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MAJOR EMPIRICAL CONTRIBUTION

A Job Demands–Resources Perspective on Emotional Exhaustion and Work Engagement in Human–Animal Work

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Abstract

Prior research has highlighted various psychological benefits and detriments associated with human–animal work, i.e., work that is substantially focused on living animals. However, systematic research that identifies both demands and resources across various occupations in this domain of work has been limited. To address this issue, we build on job demands–resources theory to identify job demands and resources that are characteristic of human–animal work and link them to health and motivational outcomes. Our study of 205 individuals who engage in human–animal work across different occupations shows that in terms of job demands, animal distress positively relates to workers' emotional exhaustion, but the occupational stigma of human–animal work does not. Regarding job resources, we find that pro-animal impact and human–animal bond both positively relate to work engagement, explaining additional variance in work engagement beyond more general job resources. However, when animal distress is high, human–animal bond does no longer predict work engagement. We discuss implications of our study for job demands–resources theory, research on occupational stigma, and the field of human–animal work.

Keywords Human–animal work · Job demands–resources theory · Work engagement · Burnout

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Introduction

Millions of people engage in human–animal work – that is, work that is substantially focused on *living* non-human animals (Hannah & Robertson, 2017). For example, the livestock farming industry employs around 4 million people in the EU (European Commission, 2020), the veterinary services industry in the USA employs more than 455,000 people (IBISWorld, 2023), and the laboratory animal industry in China employs more than 300,000 people (McLaughlin, 2016). While some studies show that human–animal work can be meaningful (Bunderson & Thompson, 2009) and that interactions with animals can prompt positive emotions such as awe (Yam et al., 2023), other studies provide evidence of negative aspects and detrimental outcomes of human–animal work. For instance, animal shelter workers (Baran et al., 2012), farmers (Kallioniemi et al., 2016), laboratory animal staff (Andrukonis et al., 2020), veterinary staff (Pohl et al., 2022), and slaughterhouse workers (Baran et al., 2016) have been found to be at high risk of burnout, secondary traumatic stress, and even suicide (Hanrahan et al., 2018). This array of psychological responses, ranging from happiness and fulfilment to burnout and exhaustion (Schabram & Maitlis, 2017), may be attributed to various challenges and resources present in the context of human–animal work. In this study, we identify job demands and resources that are characteristic of human–animal work and link them to work engagement and burnout, using a diverse sample of human–animal workers.

To date, research on psychological demands and resources in human–animal work remains largely fragmented. Apart from a few notable exceptions (Andrukonis et al., 2020; Bennett & Rohlf, 2005; Yam et al., 2023), most empirical studies have focused on human–animal work within a single occupational group. Thus, there is limited empirical evidence on the potential demands, resources, and outcomes of human–animal work across different occupations. Furthermore, while there has been some research on the negative outcomes of human–animal work, the literature on positive outcomes of human–animal relations in organizations has typically focused on work in the presence of pets (Amiot & Bastian, 2015; Kelemen et al., 2020) rather than work substantially focused on animals (Deacon & Brough, 2017; Yam et al., 2023). The lack of research on job demands and resources among workers interacting with animals hampers the development of targeted interventions for improved worker well-being, including heightened work engagement and reduced burnout (Kelloway et al., 2023).

Building on previous research, we first identify important job demands and resources that can be considered characteristic of human–animal work. Drawing on job demands–resources (JD–R) theory (Bakker & Demerouti, 2017; Demerouti & Bakker, 2023), we then examine how these demands and resources relate to individual outcomes in a sample of 205 human–animal workers across different occupations. Specifically, we study how two demands, animal distress and animal work stigma, relate to emotional exhaustion and how two resources, pro-animal impact and human–animal bond, relate to work engagement. We also examine the interaction effects of these demands and resources.

Our study offers several contributions to theory and research on occupational demands and resources (Demerouti & Bakker, 2023; Lee et al., 2020), to the human–

animal work literature, and to research on stigma in 'dirty' occupations (Soral et al., 2022). First, we contribute to JD–R theory—which has been limited to three types of occupations—occupations in which people work with things, information, or other people (Bakker & Demerouti, 2017) – by extending the theory to occupations in which people work with animals. Due to the "ambiguous person–thing status" (McIntyre & Graziano, 2016: 1263) of animals, studying human–animal work as separate 'in-between' category provides an important refinement of the JD–R literature. Second, we synthesize the literature that either conceptualizes human–animal work itself as a demand (e.g., Andrukonis et al., 2020; Baran et al., 2016) or that focuses only on the demands of human–animal work (e.g., Reeve et al., 2005) with the literature on positive aspects of and resources in human–animal work (Bunderson & Thompson, 2009; Yam et al., 2023). In doing so, our study is the first – to the best of our knowledge – to offer a comprehensive understanding of the demands and resources and their interplay in this particular context of work. Moreover, our study highlights the importance of examining animal-specific job demands and resources alongside broader, more global job demands (e.g., work hours, Hu et al., 2016) and resources (e.g., job autonomy and social support, Mazzetti et al., 2023) in collectively shaping workers' experience of emotional exhaustion and work engagement. Third, we refine the current understanding of occupational stigma in human–animal work and extend the literature on dirty work (Ashforth et al., 2007; Baran et al., 2016) by distinguishing between the negative aspects of the work itself (i.e., animal distress in our study) and how the work is perceived by society (i.e., animal work stigma), which have been conflated in previous studies (e.g., Baran et al., 2012; Baran et al., 2016; Lopina et al., 2012; Tallberg & Jordan, 2022).

