# Nonhuman Primate Social Status Effects on Compassion Fatigue in Laboratory Animal Care Professionals

Lace E. Logan,[1,2] Lara K. Ault,[2] and Keith W. Burton[2]

[1]Southwest National Primate Research Center, Texas Biomedical Research Institute

[2]Department of Social Sciences, Saint Leo University

## Author Note

This work was made possible with support from the Animal Welfare Institute. The authors thank the animal care professionals who participated in this survey and the animal heroes who sacrificed their lives to improve scientific understanding of health and wellness. Correspondence concerning this article should be addressed to Lace E. Logan, Southwest National Primate Research Center, Texas Biomedical Research Institute, 8715 Military Drive West, San Antonio, TX 78227. Email: llively@txbiomed.org.

**Abstract**

Animal care professionals are at an elevated risk of developing stress-related conditions. Research about the prevalence of compassion fatigue as an occupational hazard among animal laboratory professionals has had a recent growth in the literature. A multi-measure survey was used to examine laboratory animal care professional compassion fatigue in relation to nonhuman primate social housing status and individual understanding of social housing. Two hypotheses were tested: (a) Individuals who have a better understanding of nonhuman primate social housing report higher levels of compassion fatigue than those who do not and (b) individuals working with more single-housed nonhuman primates experience higher levels of compassion fatigue than those who work with more socially housed primates. While data set limitations prevented the establishment of a relationship between compassion fatigue and primate social housing status, we did find that a better understanding of nonhuman primate social housing was associated with higher levels of compassion fatigue. It is important to understand compassion fatigue's contributing factors, its impact on mental health, and workplace environmental factors over which animal care professionals currently have little control so that employers can take measures to lessen its effects preemptively. Together these findings suggest that as the laboratory animal community becomes more knowledgeable about the importance of social housing in nonhuman primate species, compassion fatigue can be reduced and prevented by upholding the psychological welfare needs of the animals in their care.

*Keywords*: compassion fatigue, primates, social housing, laboratory care professionals, mental health

## Nonhuman Primate Social Status Effects on Compassion Fatigue in Laboratory Animal Care Professionals

Animal care professionals are at an elevated risk of developing stress-related conditions (e.g., depression, anxiety, and compassion fatigue), and some estimates show that they are as much as two times more likely to die from suicide than the general population and human health care professionals (Hill et al., 2020). Secondary traumatic stress and burnout work together to create compassion fatigue. Secondary traumatic stress is the emotion that results from knowing that an individual has suffered. Burnout is a state of exhaustion caused by exposure to emotionally demanding situations (Figley, 1995). Compassion fatigue is the natural consequence of emotions that result from the stress of helping or wanting to help a suffering individual (Hill et al., 2020; Monaghan et al., 2020), which leads to a gradual erosion of empathy, hope, and compassion (Hanrahan et al., 2018; Mathieu, 2011).

The aim of this study was to delve further into the topic of compassion fatigue and specific factors, in this case nonhuman primate social housing status (i.e., single or social), that may help protect against it in the professional animal care community. Ultimately, we sought to determine whether compassion fatigue in laboratory animal care professionals can be reduced or even prevented by upholding the psychological welfare needs of the animals that they care for.

### Background

Between 40% and 85% of helping professionals report moderate to high levels of compassion fatigue (Mathieu, 2011). Figley (2015) states that compassion fatigue is felt most keenly by those care professionals who are especially effective at their work, as their compassionate nature leaves them vulnerable to contagion effect. Emotional contagion, also known as the mirroring effect, refers to the process where one individual can experience the

emotions of another whom they see suffering, or with whom they are in contact, often without awareness. This contagion effect puts those who have an enormous capacity for feeling at a higher risk of compassion stress (Svenaeus, 2014).

Care professionals employed within animal laboratory facilities may experience frequent moral distress, as policies or routines can conflict with personal beliefs. Wanting to provide the best possible life for the animals while inducing disease, performing euthanasia, and seeing animals in distress can cause cognitive dissonance (Mathieu, 2011). Cognitive dissonance is a psychological phenomenon that causes stress, anxiety, and discomfort when actions do not line up with beliefs (Villines, 2024).

**Nonhuman Primate Housing**

Due to their similarity to humans, macaques are the most frequently used nonhuman primates in biomedical research (Cohen et al., 1992; Phillips et al., 2014; Zijlmans et al., 2021). Like humans, macaques are highly social, and complex social interactions are crucial for normal development (Novak & Suomi, 1991; Zijlmans et al., 2021). This remains true for other primate species (i.e., baboons, marmosets, capuchins, vervets, etc.) used in laboratory research. The most important factor contributing to nonhuman primate psychological health is the opportunity for social interaction (Baker et al., 2015; Benton et al., 2013; Doyle et al., 2008; Eaton et al., 1994; Novak & Drewsen, 1989; Pahar et al., 2020), and a large body of literature demonstrates that single housing is stressful, as reviewed in DiVincenti and Wyatt (2011). Socially housed nonhuman primates exhibit more behavioral, physiological, and psychological indicators of healthy well-being than those who are singly housed (Baker et al., 2015).

