in Figure 2. In the EU, approximately half of all respondents said that they had experienced CF at some point during their career (GP: 127/238, 53%; CRO: 29/64, 45%). The most commonly reported feelings of CF (over 50% of participants) were sadness, frustration, apathy, and exhaustion. Participants with lower emotional stability scores were more likely to experience CF ($t = 4.05, P < 0.001$).

In China, 52% of respondents indicated that they had experienced CF (GP: 8/15, 53%; CRO: 5/10, 50%), while only 35% had experienced CF in Japan (GP: 9/27, 33%; CRO: 15/42, 36%). The most reported feelings of CF (over 50% of participants) in both countries and employer groups were depression and exhaustion. In the CRO groups, anxiety and sadness were also associated with CF. Participants from China reported apathy,

whereas those from Japan reported depression, anxiety, and sadness. As in the EU data, participants from China who said that they had experienced CF had lower scores for emotional stability ($t = 18.068, P < 0.0001$). This relationship was not detected for participants from Japan ($P > 0.131$).

No other significant relationships were found between CF and demographic or work factors ($P > 0.05$).

Factors influencing compassion fatigue. Work-related factors that affect feelings of CF are presented in Figure 3 and personal-related factors that affect feelings of CF are presented in Figure 4. Factors influencing CF were viewed as important if 50% or more of the participants selected that factor as extremely or moderately important in influencing feelings of CF.

The work-related factors identified as affecting EU respondents were being understaffed (GP: 51%; CRO: 66%), lacking resources (GP: 52%; CRO: 56%), and having poor relationships with management (GP: 51%; CRO: 50%) and other colleagues (GP: 50%; CRO: 50%). CRO respondents also selected working excessive overtime (53%) while GP selected good relationships with the animals (54%). The work-related factors identified for China were different for GP and CRO respondents. For GP, being understaffed (67%), having a good relationship with animals (53%), and a lack of resources were relevant factors (53%), while for CRO respondents the most relevant work-related factors were having a good relationship with animals (80%), superiors (70%) and coworkers (50%), and a positive company image (50%). For both the GP and CRO populations in Japan, being understaffed (GP: 71%; CRO: 67%) and having a poor relationship with managers (GP: 52%; CRO: 52%) were relevant work-related factors contributing to CF. The GP respondents also selected lack of training (69%) and lack of resources (55%), and good relationship with animals (52%) as important factors.

For personal factors, EU respondents indicated that poor mental health (GP: 61%; CRO: 70%) was the most influential personal factor influencing feelings of CF. In China, mental (GP: 60%; CRO: 70%) and physical health were influential (GP: 53%; CRO: 70%). In the CRO, having a good relationship with family members (70%) and friends (60%) were also important personal factors in China. Both populations in Japan selected poor mental (GP: 56%; CRO: 59%) and physical health (GP: 70%; CRO: 62%) as influential factors. For the CRO respondents, financial difficulties (57%) also influenced feelings of CF.

Coping mechanisms and support programs for CF. Coping mechanisms. A summary of coping mechanisms used to deal with feelings of CF in the different regions is presented in Figure 5. In the EU and China, respondents from both employer populations used similar strategies for managing CF. The top coping mechanism was talking to someone (EU: GP: 78%; CRO: 69%; China: GP: 52%; CRO: 50%) followed by physical activity (EU: GP: 58%; CRO: 48%; China: GP: 43%; CRO: 50%). CRO employees in China also coped by seeking professional help (36%), while participants from the GP in China coped by getting away from work (43%) and practicing self-care (35%). For participants from Japan, GP and CRO participants indicated that self-care (GP: 44%; CRO: 54%), talking to someone (GP: 40%; CRO: 46%), and getting away from work (GP: 40%; CRO: 39%) were most effective in coping with CF. CRO participants in Japan also used physical activity (39%) as a coping mechanism.