Theoretical Background and Hypotheses Development

Previous research and theorizing have defined job demands as physical, psychological, social, or organizational aspects of a job that require sustained physical and/or psychological effort and are therefore associated with certain physiological and/or psychological costs (Bakker & Demerouti, 2017). Job resources refer to aspects of the job that are functional in achieving work goals, reduce job demands and associated physiological and psychological costs, or stimulate personal growth and development (Lee et al., 2020). JD–R theory posits that job demands and job resources instigate two different processes: a health-impairment process and a motivational process, respectively (Demerouti & Bakker, 2023). Specifically, exposure to job demands causes strain and hampers health in workers via the health-impairment process, while job resources cause engagement via the motivational process. JD–R theory further proposes that job resources buffer the association between job demands and strain, while job demands exacerbate the positive impact of job resources on motivational outcomes (Demerouti & Bakker, 2023). Various job demands and resources and their interactions have been shown to predict health and motivational outcomes (Bakker et al., 2022; Demerouti & Bakker, 2023; Kelloway et al., 2023). The benefit of the JD–R theory in explaining workers' well-being and motivational outcomes is that it is inclusive and open to a wide range of demands and resources that may impact work-

ers' well-being and motivation (Bakker 2023; Schaufeli & Taris, 2014). Its adaptability allows for the inclusion of domain-specific demands and resources (Schaufeli & Taris, 2014), for instance, those that are relevant in the context of human–animal interactions.

While JD–R theory has previously been applied to occupations in which people work with things, information, or other people (Bakker & Demerouti, 2017), it has not yet been employed to human–animal work. However, it is important to study human animal work as an adjacent yet distinct category in the JD–R literature since although humans have a general tendency to perceive animals as either thing-like or person-like, they generally vary in their perception and categorization of animals as either (Hills, 1989). This "ambiguous person–thing status" (McIntyre & Graziano, 2016: 1263) warrants and even necessitates the study of animals as separate 'in-between' category. Accordingly, in the following, we present several demands and resources specific to the human–animal work context that have not been addressed in the JD–R literature to date. We then link them to health-impairment and motivational outcomes on the individual level (i.e., emotional exhaustion and work engagement). Emotional exhaustion refers to feelings of being depleted of one's emotional and physical resources (Maslach et al., 2001), and is often used as the sole indicator of burnout (e.g., Fila et al., 2023; Lopper et al., 2022). Work engagement—a positive, fulfilling work-related state of mind characterized by vigor, dedication, and absorption (Schaufeli et al., 2003)—is one of the most important indicators of motivation in the JD–R literature (Demerouti & Bakker, 2023). Our research model is displayed in Fig. 1.

Human–Animal Work Demands and Workers' Health

In many organizations and industries, human–animal workers regularly witness or cause animal harm, suffering, or distress as part of their jobs (Murray et al., 2020). With respect to job demands, animal distress can be defined as worker's perceptions of situations experienced by animals that are detrimental to their well-being. Animal distress can stem from both physical factors, such as injuries or discomfort caused by research procedures (e.g., Arluke, 1988), and psychological factors, such as exposure to unfamiliar and threatening surroundings during veterinary procedures (e.g., Atwood-Harvey, 2005). As most humans are not immune to perceiving animals as individuals with the capacity to feel and suffer (Victor & Barnard, 2016), many of these workers experience animal distress as a major job demand (e.g., Andrukonis et al., 2020; Goñi-Balentziaga et al., 2021). Workers may also face ethical dilemmas such as convenience euthanasia of healthy animals or declawing of cats which have been found to be stressful (Atwood-Harvey, 2005; Pradies, 2022). Indeed, moral stress related to inflicting pain or inducing death on animals can predict emotional exhaustion and health problems in veterinarians (Pohl et al., 2022), and working with cruelty and neglect cases is related to burnout in animal welfare and veterinary professionals (Hill et al., 2020). In other work settings, such as farming or slaughterhouses, witnessing the panicking of farm animals before slaughter has been shown to lead to recurring nightmares and heightened negative emotional responses (McLoughlin, 2019; Victor & Barnard, 2016). Moreover, perceptions of animal stress and pain have