Social interaction among nonhuman primates should be considered on the same level as basic needs as food and water provisioning (de Waal, 1991). In fact, social interaction is so

critical that, without it, abnormal behavior and physiology begin to take shape (Eaton et al., 1994; Suomi et al., 1971). Multiple studies have revealed that nonhuman primates will choose the comfort of a real or perceived partner over food resources, even when food is restricted (Dettmer & Fragaszy, 2000; Harlow 1958). Additionally, Schapiro compared young single-housed and socially housed macaques and found those who were single-housed engaged in significantly more self-aggressive behavior. Importantly, those same single-housed macaques displayed a 10-fold reduction in abnormal behavior once socialized (Schapiro, 2002).

In addition to behavioral outcomes, social deprivation also impacts nonhuman primate physical health. A 13% increase in the need for veterinary treatment was found in nonhuman primates who were single-housed, which included treatment for diarrhea, weight loss, and trauma (DiVincenti & Wyatt, 2011). Reinhardt et al. found that atherosclerosis (artery wall abnormalities) was shown to be four times more common in single-housed animals (Reinhardt et al., 1995).

While nonhuman primate well-being is prioritized through the use of social housing, laws are in place that require it, and evidence suggests they are better test subjects as a result (Hannibal et al., 2016), there are still instances where single housing is required. Constraints within laboratories may require single housing of social nonhuman primates due to scientific justification (e.g., an animal infected with contagious disease), behavioral concerns (e.g., social incompatibility), and clinical needs (e.g., an ill or injured partner) (United States Department of Agriculture, Animal and Plant Health Inspection Service, 2017).

**Compassion Fatigue in Laboratory Animal Care Professionals**

Compassion fatigue is the emotional equivalent of a physical occupational hazard (Mathieu, 2011) and it is already recognized as such in clinical health workers (Bride et al.,

2007). Healthcare workers experience worse physical and mental health than other populations of professionals. Fifty-nine percent of healthcare professionals report high levels of stress, 36% report high levels of depressed mood, and 20% are in poor physical health (Mathieu, 2011).

Research has identified factors that can increase compassion fatigue in care workers. These include lack of control, poor leadership, empathic capacity, moral issues, futility of care, and witnessing pain, suffering, and trauma (Hanrahan et al., 2018). Animal care professionals are at a heightened risk due to the aforementioned factors plus frequent exposure to negative experiences such as euthanasia, hostility from the public who may disagree with animal research, and often having to work with minimal resources (Bride et al., 2007; Hill et al., 2020; LaFollette et al., 2020; Monaghan et al., 2020). Studies have reported that compassion fatigue is higher in laboratory care professionals who have less social support, are involved in more stressful research (e.g., inducing pain or illness), or are employed in a stressful or fast-paced work environment (LaFollette et al., 2020). Despite these critical concerns, little data exists on the psychological impacts that nonhuman primate housing conditions may have on the persons who work with these animals and the prevalence of compassion fatigue as an occupational hazard in the animal care field.

If animal welfare needs are being met appropriately, it can be expected that laboratory animal care professionals will experience more positive daily experiences and report lower levels of compassion fatigue. While most facilities follow best housing practices, in reality there are circumstances where all best practices cannot be reasonably met. Therefore, this research could help encourage better housing and research conditions beyond what is typically provided, resulting in more satisfied employees and longer, more effective, tenure. Additionally, animal welfare can be expected to increase along with the mental health of those who care for them,

leading to less stress for the animals and more reliable research outcomes. Overall, by working to improve the lives of those who care for animals in research, the animals' lives can be expected to improve, too.

Given the aims mentioned above, animal care professionals were surveyed to answer the following questions:

1. Whether understanding the benefits of nonhuman primate social housing status influences compassion fatigue levels.
2. Whether exposure to nonhuman primate social housing status influences animal laboratory care professional compassion fatigue levels.

Understanding surrounding nonhuman primate social status may influence compassion fatigue levels. Therefore, the following hypotheses were examined:

1. Animal care professionals who have a better understanding of nonhuman primate social housing psychological effects will experience higher levels of compassion fatigue than those who have a lower understanding of nonhuman primate social housing.
2. Animal care professionals who work with more single-housed nonhuman primates will experience higher levels of compassion fatigue than those who work with more socially housed nonhuman primates.

## Methods

### Procedure

A survey link was provided by the online survey program, Qualtrics, and a recruitment email was sent directly to each of the directors at the seven National Primate Research Centers. The recruitment emails, including the survey link, were distributed via email to employees by the

directors. Participants were required to read an implied consent form that specified they had the right to withdraw from the study at any time before submitting their responses. Participant anonymity was maintained, and no identifying information was reported or published. Participation was voluntary with no compensation provided. A debriefing letter was provided to each participant upon completion of the survey. The authors received training on conducting minimal risk research and obtained ethical approval from Saint Leo University's Internal Review Board prior to sending out the survey and data collection.

**Participants**

Laboratory animal care professionals employed within one of the seven National Primate Research Centers who work with social nonhuman primate species (i.e., macaques, baboons, capuchins, vervets, chimpanzees, and marmosets) were surveyed. Forty-five participants (14 male, 30 female, 1 other; age: M = 35.02, SD = 10.02; Table 1) completed the survey (Figure S1). Participant recruitment occurred via direct email communication by the National Primate Research Center directors.