Relationship between personality traits and coping mechanisms. Relationships between personality traits and coping mechanisms differed across countries. In the EU, high scores for the extraversion were related to coping strategies such as

Table 1. Survey respondents by country in the EU ($n = 302$), China ($n = 39$), and Japan ($n = 77$) and by employee group, including the general population (GP) of laboratory animal professionals and from a particular multinational contract research organization (CRO) with sites in these regions.

Variable	Region	Category	GP	CRO
			n (%)	n (%)
Country	EU Countries		238 (79)	64 (21)
		Austria	1 (0.4)	0 (0)
		Belgium	13 (5)	0 (0)
		Croatia	2 (0.8)	0 (0)
		Denmark	3 (1)	0 (0)
		Finland	2 (0.8)	6 (9)
		France	122 (51)	16 (25)
		Germany	41 (17)	13 (20)
		Greece	1 (0.4)	0 (0)
		Hungary	0 (0.0)	3 (5)
		Ireland	10 (4)	7 (11)
		Italy	1 (0.4)	0 (0)
		Luxembourg	1 (0.4)	0 (0)
		Netherlands	1 (0.4)	7 (11)
		Norway	1 (0.4)	0 (0)
		Poland	1 (0.4)	0 (0)
		Spain	14 (6)	0 (0)
		Switzerland	14 (6)	0 (0)
		UK (GB and NI)	10 (4)	11 (17)
		Prefer not to say	0 (0)	1 (2)
	China		23 (62)	14 (38)
	Japan		48 (63)	28 (37)

Table 2. Personal and work-related demographic information for survey respondents for EU (*n* = 302), China (*n* = 39), and Japan (*n* = 77) from the general population (GP) of laboratory animal professionals and from one particular contract research organization (CRO).

Variable	Category	EU		China		Japan	
		GP n (%)	CRO n (%)	GP n (%)	CRO n (%)	GP n (%)	CRO n (%)
Gender	Male	71 (30)	25 (39)	13 (57)	8 (57)	28 (60)	22 (79)
	Female	165 (69)	38 (59)	10 (44)	4 (29)	18 (38)	6 (21)
	Prefer not to answer	2 (0.8)	1 (2)	0 (0)	2 (14)	1 (2)	0 (0)
Age	18–25	16 (7)	4 (6)	1 (4)	2 (14)	3 (6)	1 (4)
	26–35	77 (32)	29 (45)	8 (35)	8 (57)	11 (23)	4 (14)
	36–45	70 (29)	17 (27)	10 (44)	4 (29)	13 (27)	8 (29)
	46–55	54 (23)	8 (13)	4 (17)	0 (0)	11 (23)	11 (39)
	56–65	21 (9)	4 (6)	0 (0)	0 (0)	8 (17)	4 (14)
	> 65	0 (0)	2 (3)	0 (0)	0 (0)	2 (4)	0 (0)
Years working in laboratory animal field	0–5	47 (20)	21 (33)	5 (22)	7 (50)	11 (23)	5 (18)
	6–10	47 (20)	16 (25)	5 (22)	5 (36)	7 (15)	2 (7)
	11–15	51 (21)	7 (11)	8 (35)	2 (14)	8 (17)	2 (7)
	16–20	34 (14)	5 (8)	1 (4)	0 (0)	2 (4)	6 (21)
	> 20	58 (24)	15 (23)	4 (17)	0 (0)	20 (42)	13 (46)
Organization Type	Academic	126 (53)	—	7 (30)	2 (14)	13 (27)	2 (7)
	Hospital	5 (2)	—	—	1 (7)	2 (4)	—
	Government	24 (10)	—	—	—	2 (4)	—
	Contract Research	19 (8)	52 (81)	9 (39)	1 (7)	9 (19)	5 (18)
	Industry	47 (20)	10 (16)	4 (17)	8 (57)	18 (38)	15 (54)
	Not-for-profit	6 (3)	—	—	1 (7)	2 (4)	—
	Prefer not to answer	2 (0.8)	1 (2)	2 (9)	1 (7)	2 (4)	2 (7)
	Other	9 (4)	1 (2)	1 (4)	—	—	4 (14)
Current Position	Animal care staff	47 (20)	18 (28)	3 (13)	4 (29)	8 (17)	17 (61)
	Veterinary support	13 (5)	—	2 (9)	—	6 (13)	2 (7)
	Veterinarian	69 (29)	13 (20)	11 (48)	4 (29)	20 (42)	3 (11)
	Research staff	67 (28)	16 (25)	5 (22)	1 (7)	8 (17)	2 (7)
	Study director	21 (9)	5 (8)	1 (4)	1 (7)	2 (4)	1 (4)
	Necropsy	—	—	1 (4)	1 (7)	—	1 (4)
	Pathologist	1 (0.4)	—	—	—	3 (6)	—
	Other	17 (7)	9 (14)	—	3 (21)	1 (2)	2 (7)
Years in position	0–5	90 (38)	34 (53)	9 (39)	14 (100)	20 (42)	10 (36)
	6–10	66 (28)	13 (20)	7 (30)	—	11 (23)	2 (7)
	11–15	42 (18)	4 (6)	5 (22)	—	3 (6)	5 (18)
	16–20	22 (9)	5 (8)	1 (4)	—	5 (10)	2 (7)
	> 20	18 (7)	6 (9)	1 (4)	—	9 (19)	9 (32)
Species worked with	Rodents and rabbits	205 (86)	58 (91)	15 (100)	10 (100)	37 (90)	27 (100)
	Large mammals	64 (27)	14 (22)	7 (47)	—	16 (39)	—
	Reptile/amphibians	16 (7)	—	—	—	1 (2)	—
	Fish	39 (16)	2 (3)	1 (7)	—	4 (10)	1 (4)
	Avian	19 (8)	5 (8)	1 (7)	—	1 (2)	1 (4)
	Primates	20 (8)	14 (22)	10 (67)	—	7 (17)	—
	Other	5 (2)	—	—	—	1 (2)	—