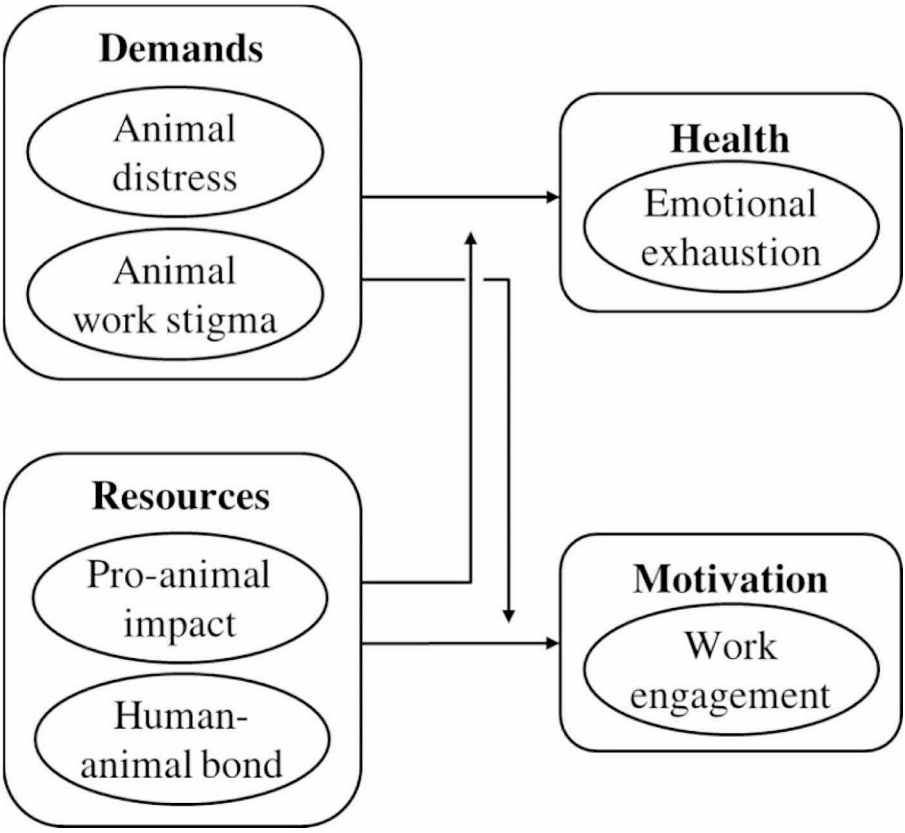

Fig. 1 Model of demands and resources in human–animal work

been shown to be related to burnout in laboratory animal staff (LaFollette et al., 2020) and dairy farmers (Kallioniemi et al., 2016). Thus, in line with JD–R theory, we argue that witnessing animal distress leads to negative emotional responses in terms of emotional exhaustion in human–animal workers.

Hypothesis 1 *Animal distress positively relates to emotional exhaustion.*

A second, commonly identified job demand in human–animal work is that of occupational stigma. Nearly all forms of human–animal work have been conceptualized as stigmatized or 'dirty' (Baran et al., 2012, 2016; Sanders, 2010; Tallberg & Jordan, 2022), as they either are directly associated with garbage, death, or body fluids (e.g., cleaning animals' living spaces); involve serving others (e.g., grooming animals) or regular contact with stigmatized groups (e.g., animals such as rats); or defy norms of civility (e.g., hurting or killing animals; Baran et al., 2012). Slaughterhouse workers often experience social isolation due to their job (Baran et al., 2012, 2016). In animal research, the negative public image of the occupation and its stigmatization have been reported to be stressful by animal caretakers (Ferrara et al., 2022). Furthermore, dairy farmers have named unfavorable treatment in society as one of their greatest

work stressors (Kallioniemi et al., 2016). Occupational stigma has been related to emotional exhaustion in workers in other occupations (Bentein et al., 2017; Soral et al., 2022). In human–animal work, too, workers need to invest energy to deal with the associated stigma, and this emotional work will eventually result in emotional exhaustion. Thus, following JD–R theory, we hypothesize:

Hypothesis 2 *Animal work stigma positively relates to emotional exhaustion.*

Human–Animal Work Resources and Workers' Motivation

Opportunities to care for and help animals have been identified as important resources in working with animals (Pradies, 2023; Sanders, 2010). Based on work on prosocial impact (i.e., how one's work makes a difference in other people's lives; Grant & Campbell, 2007), we define pro-animal impact as 'how one's work makes a difference in other animal's lives' and conceptualize it as an important aspect of task significance. Animal shelter workers, veterinarians, and zookeepers have been found to draw upon their positive impact on the lives of animals as a key job resource (Bunderson & Thompson, 2009; Schabram & Maitlis, 2017). Pro-animal impact has also been shown to contribute to a sense of meaning in human–animal work, leading zookeepers to sacrifice pay, personal time, and comfort (Bunderson & Thompson, 2009), which might indicate high levels of work engagement. Lastly, previous studies have identified a positive impact on other humans' lives as an important predictor of work engagement (Christian et al., 2011), and we expect that these findings will replicate in human–animal interactions. In line with the JD–R model, we hypothesize:

Hypothesis 3 *Pro-animal impact positively relates to work engagement.*

Another commonly highlighted resource in human–animal work is that of social attachment and connection between people and animals, also referred to as the human–animal bond (Hanrahan et al., 2018). The concept of the human–animal bond is most often applied to companion animals, such as interactions with dogs at the workplace that are generally associated with positive emotions and worker well-being (e.g., Colarelli et al., 2017; Cunha et al., 2019; Kelemen et al., 2020). However, bonds can also develop between humans and the animals they work with (Chang & Hard, 2002; Fine & Beck, 2015). For instance, police officers who work with dogs often form strong bonds with them (Knight & Sang, 2020; Sanders, 2006), and laboratory staff may develop pet-like relationships with laboratory animals (Arluke, 1988). Even in jobs where people may need to inflict pain or death on animals, forming bonds with animals has been identified as an important job resource, for instance for laboratory animal staff (Chang & Hard, 2002; LaFollette et al., 2020), veterinarian staff (Hanrahan et al., 2018; Polachek & Wallace, 2018), and zoo keepers (Bunderson & Thompson, 2009). Interactions with animals are positively related to compassion satisfaction (i.e., a sense of pleasure or fulfilment that care providers receive from helping others) among researchers (Goñi-Balentziaga et al., 2021) and

veterinarian staff (Polachek & Wallace, 2018), and to job satisfaction among laboratory personnel (Chang & Hard, 2002). Strong bonds represent meaningful and fulfilling relationships with others, offering connectedness and emotional rewards. These relationships have the potential to confer both psychological and physiological health benefits (Chang & Hard, 2002; Fortuin et al., 2023; Lee et al., 2020). The rationale that human–animal bonds constitute an important resource for workers can be further explained by self-determination theory (SDT; Ryan & Deci, 2017; Van den Broeck et al., 2010). According to SDT, relatedness—the sense of social connectedness and belonging—represents one of the fundamental human needs and, when satisfied, relatedness has motivational potential, enhancing workers' intrinsic motivation and engagement at work. Accordingly, we propose that, for individuals working closely with animals, establishing strong bonds with the animals can satisfy their need for relatedness, which stimulates work engagement. Thus, we hypothesize:

Hypothesis 4 *Human–animal bonds positively relate to work engagement.*

The Moderating Roles of Human–Animal Work Resources and Demands

According to JD–R theory, job resources weaken the impact of job demands on strain. Emotional exhaustion due to demands should be reduced when individuals can draw upon resources (Demerouti & Bakker, 2023). This buffer hypothesis has been widely tested in previous research based on samples from other types of work (e.g., Bakker et al., 2005; Xanthopoulou et al., 2007). For example, task significance was found to enable workers to mitigate negative experiences of doing harm by focusing on a greater good (Grant & Campbell, 2007) and aid in coping with occupational stigma by affirming an individual's self-worth (Soral et al., 2022). In human–animal work, workers' perceptions of having a positive impact on animals might relieve the emotional demands of tasks such as de-clawing cats (i.e., declawing is perceived as preferable to the cats being abandoned by owners for scratching; Atwood-Harvey, 2005) or animal euthanasia in overcrowded shelters (i.e., providing a peaceful death to animals as preferable to animals being caged or dying on the street; Sanders, 2010) and reduce emotional exhaustion resulting from animal distress. Also, positive emotions that result from interacting with and providing enrichment for animals (e.g., giving them treats) and thereby bonding with the animals have been suggested to counter feelings of burnout that may result from the stress of animals among laboratory technicians (LaFolette et al., 2020). Accordingly, we argue that pro-animal impact and human–animal bond might buffer the relationship of animal work stigma with emotional exhaustion. Thus, we hypothesize:

Hypothesis 5 *Human–animal work resources negatively moderate the relationship between human–animal work demands and emotional exhaustion, such that the positive relationship between human–animal work demands and emotional exhaustion is weaker at higher levels of human–animal work resources.*

Lastly, JD–R theory proposes that resources should particularly influence work engagement when demands are high, amplifying the impact of job resources on work engagement (Demerouti et al., 2023). In the context of human–animal work, for veterinary technicians, providing a peaceful death to a sick pet (Sanders, 2010) might be associated with meaning and purpose, such that pro-animal impact increases worker engagement when animal distress is high. Notably, forming bonds with animals has been suggested to be an important resource for workers in occupations in which they may witness or even be responsible for animal distress (Chang & Hard, 2002; Hanrahan et al., 2018; Polachek & Wallace, 2018). Hence, these bonds might help workers to stay engaged in their work when animals are distressed. For instance, zookeepers indicated a willingness to work harder to improve the circumstances of animals in their care if animal mistreatment and distress were caused by circumstances created by the organization (Bunderson & Thompson, 2009). Pro-animal impact might be especially important when workers have negative perceptions of 'dirty' work tasks such as cleaning up after animals, as perceptions of pro-animal impact might help workers focus on the positive outcomes of their work. This might apply even more if these work tasks provide an opportunity for bonding with the animal (Sanders, 2010). Lastly, previous work indicates that in stigmatized occupations, a strong sense of belongingness or bond with one's work group can increase engagement (Soral et al., 2022). Thus, when animal work stigma is high, forming a strong social bond with animals might be especially important for work engagement. Overall, we hypothesize:

Hypothesis 6 *Human–animal work demands positively moderate the relationship between human–animal work resources and work engagement, such that the positive relationship between human–animal work resources and work engagement is stronger at higher levels of human–animal work demands.*

Method

Design and Procedure

We recruited study participants from the crowdsourcing platform Prolific, which has been shown to provide high-quality data (e.g., Douglas et al., 2023). Prior to starting the survey, we informed participants that participation was voluntary, and they had to provide active consent before they could participate in the study. Ethical approval was waived according to the regulations of the data collecting institution's regulations for similar studies. We adapted several items and instructions to fit the context of human–animal work, and following a pretest with 15 completed surveys, the wording of two items was improved before starting the survey.

To acquire our sample, we searched Prolific for individuals working in industries with potential for human–animal work. In total, 1,096 individuals participated in a short screener survey. We then invited those who indicated they had direct contact with living animals as part of their work on most or all of their workdays ($N = 381$), were at least 18 years old, either part-time or full-time workers and fluent in Eng-

lish, to participate in the study, which was conducted in English. Following previous research (e.g., Santuzzi & Barber, 2018, Thompson & Bruk-Lee, 2019), job demands, resources, and control variables were measured at T1, and outcomes were measured one month later (T2). This time-lagged approach is an effective method to ease concerns of common method variance through temporal separation of the focal variables (Cooper et al., 2020; Podsakoff et al., 2012). The participants received monetary compensation for their participation in the survey (on average $15.60 an hour).

Participants

A total of 278 participants finished the survey at T1. After excluding those who failed one or more attention checks ($n=8$), whose interaction was with their own pets rather than animals at work ($n=14$), and/or whose main job was not *substantially* focused on working with living vertebrate animals ($n=25$; e.g., a waitress who interacts with guests' dogs as part of her job, a researcher focusing on bacteria), we invited 231 individuals to participate at T2. At T2, 210 individuals (91%) participated, of which 5 failed the attention checks. Dropout analyses revealed no significant ($p<.05$) differences in *t*-tests with regard to the study variables between participants who only responded at T1 and participants who responded at both T1 and T2.

The final sample size was 205 and consisted of 137 people identifying as women and 68 identifying as men, aged between 19 and 68 years ($M=32.46$ years, $SD=11.81$). With respect to highest education, 0.5% of participants had no school degree, 23.41% had a high school degree, 12.68% had a vocational qualification, 38.53% had an undergraduate degree, 19.51% had a graduate degree, and 5.36% had a doctorate degree. Participants were from 23 OECD countries around the globe. Most participants were from the UK (32.20%) or the USA (23.14%), and 91.70% were nationals of their country of residence. Concerning employment status, 63.41% of participants worked full-time and 36.59% worked part-time. On average, participants had an organizational tenure of 5.57 years ($SD=7.33$), and 15.63% were self-employed. In Table 1, we list participants' occupations and sum qualitative answers regarding their main tasks or activities, animal species they interact with, and the most positive and negative aspects of their work with animals. The qualitative answers allow for a better understanding of different types of human–animal work, and make the coexistence and potential interplay of job demands and job resources easier to grasp. Data will be shared upon reasonable request.