**Measures**

To evaluate the impact of nonhuman primate social housing status on animal laboratory care workers' level of compassion fatigue, a multimeasure survey was developed using Qualtrics. Similar to existing studies examining compassion fatigue levels in care workers, this survey includes the Professional Quality of Life Scale (ProQOL) (Stamm, 2009–2012), Perceived Stress Scale (PSS) (Cohen et al., 1983), and Compassion Fatigue "Short" Scale (CF-Short) (Polachek & Wallace, 2018). In addition, a demographic questionnaire was developed to obtain information on age, gender, country of residency, education level, type of animal care position, and length of time in their current role. The percentage of animals in single, pair, or

group housing that an individual works with on average was measured. The percentage of animals in single housing was used for analysis as this was the focus of our study.

### *Understanding of Nonhuman Primate Social Housing Scale*

A 10-item, 5-point Likert scale, developed for the purposes of this study, measured the extent of understanding that participants had about nonhuman primate social housing. Questions 1, 4, 5, 6, and 7 were reverse-scored, resulting in a maximum score of 50. A score of 40 or above, capturing individuals that selected agree or strongly agree, signified a higher degree of understanding of nonhuman primate social housing. Therefore, participants were categorized as "understands social housing" or "does not understand social housing" based on the cutoff score of 40. These categorical values were used for analyses. The Understanding of Nonhuman Primate Social Housing Scale was found to have a Cronbach's alpha of .82 and adequate validity (Table 2).

### *Professional Quality of Life Scale (ProQOL)*

The Professional Quality of Life Scale (ProQOL) is a 30-item measure adapted from a version of Figley's Compassion Fatigue Self-Test (Figley, 1995) and allows for comparison over time. The ProQOL focuses on positive and negative experiences over the past 30 days and consists of three subgroups including burnout, compassion satisfaction, and secondary traumatic stress (Stamm, 2009–2012). Each subgroup is represented by 10 questions. Items are anchored by a 5-item Likert scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *very often*; Stamm, 2009–2012). Questions 1, 4, 15, 17, and 29 were reverse-scored. This measure is free to use, can be adapted for multiple types of care professions, and is easily accessible. Past research has found the ProQOL to be reliable (e.g., Bride et al. [2007] found alpha = .87 for compassion satisfaction, .72 for burnout, and .80 for secondary traumatic stress). Geoffrion et al. (2019)

report the ProQOL with adequate discriminant and convergent validity. Reliability coefficients in the present study were .91 for compassion satisfaction, .80 for burnout, and .84 for secondary traumatic stress. This scale was used in this study to further support the Compassion Fatigue Short Scale, which was used to calculate compassion fatigue scores used for analyses.

***Perceived Stress Scale (PSS)***

The Perceived Stress Scale (PSS) is a 10-item measure that was adapted from a 14-item version that Cohen et al. (1993) developed. It is used to assess the feelings that individuals experience regarding how much stress they have been under in the past month. Each item is anchored by a 5-item Likert scale (0 = *never*, 1 = *almost never*, 2 = *sometimes*, 3 = *fairly often*, 4 = *very often*; Cohen & Williamson, 1988). Questions 4, 5, 7, and 8 were reverse-scored. The PSS was adapted to reflect the scale used in the ProQOL to help reduce any confusion the change in scale would cause to participants. The PSS is reported to have adequate internal and test-retest reliability and validity with a Cronbach's alpha of .91 and split-half reliability of .90 (Hill et al., 2020). The general nature of the PSS allows it to be used freely in a variety of different populations (Cohen et al., 1983). The present study found reliability to be alpha = .90.

***Compassion Fatigue Short Scale (CF-Short)***

The Compassion Fatigue Short Scale (CF-Short) is a 13-item scale adapted from the Compassion Fatigue Scale—Revised and is used to assess burnout and secondary traumatic stress with responses being scored on a 10-point Likert scale ranging from 1 (*rarely/never*) to 10 (*very often*) (Adams et al., 2006; Hill et al., 2020; Yildirım & Cavcav, 2020). It consists of two subscales that include eight burnout items and five secondary trauma items (Bride et al., 2007). This measure's Likert scale was adapted to reflect that used in the ProQOL so that all survey questions have a similar format. Bride et al. (2007) report the CF-Short to have a reliability score

of .80 for secondary trauma with positive concurrent validity, .90 for burnout with positive factor validity, and .90 for full scale with positive predictive validity. Yildirim and Cavcav (2020) report an internal consistency with a Cronbach's alpha coefficient of 0.91 for the CF-Short. The present study found reliability to be alpha .92 for full scale, .82 for secondary traumatic stress, and .91 for burnout. This scale was used to provide individual compassion fatigue scores. Burnout and secondary traumatic stress scores were combined to obtain a score for compassion fatigue. The highest possible score a participant could obtain was 65. Since the Likert scale was adapted to match other scales used, if participants scored in the top two-thirds, or 22 and above, they were recorded as positive for compassion fatigue.