talking to friends or family ($t = -2.161, P = 0.031$) and turning to religion ($t = -1.99, P = 0.048$), while lower scores for extraversion were related to emotionally detaching from work ($t = 2.021, P = 0.044$). In Japan, participants with higher extraversion scores used physical activity ($t = -2.099, P = 0.039$), mindfulness ($t = -2.207, P = 0.031$), and emotional detachment from work ($t = -2.935, P = 0.004$) as coping mechanisms for CF.

Participants with higher scores for agreeableness in the EU used mindfulness practice or meditation ($t = -2.515, P = 0.012$) to cope, while agreeable participants in China were more likely

to seek professional help ($t = -2.842, P = 0.007$) and use physical activity ($t = -2.196, P = 0.035$) to deal with feelings of CF.

EU individuals who were higher in conscientiousness used self-care strategies ($t = -2.866, P = 0.0044$) and physical activity ($t = -3.791, P < 0.001$) to cope with CF while those in China were more likely to seek professional help ($t = -2.864, P = 0.007$).

In the EU, those higher in emotional stability used self-care strategies ($t = -2.589, P = 0.01$) to cope with CF in contrast to those with lower scores for emotional stability, who were more likely to use recreational substances, such as alcohol,

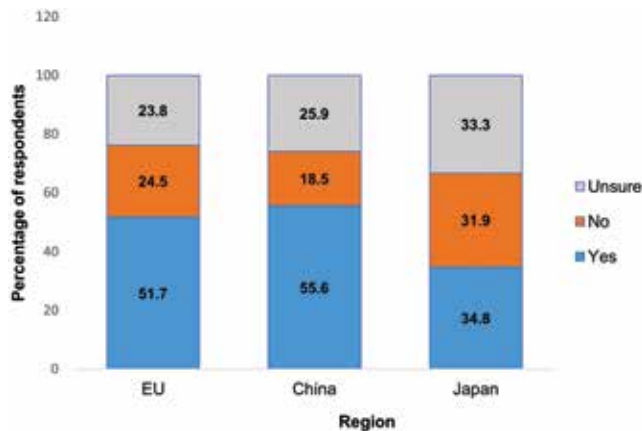


Figure 2. Prevalence of compassion fatigue in laboratory animal professionals in the EU ($n = 304$), China ($n = 39$), and Japan ($n = 77$).

smoking, or other drugs ($t = 4.158$, $P < 0.001$), emotional eating ($t = 3.214$, $P = 0.0015$), and releasing emotions after work ($t = 3.544$, $P < 0.001$) to cope with feelings of CF. A similar relationship was seen in Japan for participants with lower emotional stability, who were more likely to cope with CF through recreational use of alcohol, drugs, and cigarettes ($t = 2.569$, $P = 0.012$), and emotional eating ($t = 2.053$, $P = 0.044$).