Measures

Human–Animal Work Demands and Resources

All items used to measure the demands and resources at T1 are displayed in Appendix A. Animal distress was measured with an assessment tool for animal welfare (Welfare Quality Consortium, 2009) that we found to be suitable across species, occupations, and contexts as the items prompt respondents to reflect on the specific individual animal or species they work with. The scale consists of items in four categories:

Table 1 Main tasks, animal species, positive aspects, and negative aspects of human–animal work

Occupation	n	Main tasks	Animal species	Positive aspects	Negative aspects
Farmer/ farm worker	42	Feeding; cleaning living spaces; monitoring and medical attention; milking; collecting eggs; shearing; dehorning; birth assistance.	Chicken, cow, pig, sheep, goat, fish.	Interacting with and bonding with animals; providing for animals' needs; peaceful time with animals; providing for the community.	Animal distress; handling difficult animals; animal waste; killing animals for meat or to prevent suffering; weather conditions.
Veterinary nurse	33	Assisting with animal treatment; stress and pain relief; diagnostic tests; accompanying owners during medical procedures.	Dog, cat, rabbit, guinea pig, mouse, hamster, bird, turtle, snake, etc.	Helping animals and improving their quality of life; bonding with and calming animals; assisting and educating owners about pet care.	Euthanasia; animal distress, also due to financial constraints or owner attitudes; owners' suffering; aggressive animals; handling deceased bodies.
Veterinarian	23	Examining animals; providing treatments and surgeries; vaccinating; pain relief; communicating with owners.	Dog, cat, cow, horse, sheep, chicken, rabbit, hamster, bird, turtle, snake, etc.	Improving quality of life for animals and their owners; interacting with animals and building relationships with them; positive feedback from owners.	Owners who do not care for their pets; seeing animal distress; animal waste; dealing with aggressive animals.
Pet sitter/ pet groomer	22	Feeding; cleaning living spaces; walking dogs for exercise; bathing, trimming; training, monitoring, and entertaining animals.	Dog, cat.	Caring for animals; bonding with animals and owners; seeing animals enjoy themselves through play or cuddles; making animals look good.	Dealing with animals that have behavioural issues, are sick, or anxious; animal waste; weather conditions.
Researcher	20	Performing surgeries; exposing animals to substances and stimuli; training animals on laboratory tasks.	Mouse, fish, rat, cow, pig, frog.	Advances in health research that impact human wellbeing; research benefit for animals in the future; interacting with animals.	Animal suffering caused by experiments or inbreeding; animal death and euthanasia; handling of dead animals.
Laboratory animal technician	14	Feeding, cleaning living spaces; health monitoring; breeding; administering experiments; collecting samples.	Mouse, fish, rat, rabbit, pig, dog, ferret, monkey, cow, etc.	Caring for animals and observing their behaviour; potential for scientific advances.	Animal distress; euthanasia; negative perception of the job by others.
Animal shelter worker	9	Feeding; cleaning living areas; providing exercise, enrichment, and social interaction; medical attention.	Dog, cat, rabbit, guinea pig, mouse, bird, turtle, snake, lizard.	Bonding with animals; cuddling; caring for animals; seeing anxious or neglected animals develop; seeing a happy family take an animal home.	Dealing with the passing of animals; dealing with aggressive or anxious animals; witnessing or assisting with euthanasia.

Table 1 (continued)

Occupation	n	Main tasks	Animal species	Positive aspects	Negative aspects
Pet shop worker	8	Feeding; cleaning living spaces; monitoring anima behaviour; providing medical attention.	Dog, cat, rabbit, guinea pig, mouse, bird, gerbil, snake, parrot.	Creating bonds with animals; watch animals being happy and playful; making a positive difference in animals' lives.	Animal aggression; customers who do not properly interact with animals; animal waste; animals being kept in cages; fear of animals such as snakes.
Countryside ranger	8	Wildlife management; enhancing animal habitats; rehabilitating injured animals, guiding animal-assisted activities.	Bird, deer, squirrel, badger, wild horse, goat, dog, horse.	Helping wild animals; seeing the impact of habitat work on animal populations and the joy it brings to people; calming presence of animals.	People feeding wild animals; people hunting illegally; weather conditions; seeing harm that humans cause to wildlife populations; difficult animals.
Horse groom	6	Feeding; cleaning living spaces; grooming; providing exercise and training; medical attention; shoeing.	Horse.	Caring for animals; interacting with animals; being outdoors.	Handling difficult animals; safety concerns with handling animals; animal waste; weather conditions.
Zookeeper	5	Feeding, cleaning enclosures; developing enrichment programs; training animals for public displays; medical procedures.	Giraffe, lemur, wolfdog, savannah cat, tortoise, raccoon, emu, etc.	Bonding with animals; educating the public; promoting conservation efforts for threatened species; improving animals' life.	Suffering or passing of animals; dealing with aggressive animals; animal waste.
Zoologist	5	Studying animal behaviour; caring for animals in captive environments; developing conservation strategies.	Shark, snake, killer whale, cat, eagle, pigeon, etc.	Bonding with animals; caring for animals and their habitats; contributing to the scientific community.	Aggressive animals; difficulty to form bonds with wild animals.
Pet behaviour consultant	4	Training; behaviour consultation for animal owners.	Dog, cat, rabbit, chinchilla, hamster.	Helping animals; seeing development of animals and owners; interacting with animals.	Owners who refuse to help their pets; dealing with difficult or aggressive animals.
Veterinary inspector	4	Examining animals for diseases; ensuring compliance with regulations to ensure public health.	Pig, chicken, cow, horse.	Ensuring animals do not feel pain before slaughter; encountering animals.	Slaughter; limited opportunities to interact with animals; limited opportunities to ease animals' stress.
Animal-assisted therapist	2	Help create a bond between client and animal; cleaning, feeding, training.	Horse.	Gratitude by clients; relaxing interaction with animals.	Negative occupational stereotypes; concern about animals' wellbeing.