**Data Analysis**

To achieve an adequate sample size based on a G*Power analysis (Faul, 2019), at least 24 laboratory animal care professionals' survey responses were needed. Pearson correlation coefficient and 2 × 2 one-way factorial MANOVA were computed to assess the linear relationships between the variables using IBM SPSS Statistics (Version 24). An alpha level of .05 was used for all statistical tests.

Surveys that were completed but had a missing data point (e.g., skipped over a selection, no age) were included. Mean imputation, a method where the mean of the observed values for each variable was calculated and inserted for the missing values, was used for all survey questions that used a Likert scale. Ages were left blank if not answered and not calculated into the mean.

## Results

Eighty-seven percent of participants worked with more socially housed animals (i.e., pair or group). Six participants (13%) worked with more single-housed nonhuman primates, *M* =

16.96, *SD* = 26.13. Nineteen participants (42%) worked with more pair-housed, *M* = 42.07, *SD* = 34.20, and more group-housed, *M* = 40.97, *SD* = 37.74, nonhuman primates. One individual (2%) worked with an equal amount of single- and pair-housed animals.

Hypothesis 1: Animal care professionals who have a better understanding of nonhuman primate social housing will experience higher levels of compassion fatigue than those who have less understanding of nonhuman primate social housing. Since the assumption of homogeneity of variance was not met for this data, we used the obtained Welch's adjusted F ratio (10.62), which was significant at the .05 alpha level reported as Welch's $F$ (1, 41.67) = 10.62, $p$ = .002, supporting the first hypothesis. Working with more single-housed nonhuman primates was related to understanding of nonhuman primate social housing, Welch's $F$ (1, 16.62) = 4.75, $p$ = .04. Further, a one-way MANOVA examining perceived stress and compassion satisfaction revealed that there was a statistically significant difference in perceived stress between groups of understanding, $F$ (1, 42) = 5.963, $p$ = .019.

Hypothesis 2: Animal care professionals who work with more single-housed nonhuman primates will experience higher levels of compassion fatigue than those who work with more socially housed nonhuman primates. This hypothesis could not be tested due to variable homogeneity. Only four participants (9%) reported working exclusively with single-housed and only 6 (13%) reported working with more single-housed than socially housed nonhuman primates. With only 10 participants having experience working with single-housed non-human primates, no meaningful analysis could be performed. We note that nearly all participants were working with socially housed nonhuman primates.

A total of thirty-three participants (73%) scored positive for compassion fatigue according to our predetermined criteria of scoring 22 or above. As expected, CF-Short

compassion fatigue was positively correlated with ProQOL compassion fatigue and perceived stress (Table 3). Compassion satisfaction ($M = 41.84$, $SD = 6.17$) was negatively correlated with compassion fatigue, $r\ (43) = -.37$, $p = .01$, and perceived stress, $r\ (43) = -.50$, $p < .01$.

Understanding (Table 4), education (Table 5), and type of role (Table 6) were not found to have any significant difference between groups for compassion fatigue, compassion satisfaction, or perceived stress.

## Discussion

It can be expected that laboratory animal care professionals will experience compassion fatigue, as this is a normal consequence of similar professions. Furthermore, laboratory care professionals experience additional challenges associated with the inability to find compatible social partners for their animals, and trauma that may occur during the introduction process or result from negative social interaction between the animals. In fact, the majority of participants in this study reported compassion fatigue. Individual symptoms of compassion fatigue include intrusive thoughts, avoidance behavior, arousal (i.e., anxiety, anger, and sleep disturbance), and burnout symptoms (Bride et al., 2007; Rank et al., 2009). If left untreated, compassion fatigue may lead to a decrease in individual well-being, poor professional judgments, low job satisfaction, more missed days of work, and high staff turnover (Bride et al., 2007; Hill et al., 2020; LaFollette et al., 2020; Monaghan et al., 2020).

### Hypothesis 1

There was a significant difference in compassion fatigue based on the understanding of social housing. This may suggest that as people become more knowledgeable about the importance of nonhuman primate social housing, or about the factors that contribute to an animal's psychological health in general, they could be more heavily impacted by caring for

them. Although this study was unable to test a relationship between compassion fatigue and single housing, this effect between understanding and compassion fatigue suggests that a larger sample size and a more diverse group of housing situations may provide a different story.

Nonhuman primates should have access to naturalistic social groups, a complex, mentally stimulating environment, and be provided with choices (e.g., varied enrichment items, social partners, and spaces that may or may not provide visual isolation; United States Department of Agriculture, Animal and Plant Health Inspection Service, 2017). Federal law requires nonhuman primates to be housed in mandated cage minimum enclosures and that animals are rarely or infrequently singly housed, having access to at least one partner. However, even with these mandates in place, laboratory nonhuman primates who are on study are often housed indoors, have limited space to locomote, and may have access to only one or no social partner. Although these animals receive daily enrichment, most items only provide short-term stimulation. Study animals are sedated regularly, and procedures may be performed often. Not only do these events stress the animal, but the technical staff responsible for animal clinical health are often the ones inducing disease or performing stressful procedures, negatively impacting the animals' health. Knowing the effects that this can have on the animals, even if one is not able to visually see their suffering, can explain why those with higher understanding of social housing and a better understanding of psychological well-being are more heavily impacted by the work that they do. The lack of a significant difference between levels of understanding was a pleasant surprise as this signifies that laboratory animal care professionals were working with nonhuman primates living under better conditions than expected.