In the EU and Japan, individuals with high scores for openness sought further education on CF (EU: $t = -2.491$, $P = 0.013$; Japan: $t = -3.083$, $P = 0.003$).

Workplace support programs. Relatively few participants (EU: GP, 7%; CRO, 16%; China: GP, 7%; CRO, 30%; Japan: GP, 10%; CRO, 18%) stated that their workplace had CF programs. In the EU and Japan, few of those participants claimed that the programs were always or often helpful (EU: GP, 11%; CRO, 10%; Japan: GP, 4%; CRO, 5%). In China, CRO participants were more likely to receive CF support at work (GP, 7%; CRO, 30%); 40% of these thought that the CRO programs were always or

often helpful as compared with 79% for GP respondents. More participants from China stated their place of employment had self-care or resiliency training as compared with EU and Japan (EU: GP, 16%; CRO, 16%; China: GP, 40%; CRO, 50%; Japan: GP, 15%; CRO, 24%).

The top ranked physical-focused programs that were considered beneficial for coping with CF in the workplace were similar for the EU and China, including financial reimbursement for activities outside of work, such as fitness memberships (EU, 22%; China, 8%), group activities at work (EU, 21%; China, 15%), and physical exercise resources at the workplace (EU, 20%; China, 23%). For participants in Japan, most felt that physical exercise programs would not be helpful (34%) but otherwise selected financial reimbursement for physical activities outside of work (29%). The top ranked mental and emotional program ideas to help with CF was having a quiet place at work to be alone and reflect (EU: 26%; China: 26%; Japan: 27%). The top ranked social program in the EU and China were support groups with peers and coworkers (EU: 26%; China: 15%), while in Japan the top-rated social program was having recreational activities outside of work (19%). Finally, the top ranked work management program idea to help employees reduce feelings of CF was enforcing strict workday hours (EU: 18%, China: 18%; Japan: 14%). Participants from Japan also thought that paid leave from work (27%) and debriefing on the experiments and procedures being conducted (16%) would be beneficial for workplace CF programs.

Discussion

CF can affect the mental wellbeing of LAP and their ability to properly care for animals, in addition to affecting their long-term retention within the field of LAP. This issue is largely understudied, especially on a global scale. The goal of this study was to better understand CF in LAP by investigating the prevalence, factors related to, and coping mechanisms for CF, and to determine what support programs would be most helpful to