Note $N=205$

feeding (e.g., "Animals do not have enough clean water"), housing (e.g., "Animals are exposed to uncomfortable temperatures"), health (e.g., "Animals have injuries or behavioral disorders"), and animal-appropriate behavior (e.g., "Animals are not handled well or forced to interact with humans"). These indicators create a formative measure of animal distress. We adjusted the original response procedure and format to a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*) to reduce the complexity of the original assessment for our respondents.

Animal work stigma was measured with an adjusted three-item scale based on the experiences of marginalization scale (Duffy et al., 2019). An example item is: "I had many interpersonal interactions that left me feeling stigmatized due to my work with animals." Pro-animal impact was based on an adapted measure of perceived prosocial impact (Grant & Campbell, 2007) with three items (e.g., "My work really makes animals' lives better"). The human–animal bond scale included a measure of perceived connection to animals (Polachek & Wallace, 2018; i.e., "I feel a strong personal connection with the animals I work with.") along with two items derived from a workplace friendship scale (Nielsen et al., 2000). We used these items since prior quantitative research on human–animal relations focused either on interactions rather than bonds (e.g., LaFollette et al., 2020), attachment to pets (e.g., Johnson et al., 1992), or general attitudes towards animals (e.g., Porcher et al., 2004). The response format for the variables was a 7-point Likert scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*).

Emotional Exhaustion

Emotional exhaustion was measured at T2 with five items from the Maslach Burnout Inventory–General Survey (MBI–GS; Maslach et al., 2017). A sample item is "I feel used up at the end of the workday". The response format was a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*).

Work Engagement

Work engagement was measured at T2 with the Utrecht Work Engagement Scale (UWES-9; Schaufeli et al., 2003). It consists of nine items, and a sample item is "I am proud of the work that I do". The response format was a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*).

Control Variables

We considered several potentially relevant control variables that might relate to one or more of the independent and dependent variables (Bernerth & Aguinis, 2016), including gender (0=*female*, 1=*male*; all participants identified as either female or male), age in years, education level (1=*no school degree* to 6=*doctorate*), occupational tenure in years, work hours per week, and whether the animals are pets ("Are the animals you interact with pets that are kept for companion?", 0=*no*, 1=*yes*). These variables have either been shown to predict both job demands and health

outcomes (Fila et al., 2017; Yoon et al., 2018) and/or both job resources and work engagement (Mazzetti et al., 2023).

Analytic Strategy

Hypothesis testing was carried out by applying partial least squares structural equation modeling (PLS-SEM) using the *SEMinR* package for R. Other than covariance-based SEM, PLS-SEM is based on variance (partial least squares). It can be used with smaller sample sizes and is robust to non-normality (Ringle et al., 2023). It enables researchers to assess both the measurement model and the structural model with regard to their predictive validity (Henseler et al., 2016), which is suitable in our study given the novel context of human–animal work demands and resources for individual health and motivation. Furthermore, PLS-SEM enables researchers to include formatively specified measurement models and is better suited than conventional covariance-based SEM for models involving moderation (Ringle et al., 2023). To conduct a confirmatory composite analysis for the higher-order composite factor of animal distress, we used the *cSEM* package for R. Importantly, OLS regressions replicated all reported results.

Results

Measurement Model

Before testing the hypothesized relationships, we assessed the quality of the measurement model. Appendix A depicts the descriptive statistics for items of demands and resources and their respective loadings. At first, we modeled animal distress formatively as a higher-order composite factor consisting of the four factors of feeding, housing, health, and animal-appropriate behavior in a confirmatory composite analysis. However, the recommended fit indices (Schuberth et al., 2023) for this composite model indicated marginal fit of the model (GFI = 0.89; NFI = 0.88, SRMR = 0.07). As the loadings of two items measuring the factor housing were below the recommended threshold of 0.70, we excluded housing from our main analysis and modeled animal distress as a higher-order composite factor consisting of feeding, health, and animal-appropriate behavior (Hair et al., 2017). This adjusted composite model showed very good fit (GFI = 0.95; NFI = 0.95, SRMR = 0.04), and thus we used it in our further analyses.

Reliability of the constructs was measured using Cronbach's Alpha and Composite Reliability (rhoC; should exceed 0.70). Convergent validity was assessed with Average Variance Extracted (AVE; should exceed 0.50) and construct loadings (available upon request). As shown in Table 2, all measures achieved good levels. For discriminant validity, we compared square roots of AVE with correlations against the remaining constructs using the Fornell-Larcker criterion (Hair et al., 2017). All square roots of AVE were greater than the remaining correlations (see Table 3), indicating discriminant validity. Lastly, all variance inflation factors were lower than 2.32, indicating no multicollinearity problems.

Table 2 Measurement model indicators for constructs

Variables	α	rhoC	AVE
Emotional exhaustion	0.93	0.92	0.72
Work engagement	0.94	0.94	0.64
Animal distress - Higher order	0.73	0.85	0.75
Animal distress - Feeding	0.71	0.87	0.77
Animal distress - Health	0.84	0.89	0.67
Animal distress - Behavior	0.66	0.80	0.57
Animal work stigma	0.95	0.96	0.90
Pro-animal impact	0.92	0.92	0.80
Human–animal bond	0.90	0.91	0.77

Note α = Cronbach's Alpha; rhoC = Composite Reliability; AVE = Average Variance Extracted; emotional exhaustion and work engagement were measured at T2 while the other variables were measured at T1

Structural Model

Upon validating the measurement model, we assessed the structural model. As PLS-SEM mainly focuses on prediction as opposed to model fit, Hair et al. (2017) recommend focusing on R^2 values and the significance of path coefficients. For the sake of parsimony, we followed Bernerth and Aguinis's (2016) statistical control recommendations. Since only gender and work hours were significantly related to the dependent variable emotional exhaustion, we report the results of all hypothesis tests with only gender and work hours included. Importantly, the findings presented in the following are robust to the inclusion of all control variables. We drew 10,000 bootstrap samples to test our hypotheses (Henseler et al., 2016). Results are displayed in Table 4.