**Hypothesis 2**

Animal care professionals who deal with more suffering, stress, or traumatic experiences were predicted to become more overwhelmed in their work (Rank et al., 2009). An immense amount of stress and negatively perceived experiences may lead to compassion fatigue. This study examined whether working with more singly housed nonhuman primates put laboratory animal care professionals at an elevated risk of developing compassion fatigue. While it reflects well on facility practices that most participants worked with socially housed nonhuman primates, our inability to directly test this relationship was an unfortunate outcome of the lack of housing variability. It would make sense that single animals suffer more (Cohen et al., 1983) and, therefore, care professionals who work with more single-housed nonhuman primates experience heightened levels of compassion fatigue. Indeed, this inspired our prediction; however, only four out of the 45 participants worked with more single than socially housed nonhuman primates. Gathering information on a larger sample size with more diverse living conditions may be more effective at answering this question than it was in the scope of this study.

**Understanding of Nonhuman Primate Social Housing**

Interestingly, there was a difference in animal caregivers' understanding of social housing based on the number of single-housed animals worked with. Specifically, those demonstrating better understanding worked with more socially housed primates. This could suggest that people working in areas with more single-housed animals are not exposed to the benefits of social housing and thus may be less aware of its importance for psychological and physiological health. This finding could help to explain why there was no significant difference between the number of single-housed and socially housed nonhuman primates that an individual worked with. If people who work with more single-housed animals do so because they are

already aware of its negative influence on the animals, then they may be less emotionally impacted and, thus, experience lower compassion fatigue levels than expected.

Education level and having a higher role within a laboratory research center did not correlate significantly with understanding of social housing. Those who hold higher positions within animal laboratory facilities may be highly trained in their area of focus, such as infectious disease, clinical medicine, or physiological health, but they may be lacking an understanding of psychological health and how that impacts nonhuman primate well-being (Garner, 2014). Furthermore, priorities may differ from those who work directly hands-on with the animals. Possibly, those who hold higher positions may know and care about these issues but find that they are worth enduring if it means advancing knowledge, getting grants funded, and having papers published.

**Compassion Satisfaction**

Compassion satisfaction can be increased to help combat compassion fatigue (Cake et al., 2015). Compassion satisfaction scores were overwhelmingly high in this study's results. There were no participants who reported low compassion satisfaction. All participants scored average (47%) or high (53%) on the compassion satisfaction scale.

Despite workplace stress and the emotional baggage associated with providing care to laboratory animals, care professionals in this sample remain highly satisfied in their positions and feel that their positions give their life meaning. Therefore, many laboratory animal care professionals may see their jobs as benefiting their well-being (Cake et al., 2015). If animal welfare needs are being met appropriately, it can be expected that laboratory animal care professionals may experience more positive daily experiences that work to increase compassion satisfaction and lower levels of compassion fatigue.

**Implications**

This project has important practical repercussions for understanding compassion fatigue and providing information relevant to the optimization of laboratory environments for care staff. If working environments intentionally promote mental health by housing animals socially, symptoms of stress should mitigate and resolve with time (Mathieu, 2011). Furthermore, as mentioned in the introduction, animal welfare can be expected to increase along with the mental health of those who care for them, leading to less stress for the animals and more reliable research outcomes. This provides an important motivation to decrease compassion fatigue in laboratory animal care professionals.

Currently, animal care facilities throughout the country face a severe staff shortage (Best Friends, n.d.). Stress-related conditions give rise to illness in individuals and breakdowns within institutions. Therefore, it is important that employers are aware of compassion fatigue and its contributing factors so that preventative mechanisms are in place *before* traumatic or painful experiences occur (Figley, 2015). Intervention programs have been examined and shown to lead to an increase in compassion satisfaction and a decrease in organizational role stress and burnout (Rohlf, 2018). Compassion satisfaction is described as the pleasure that is derived from being successfully able to help others and can combat compassion fatigue (Bride et al., 2007). Rank et al. (2009) found an increase in compassion satisfaction and a decrease in traumatic stress scores when participants took part in the training-as-treatment intervention programs. This indicates that employers may be able to effectively combat compassion fatigue through refinement strategies if they are aware of the problem.

Polachek and Wallace (2018) found that compassion satisfaction increased when individuals built a relationship with their patients. Furthermore, LaFollette et al. (2020) reported

that care professionals who worked with animals experiencing less pain or stress, who engaged in more human-animal interactions, and who had more social support experienced higher levels of compassion satisfaction. It is important to understand compassion fatigue's contributing factors, its impact on mental health, and prevention methods that do not solely rely on animal care professionals' personal actions so that employers can take measures to lessen its effects preemptively. Another important way to combat compassion fatigue is to change environmental conditions for nonhuman primates by providing them with opportunities to socialize and engage with environmental enrichment. Absent that, and in addition, we should foster compassion satisfaction. When mental health is promoted in the workplace, employers benefit by seeing less absenteeism and an increase in productivity (Murray et al., 2020).