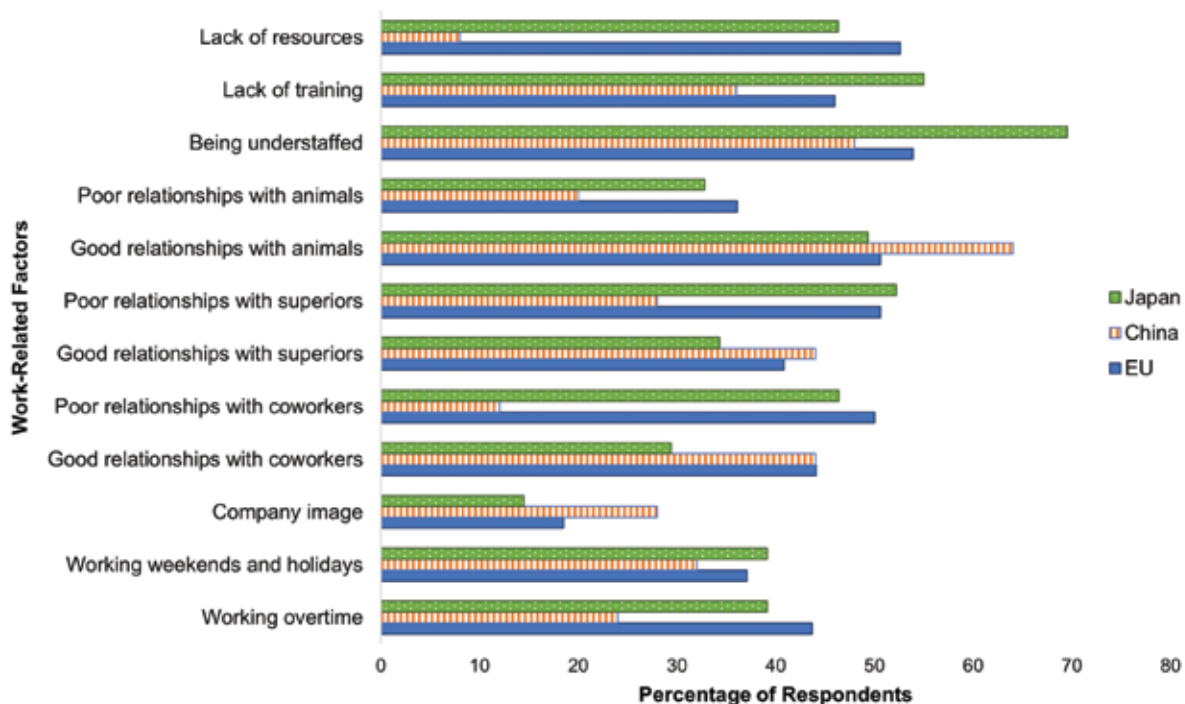


Figure 3. Work-related factors for laboratory animal professionals that extremely or moderately influence feelings of compassion fatigue in the EU ($n = 304$), China ($n = 39$), and Japan ($n = 77$).