The adjusted-R^2 values were 0.20 for emotional exhaustion and 0.26 for work engagement. Animal distress was positively related to emotional exhaustion ($\beta = 0.33$, $p < .001$, Cohen's $f^2 = 0.14$), supporting Hypothesis 1. Animal distress also predicted emotional exhaustion over and above the effects of a more general job demand, i.e. work hours. Animal work stigma was not significantly related to emotional exhaustion ($\beta = 0.13$, $f^2 = 0.02$) and did also not contribute to the explanation of additional variance in emotional exhaustion; thus, Hypothesis 2 was rejected. Pro-animal impact ($\beta = 0.33$, $p < .05$, $f^2 = 0.08$) and human–animal bond ($\beta = 0.21$, $p < .05$, $f^2 = 0.04$) were both positively related to work engagement, supporting Hypotheses 3 and 4.

The interaction effects were tested using the two-stage approach (Henseler et al., 2016). The relationships between job demands and emotional exhaustion were not moderated by job resources; thus, Hypothesis 5 was rejected. There was one significant moderation effect of demands, that of animal distress on the relationship between human–animal bond and work engagement (β = -0.34, $p < .05$, $f^2 = 0.07$). However, this effect was contrary to the proposed direction of the relationship; thus, Hypothesis 6 was rejected. Nevertheless, to determine the nature of this interaction, we conducted a simple slopes analysis. The relation of human–animal bond with work engagement was positive and significant for individuals with observed low (1.55; $\beta = 0.24$, $p < .001$) and mean (2.44, $\beta = 0.10$, $p < .05$) values of animal distress, but not for individuals with high values of animal distress (3.33; β = -0.04, $p = .65$; see Fig. 2). We also conducted a test of the range of significance for this interaction using the Johnson-Neyman technique. The regression of work engagement on human–animal bond became non-significant from a value of 2.54 for animal distress.

Table 3 Square root of AVE and correlations

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Emotional exhaustion	3.50	1.36	0.85														
2. Work engagement	5.12	1.03	−0.57	0.80													
3. Animal distress - Higher order	2.44	0.89	0.35	−0.25	0.81												
4. Animal distress - Feeding	2.07	1.06	0.20	−0.10	0.75	0.88											
5. Animal distress - Health	2.77	1.19	0.30	−0.16	0.87	0.57	0.82										
6. Animal distress - Behavior	2.26	0.97	0.29	−0.31	0.80	0.38	0.48	0.75									
7. Animal work stigma	2.35	1.45	0.12	−0.06	0.13	0.07	0.09	0.15	0.95								
8. Pro-animal impact	5.68	1.38	−0.23	0.46	−0.17	0.09	−0.09	−0.35	−0.03	0.89							
9. Human–animal bond	5.44	1.47	−0.18	0.39	−0.36	−0.11	−0.32	−0.38	−0.05	0.56	0.88						
10. Gender [a]	0.34	0.50	−0.14	−0.02	0.00	0.00	0.01	0.01	0.00	−0.08	−0.11	1.00					
11. Age	32.46	11.81	−0.10	0.06	−0.07	−0.01	0.01	−0.15	−0.05	0.18	0.14	0.04	1.00				
12. Education	3.69	1.20	0.00	0.03	0.14	0.03	0.20	0.09	0.07	−0.13	−0.25	0.05	−0.16	1.00			
13. Work with pets [b]	0.57	0.50	−0.13	−0.10	−0.24	−0.31	−0.26	−0.04	0.20	−0.34	−0.24	0.17	−0.06	0.15	1.00		
14. Occupational tenure	7.32	9.09	−0.03	0.03	0.02	0.02	0.09	−0.07	−0.03	0.12	0.10	0.01	0.76	0.04	−0.04	1.00	
15. Work hours per week	36.65	16.09	0.13	0.08	−0.05	−0.04	0.04	−0.12	−0.02	0.01	0.00	0.05	0.13	0.08	0.08	0.11	1.00

Note M=mean; *SD*=standard deviation; values on the diagonal represent the square root of the AVE; [a] 0=female, 1=male; [b] 0=no, 1=yes; emotional exhaustion and work engagement were measured at T2 while the other variables were measured at T1

$p < .05$ for $|r| \geq 0.14$

$p < .01$ for $|r| \geq 0.18$

$p < .001$ for $|r| \geq 0.23$

Thus, when animal distress exceeded the mean observed level, human–animal bond no longer significantly predicted work engagement.