**Limitations**

This study may exclude a large population of those who have been exposed to traumatic events in the animal care profession and subsequently removed themselves from the field included in this study because of those experiences. A study limitation may include missing data from individuals who have dropped out of the animal care profession due to elevated levels of compassion fatigue early on in their careers.

As with all surveys, another limitation is evident. Self-reports are not always reliable. They depend on participants being honest and accurate in their answers. Nonetheless, it is an important step in an investigation regarding nonhuman primate caregiver professionals. Another potential limitation with this survey was that participants were not asked if they were familiar with the Animal Welfare Act Regulations or the Guide requirements for social housing. This could impact outcomes as someone who is working in a facility where the law is being intentionally or ignorantly broken could experience higher stress than those who work in a

facility where attempts are being made to provide animals with the best possible care, despite periodic single housing. This may even fluctuate between teams within an institution. Although survey questions aim to gauge their understanding of these regulations, the authors understand that not explicitly asking could be a limitation in this study.

**Future Directions**

Furthering the work of this study, researchers should investigate other factors of nonhuman primate psychological health to determine whether they are related to compassion fatigue levels in those who care for them. Furthermore, this work should be conducted in multiple species with species-specific needs considered to determine whether there is a link between species and laboratory animal care professional mental health. Future research should replicate this study to assess a larger and more heterogeneous population of animal care professionals. Other factors of care that affect nonhuman primate psychological health should be examined to determine whether there is an effect on care professionals' level of compassion fatigue.

Although limitations have been identified, the authors hope that this study will influence further exploration of the animal–human welfare dynamic and its impact on compassion fatigue in the workplace.

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**Table 1**

*Demographics.*

| **Personal Information** | **n** | **%** |
|---|---|---|
| Gender | | |
| Female | 30 | 66.7 |
| Male | 14 | 31.1 |
| Other | 1 | 2.2 |
| Professional Level | | |
| Low-range | 20 | 44.4 |
| Mid-range | 15 | 33.3 |
| High-range | 10 | 22.2 |
| Race/Ethnicity | | |
| White | 33 | 73.3 |
| Hispanic | 10 | 22.2 |
| Asian American | 1 | 2.2 |
| Other | 1 | 2.2 |
| Age (years), mean + / - SD | 35.02 + / - 10.02 | |
| Time in current role (years), mean + / - SD | 5.57 + / - 8.31 | |

**Table 2**

*Understanding of Nonhuman Primate Social Housing Scale Validity*

*Correlations*

| | | Q1 | Q2 | Q3 | Q4 | Q 5 | Q6 | Q7 | Q8 | Q9 | Q10 | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q1 | Pearson Correlation | 1 | | | | | | | | | | |
| | Sig (2-tailed) | | | | | | | | | | | |
| | N | 45 | | | | | | | | | | |
| Q2 | Pearson Correlation | .387** | 1 | | | | | | | | | |
| | Sig (2-tailed) | .009 | | | | | | | | | | |
| | N | 45 | 45 | | | | | | | | | |
| Q 3 | Pearson Correlation | .173 | .028 | 1 | | | | | | | | |
| | Sig (2-tailed) | .257 | .857 | | | | | | | | | |
| | N | 45 | 45 | 45 | | | | | | | | |
| Q 4 | Pearson Correlation | .696** | .568** | .256 | 1 | | | | | | | |
| | Sig (2-tailed) | .000 | .000 | .090 | | | | | | | | |
| | N | 45 | 45 | 45 | 45 | | | | | | | |
| Q5 | Pearson Correlation | .570** | .441** | .018 | .502** | 1 | | | | | | |
| | Sig (2-tailed) | .000 | .002 | .906 | .000 | | | | | | | |
| | N | 45 | 45 | 45 | 45 | 45 | | | | | | |
| Q6 | Pearson Correlation | .667** | .408** | .262 | .603** | .534** | 1 | | | | | |
| | Sig (2-tailed) | .000 | .005 | .082 | .000 | .000 | | | | | | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | | | | | |
| Q7 | Pearson Correlation | .696** | .461** | .242 | .696** | .401** | .601** | 1 | | | | |
| | Sig (2-tailed) | .000 | .001 | .110 | .000 | .006 | .000 | | | | | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | 45 | | | | |
| Q8 | Pearson Correlation | .252 | .352* | .039 | .346* | .311* | .315* | .252 | 1 | | | |
| | Sig (2-tailed) | .095 | .029 | .797 | .020 | .038 | .035 | .095 | | | | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | | | |
| Q9 | Pearson Correlation | .292 | .489** | .012 | .497** | .621** | .466** | .212 | .495** | 1 | | |
| | Sig (2-tailed) | .052 | .001 | .937 | .001 | .000 | .001 | .162 | .001 | | | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | | |
| Q10 | Pearson Correlation | .354* | .447** | -.229 | .414** | .461** | .294 | .354* | .222 | .419** | 1 | |
| | Sig (2-tailed) | .017 | .002 | .130 | .005 | .001 | .050 | .017 | .142 | .004 | | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Total Score | Pearson Correlation | .710** | .700** | .267 | .806** | .736** | .771** | .684** | .577** | .720** | .598 | 1 |
| | Sig (2-tailed) | .000 | .000 | .077 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | |
| | N | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**Table 3**