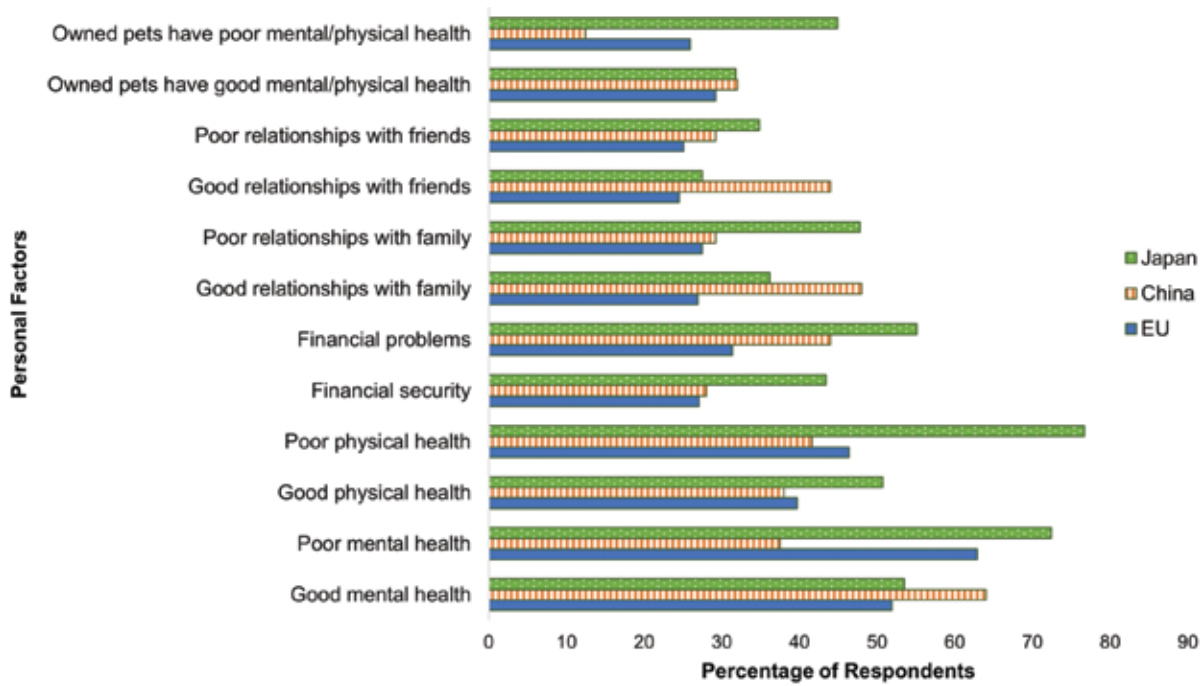


Figure 4. Personal factors for laboratory animal professionals that extremely or moderately influence feelings of compassion fatigue in the EU ($n = 304$), China ($n = 39$), and Japan ($n = 77$).

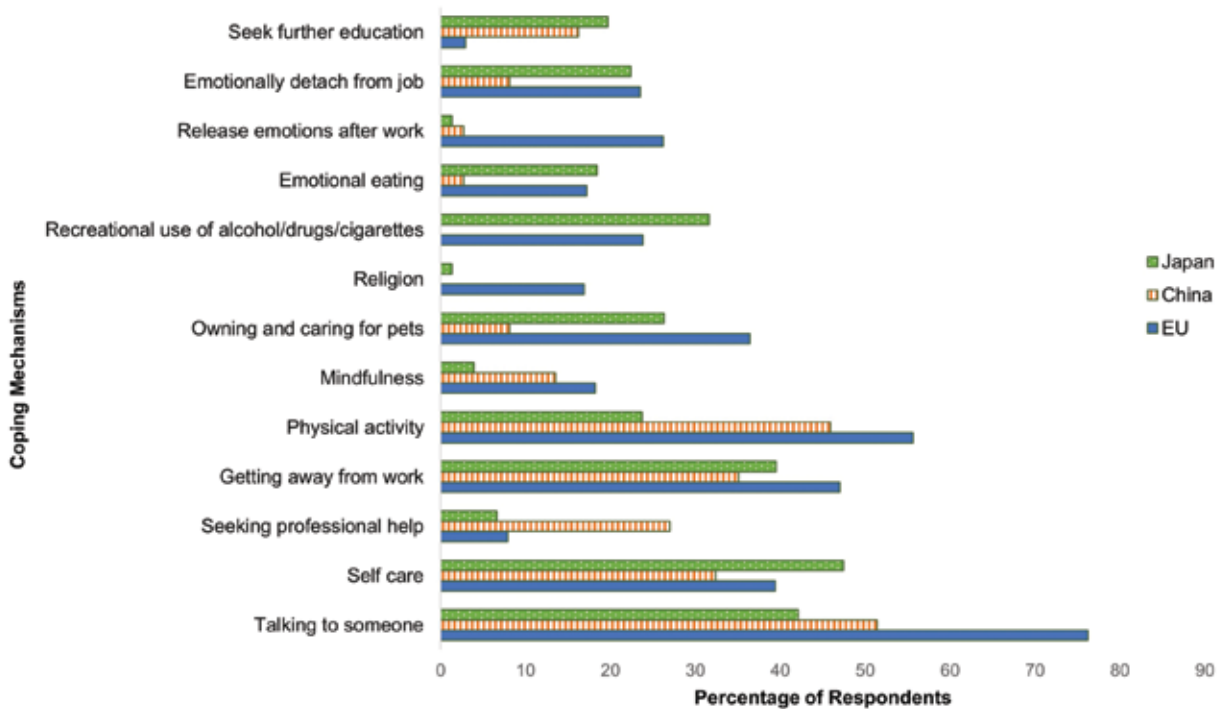


Figure 5. Coping mechanisms used by laboratory animal professionals to deal with feelings of compassion fatigue in the EU ($n = 304$), China ($n = 39$), and Japan ($n = 77$).

LAP in different regions to deal with feelings of CF. In general, no major differences in responses were detected between LAP working in different sectors, for example, academia, contract research, etc. Previous studies also reported no major differences when comparing between veterinarians and veterinary technicians, years in role, and species worked with⁵ or between paid animal-care workers and volunteers in other animal care fields.²⁰ This suggests that CF is experienced similarly by LAP.