*Variable correlations*

*Correlations*

| | | Age | Time in Role | Single Housing | Short_CF | ProQOL | Perceived Stress | Compassion Satisfaction |
|---|---|---|---|---|---|---|---|---|
| Age | Pearson Correlation | 1 | | | | | | |
| | Sig. (2-tailed) | | | | | | | |
| | N | 42 | | | | | | |
| Time in Role | Pearson Correlation | .561** | 1 | | | | | |
| | Sig. (2-tailed) | .000 | | | | | | |
| | N | 42 | 45 | | | | | |
| Single Housing | Pearson Correlation | -.057 | .073 | 1 | | | | |
| | Sig. (2-tailed) | .718 | .632 | | | | | |
| | N | 42 | 45 | 45 | | | | |
| Short_CF | Pearson Correlation | -.222 | -.113 | -.146 | 1 | | | |
| | Sig. (2-tailed) | .157 | .460 | .340 | | | | |
| | N | 42 | 45 | 45 | 45 | | | |
| ProQOL | Pearson Correlation | -.180 | -.080 | -.183 | .860** | 1 | | |
| | Sig. (2-tailed) | .254 | .599 | .230 | .000 | | | |
| | N | 42 | 45 | 45 | 45 | 45 | | |
| Perceived Stress | Pearson Correlation | -.233 | .012 | .015 | .705** | .800** | 1 | |
| | Sig. (2-tailed) | .138 | .939 | .921 | .000 | .000 | | |
| | N | 42 | 45 | 45 | 45 | 45 | 45 | |
| Compassion Satisfaction | Pearson Correlation | .057 | -.051 | -.097 | -.372* | -.529** | -.496** | 1 |
| | Sig. (2-tailed) | .718 | .741 | .527 | .012 | .000 | .001 | |
| | N | 42 | 45 | 45 | 45 | 45 | 45 | 45 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

*Note.* Time in Role = Length of time (years) in current role. Single Housing = reported percentage of single-housed nonhuman primates worked with. Short-CF = Compassion Fatigue Short Scale Score. ProQOL = Professional Quality of Life Scale Score. Perceived Stress = Perceived Stress Scale. Compassion Satisfaction = Compassion satisfaction score obtained from the ProQOL.

**Table 4**

*ANOVA: Understanding*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| ProQOL | Between Groups | 877.344 | 1 | 877.344 | 7.402 | .009 |
| | Within Groups | 5096.967 | 43 | 118.534 | | |
| | Total | 5974.311 | 44 | | | |
| Perceived Stress | Between Groups | 298.844 | 1 | 298.844 | 5.963 | .019 |
| | Within Groups | 2155.067 | 43 | 50.118 | | |
| | Total | 2453.911 | 44 | | | |

*Robust Tests of Equality of Means*

| | | Statistic[a] | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Short CF | Welch | 10.620 | 1 | 41.665 | .002 |
| Compassion Satisfaction | Welch | 2.264 | 1 | 39.884 | .140 |

a. Asymptotically F distributed.

**Table 5**

*ANOVA: Education*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Short_CF | Between Groups | 463.384 | 3 | 154.461 | 1.702 | .182 |
| | Within Groups | 3720.260 | 41 | 90.738 | | |
| | Total | 4183.644 | 44 | | | |
| Perceived Stress | Between Groups | 135.996 | 3 | 45.332 | .802 | .500 |
| | Within Groups | 2317.915 | 41 | 56.535 | | |
| | Total | 2453.911 | 44 | | | |

*Robust Tests of Equality of Means*

| | | Statistic[a] | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| ProQOL | Welch | 1.536 | 3 | 4.355 | .327 |
| Compassion Satisfaction | Welch | .959 | 3 | 4.379 | .488 |

a. Asymptotically F distributed.

**Table 6**

*ANOVA: Role*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Short_CF | Between Groups | 36.811 | 2 | 18.406 | .186 | .831 |
| | Within Groups | 4146.833 | 42 | 98.734 | | |
| | Total | 4183.644 | 44 | | | |
| Perceived Stress | Between Groups | 79.278 | 2 | 39.639 | .701 | .502 |
| | Within Groups | 2374.633 | 42 | 56.539 | | |
| | Total | 2453.911 | 44 | | | |
| Compassion Satisfaction | Between Groups | 51.128 | 2 | 25.564 | .661 | .522 |
| | Within Groups | 1624.783 | 42 | 38.685 | | |
| | Total | 1675.911 | 44 | | | |

*Robust Tests of Equality of Means*

| | | Statistic[a] | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| ProQOL | Welch | .508 | 2 | 26.600 | .608 |

a. Asymptotically F distributed.

## Appendix A

## Compassion Fatigue in Laboratory Animal Care Professionals Survey

Age: _____

Gender:

- Male
- Female
- Transgender female
- Transgender male
- Non-binary
- Prefer not to answer

Country of Residency: _____

Please check the term that best describes your racial/ethnic background:

- Black or African American
- American Indian / Alaska Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Hispanic
- White
- Other: _____ (please specify)
- Prefer not to answer

Highest level of education completed:

- Less than high school
- High school diploma/GED

- Associates degree
- Bachelors degree
- Masters degree
- PhD, DVM, MD
- Other_____

Current work role/position: _____

Length of time working in current role/position: _____

In regard to the nonhuman primates you directly work with, please provide an average percent of individuals in single, paired, or group housing (must add up to 100).