A previous study⁸ surveyed LAP in Spain and found that LAP in senior positions report less CF than other workers,

suggesting that position may be important. This may be due to greater self-autonomy, choice, and control over their work activities. Other factors that may contribute to CF are related to observing greater pain and distress in the animals as a result of research procedures,^{8,14} lack of choice over participating in euthanasia activities, and being unable to provide enrichment to research animals in more or varied ways because of time or financial constraints.^{14,28,32} Euthanasia has been investigated as a risk factor for CF, with results suggesting that participating in euthanasia activities may contribute to feelings of CF.^{1,2,22,30}

Other factors, such as more CF contact with animals¹ and other individual and/or work-related factors, also contribute.^{2,30} The present study found no relationships between work-related factors and CF.

The data presented in this paper extend those of a previous questionnaire that collected responses from LAP working in the USA and Canada.²⁷ The same questionnaire and methodology were used in this study, allowing comparisons among the USA, Canada, EU, China, and Japan and providing a better picture of CF at a global level. Participants from the USA and Canada were more likely to report CF than were participants from the EU, China, and Japan. Across all 5 regions surveyed, exhaustion was the feeling most frequently associated with CF. In the USA and Canada, females were more likely than males to experience CF, but no specific gender or demographic factors related to CF were reported in the EU, China, and Japan. Work-related factors most likely to influence feelings of CF were similar across regions and included ensuring proper staffing of facilities, having good relationships with animals, coworkers, and colleagues, and implementing training and resources to deal with CF.²⁷ Six work domains that have been linked to feelings of burnout are workload, reward, community, fairness, control, and values,¹⁶ which are consistent with the factors considered here. Personal factors most associated with feelings of CF across all regions were mental and physical health. Only participants from China mentioned relationships with family and friends as an important personal factor, despite the identification of social support as an important means of coping with CF for LAP,^{8,14} other animal care professionals,^{2,11} and human health professionals such as oncology nurses.³⁹ Other studies reported that workplace factors such as hours, workload, experience, workplace support, perception of workplace (including relationships at work), coping resources at work,^{33,35,42} and personal features (such as age, sex, ethnicity, previous trauma, coping style, mindfulness, and empathy) as factors that can influence feelings of CF.^{35,42} However, the relationships between demographic factors and CF vary.³³ The coping mechanisms that were most effective across regions in this study were talking to someone and physical activity, but getting away from work and self-care also rated highly. For health care professionals, self-care and work-life balance were identified as important management strategies for CF, particularly exercise, mind-body connection, and maintaining positive social relationships.³³

Few differences were detected between LAP working in the US, Canada, EU, China, and Japan. A study of CF in oncology nurses found that those in China and Korea had less compassion satisfaction and higher burnout and secondary traumatic stress than did nurses in the USA.⁴⁰ Some evidence suggests cultural differences in CF⁷ and mental health, including its perception, coping styles, and treatment seeking; thus, geographic and cultural factors may need to be considered and investigated further in order to understand this challenge.⁹ A global understanding of CF is important as research being conducted varies between world regions and individuals show greater worldwide mobility in seeking work. Despite this worldwide need, previous surveys on CF in LAP have primarily surveyed workers in the US and Canada.^{14,27,34}

Personality factors were related to CF, as participants low in emotional stability were more likely to report feelings of CF. Low scores on emotional stability have been correlated with secondary traumatic stress and burnout in palliative care clinicians, whereas high scores on agreeableness were associated with compassion satisfaction, suggesting a relation to resilience.²⁴ Emotional intelligence and ability-based emotion management

were reported to be inversely related to CF in other health care professions.⁴³ In the current study, LAP who were low in emotional stability were more likely to cope through recreational use of alcohol, drugs, cigarettes, emotional eating, and releasing emotions after work. Use of negative or maladaptive coping mechanisms, such as substance abuse, is related to higher levels of CF.³⁵ Coping mechanisms that are emotion-focused are generally related to higher levels of CF while those that are task-focused are related to lower levels of CF.³⁵ When developing CF and resiliency building programs, considerations should include regions, cultures, and individual personality differences, while also providing support for those low in emotional stability to prevent burnout and substance abuse.^{11,13,16} Emphasis should also be placed on promoting task-focused coping skills and overall resilience.^{13,35}