____ Single: One individual, alone in an enclosure that does not have access to conspecifics. This includes individuals that have only tactile/grooming contact to conspecifics.

____ Pair: Two individuals that have full tactile contact to only each other, with no separation.

____ Group: Three or more individuals that have full tactile contact with each other, with no separation.

For the next set of questions, best reflect your current thoughts/beliefs about the social housing of nonhuman primates.

1 = Strongly agree 2 = Agree 3 = Undecided 4 = Disagree 5 = Strongly disagree

1. ____ Social housing is necessary for psychological health.
2. ____ Social housing is more stressful than single housing.
3. ____ They are at an elevated risk of wounding when socially housed.
4. ____ They benefit from social housing.
5. ____ Social housing reduces chronic stress.

6. ____ Social housing has positive effects on study outcomes.
7. ____ I enjoy seeing them in social housing.
8. ____ Social housing has no effects on study outcomes.
9. ____ Social housing is harmful.
10. ____ Social housing increases chronic stress.

When you care for animals you have direct contact with their lives. As you may have found, your compassion for those you care for can affect you in positive and negative ways. Below are some questions about your experiences, both positive and negative, as a caregiver. Consider each of the following questions about you and your current work situation. Select the number that honestly reflects how frequently you experienced these things in the last 30 days.

For this portion of the survey, please substitute "animal/animals" for "person/people" in questions 12, 13, 18, 23, and 33.

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Very Often

11. ____ I am happy.
12. ____ I am preoccupied with more than one person I care for.
13. ____ I get satisfaction from being able to care for people.
14. ____ I feel connected to others.
15. ____ I jump or am startled by unexpected sounds.
16. ____ I feel invigorated after working with those I care for.
17. ____ I find it difficult to separate my personal life from my life as a caregiver.
18. ____ I am not as productive at work because I am losing sleep over traumatic experiences of person I care for.

19. ____ I think that I might have been affected by the traumatic stress of those I care for.
20. ____ I feel trapped by my job as a caregiver.
21. ____ Because of my care giving, I have felt “on edge” about various things.
22. ____ I like my work as a caregiver.
23. ____ I feel depressed because of the traumatic experiences of the people I care for.
24. ____ I feel as though I am experiencing the trauma of someone I have cared for.
25. ____ I have beliefs that sustain me.
26. ____ I am pleased with how I am able to keep up with techniques and protocols.
27. ____ I am the person I always wanted to be.
28. ____ My work makes me feel satisfied.
29. ____ I feel worn out because of my work as a caregiver.
30. ____ I have happy thoughts and feelings about those I care for and how I could help them.
31. ____ I feel overwhelmed because my workload seems endless.
32. ____ I believe I can make a difference through my work.
33. ____ I avoid certain activities or situations because they remind me of frightening experiences of the people I care for.
34. ____ I am proud of what I can do to care.
35. ____ As a result of my care giving, I have intrusive, frightening thoughts.
36. ____ I feel “bogged down” by the system.
37. ____ I have thoughts that I am a “success” as a caregiver.
38. ____ I can’t recall important parts of my work with trauma victims.
39. ____ I am a very caring person.
40. ____ I am happy that I chose to do this work.

41. ____ In the last month, how often have you been upset because of something that happened unexpectedly?
42. ____ In the last month, how often have you felt that you were unable to control the important things in your life?
43. ____ In the last month, how often have you felt nervous and stressed?
44. ____ In the last month, how often have you felt confident about your ability to handle your personal problems?
45. ____ In the last month, how often have you felt that things were going your way?
46. ____ In the last month, how often have you found that you could not cope with all the things that you had to do?
47. ____ In the last month, how often have you been able to control irritations in your life?
48. ____ In the last month, how often have you felt that you were on top of things?
49. ____ In the last month, how often have you been angered because of things that happened that were outside of your control?
50. ____ In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

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51. ____ I have felt trapped by my work.
52. ____ I have thoughts that I am not succeeding in achieving my life goals.
53. ____ I have had flashbacks connected to my work.

54. ____ I feel that I am a “failure” in my work.

55. ____ I experience troubling dreams about work.

56. ____ I have felt a sense of hopelessness associated with working animals.

57. ____ I have frequently felt weak, tired or rundown as a result of my work as a caregiver.

58. ____ I have experienced intrusive thought after working with an especially difficult animal.

59. ____ I have felt depressed as a result of my work.

60. ____ I have suddenly and involuntarily recalled a frightening experience while working with an animal.

61. ____ I feel I am unsuccessful at separating work from my personal life.

62. ____ I am losing sleep over a animal’s traumatic experience.

63. ____ I have a sense of worthlessness, disillusionment, or resentment associated with my work.

Yıldırım, S., & Cavcav, F. (2020). The Compassion Fatigue-Short Scale for healthcare professionals: A Turkish study of validity and reliability. *Perspectives in Psychiatric Care*, *57*(3), 1459–1465. https://doi.org/10.1111/ppc.12712