Across regions, less than 30% of survey participants reported that their place of employment had CF support programs, and few participants stated that the programs were helpful. This indicates that research organizations are providing insufficient resources or ineffective programs. According to respondents, the most beneficial workplace programs to promote compassion satisfaction, defined as a degree of fulfillment, sense of purpose, and gratification,^{6,22} would provide employees with quiet spaces to be alone and reflect at times during the workday, self-care training, programs that promote physical and mental health, opportunities for support-groups, team building among coworkers, and giving employees outlets for paying tribute to animals they care for. Animal shelter workers and healthcare professionals have reported similar programs, including counseling, seminars, and support groups, to be beneficial in coping with CF.^{11,33} For LAP, compassion satisfaction can come from the joy of working with and helping animals, and from being able to detach from work physically and psychologically.⁶ Enforcing strict work hours and providing opportunities for paid leave from work are also important for battling feelings of CF and promoting compassion satisfaction. However, the nature of working with and providing care for research animals may require mandatory overtime, and understaffing can be a problem in many facilities.²¹ Organizing opportunities to honor research animals recognizes the bond that workers shared with animals and can promote compassion satisfaction by reminding personnel of the joy of working with the animals and the overall purpose of the research being to improve the wellbeing of humans and animals.^{6,12,21} Three main priorities for addressing CF based on a survey of LAP in a university setting include providing a welcoming and receptive work environment, providing positive work experiences, and giving positive feedback.²⁶ More specifically, respondents mentioned trust, adequate resources, job rotation, staff appreciation, leadership support, open discussions, and an understanding of their impact on research as a way to improve CF and reduce burnout.²⁵ CF and resiliency building programs can be effective means of addressing the issue if designed appropriately and made readily available to LAP.²⁸ Few studies have investigated the effectiveness of work intervention programs, with only 3 included in a systematic review on intervention programs for LAP.³¹ Future research on this topic should investigate intervention programs that mitigate feelings of CF.

A limitation of the current study was low response rate of LAP across all countries surveyed. Within the EU, most respondents were from France and Germany. Surveys did not account for other factors that could affect CF such as time of year or emotional state when taking the survey. Also, the surveys for this study were sent during the COVID-19 global pandemic, whereas

the previous North American survey occurred in the summer of 2019. The COVID-19 pandemic may have increased feelings of CF in LAP in the USA, including adding new or worsening symptoms of CF, new work stressors such as personal health and safety, or changes to social networking and greater social isolation in the workplace.³⁴ Similar trends in CF have been documented during the recent pandemic in other professionals globally.^{17,19,36,41}

In conclusion, CF is an important issue impacting LAP around the world. The goal of this research was to better understand CF in the general population of LAP and in CRO through surveys completed by LAP working in the EU, China, and Japan. LAP in these regions had similar experience of CF in terms of the work factors influencing feelings of CF and the coping mechanisms used to deal with CF. Staffing, workplace relationships, and provision of CF programs to teach coping mechanisms and self-care were indicated as important workplace factors to protect against CF. Talking to someone, physical activity, getting away from work, and self-care were common coping mechanisms. Research organizations need better outreach and programming for management of CF, as fewer than 30% of participants indicated that their workplace had CF-related support programs, and few found those programs to be helpful. Quiet places at work, programs supporting self-care and physical and mental health, opportunities to pay tribute to animals, and building positive social connections are initiatives that institutions could implement to help employees cope with CP.

Acknowledgments

The authors thank Judy Murray for assistance with recruiting participants, the laboratory animal science associations that shared the survey with their communities, and the survey participants for being open to discussing their experiences with compassion fatigue to better support their colleagues around the world.

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