Robustness and Post-hoc Tests

To assess and reinforce the validity of our findings, we conducted several robustness and post-hoc tests using variables that did not qualify as control variables for our hypothesized relationships (Bernerth & Aguinis, 2016) but that nevertheless allow for further interesting insights. Detailed results from these analyses are available upon request. First, we conducted a robustness test with animal housing as a fourth composite factor of animal distress. Although this factor was not considered in the main analyses due to low item factor loadings, we wanted to investigate its possible impact on emotional exhaustion. The bootstrapped coefficients for the relationship between animal distress and emotional exhaustion ($\beta = 0.32$, $p < .001$, $f^2 = 0.12$), as well as for the moderating effect of animal distress on the relation between human–animal bond and work engagement ($\beta = -0.33$, $p < .05$, $f^2 = 0.07$), were similar to, but slightly lower than, those when using three composite factors to model animal distress, supporting the robustness of our main findings. Second, to assess the impact of dirtiness, rather than of stigma attached to animal work, we tested whether a measure of general dirty work (4 items, $\alpha = 0.83$; e.g., "Others outside of my place of work would say my job is gross"; 1 = *disagree strongly* to 7 = *agree strongly*; Bickmeier, 2022), predicts emotional exhaustion. The correlation between animal work stigma and dirty work was moderate to high ($r = .59$, $p < .001$), but dirty work did not significantly predict emotional exhaustion ($\beta = 0.02$, $f^2 = 0.00$). Third, to address the possibility that workers with lower socio-economic status are more likely to experience animal work stigma (Soral et al., 2022), we included highest level of education as a moderator of the relationship between animal work stigma and emotional exhaustion. However, animal work stigma remained non-significantly related to emotional exhaustion ($\beta = 0.05$, $f^2 = 0.00$), and highest level of education was not a significant moderator of this relationship ($\beta = -0.03$, $f^2 = 0.00$).

Fourth, the frequency of having to kill animals ("How often do you have to kill animals as part of your work?", 0 = *never*, 1 = *less than once a month*, 2 = *monthly*, 3 = *weekly*, 4 = *daily*) was included as an additional predictor of emotional exhaustion, as previous research suggests that this might be a central moral dilemma in human–animal work (e.g., Baran et al., 2012; Goñi-Balentziaga et al., 2021). Ninety-five individuals in our sample indicated that they had to kill animals as part of their jobs. The correlation between the frequency of killing animals and animal distress was 0.39 ($p < .001$). The bootstrapped coefficient for the frequency of killing animals on emotional exhaustion was not significant ($\beta = 0.04$, $f^2 = 0.00$), with animal distress being the only significant predictor ($\beta = 0.32$, $p < .001$, $f^2 = 0.12$). Fifth, as killing animals has been conceptualized as especially dirty (Baran et al., 2012), we tested whether animal work stigma would be related to emotional exhaustion in a subsample of individuals who kill animals at least once a month ($n = 95$). While animal work stigma was still not significantly related to emotional exhaustion ($\beta = 0.05$, $f^2 = 0.00$), the relationship between animal distress and emotional exhaustion was stronger in this subsample ($\beta = 0.50$, $p < .001$, $f^2 = 0.26$).

Table 4 Results of PLS-SEM: hypotheses testing

Path	β	t-statistic	Effect size f^2	Confidence interval	Inference
H1: Animal distress → Emotional exhaustion	0.33***	4.33	0.14	[0.22; 0.52]	Supported
H2: Animal work stigma → Emotional exhaustion	0.13	0.90	0.02	[-0.21; 0.28]	Not supported
H3: Pro-animal impact → Work engagement	0.33*	2.35	0.08	[0.12; 0.67]	Supported
H4: Human–animal bond → Work engagement	0.21*	2.05	0.04	[0.03; 0.41]	Supported
H5: Animal distress × Pro-animal impact → Emotional exhaustion	-0.03	-0.22	0.00	[-0.30; 0.19]	Not supported
H5: Animal distress × Human–animal bond → Emotional exhaustion	0.11	0.83	0.01	[-0.13; 0.38]	Not supported
H5: Animal work stigma × Pro-animal impact → Emotional exhaustion	0.11	0.80	0.01	[-0.24; 0.32]	Not supported
H5: Animal work stigma × Human–animal bond → Emotional exhaustion	0.11	0.70	0.01	[-0.30; 0.37]	Not supported
H6: Pro-animal impact × Animal distress → Work engagement	0.12	0.73	0.01	[-0.18; 0.43]	Not supported
H6: Pro-animal impact × Animal work stigma → Work engagement	-0.20	-1.07	0.04	[-0.46; 0.30]	Not supported
H6: Human–animal bond × Animal distress → Work engagement	-0.34*	-2.39	0.07	[-0.46; -0.05]	Counters prediction
H6: Human–animal bond × Animal work stigma → Work engagement	0.02	0.15	0.00	[-0.25; 0.29]	Not supported

Note $N = 205$; emotional exhaustion and work engagement were measured at T2 while the other variables were measured at T1

*$p < .05$

**$p < .01$

***$p < .001$

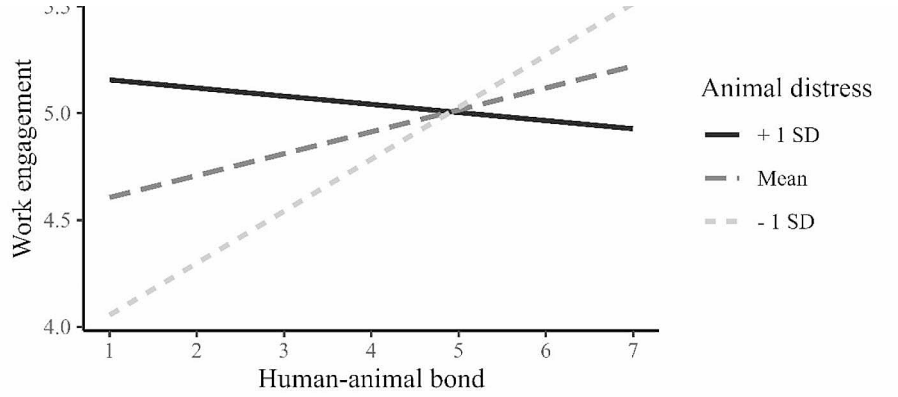

Fig. 2 Animal distress moderates the relationship between human–animal bond and work engagement

Sixth, as an incremental validity test, we tested if animal-specific resources predict engagement over and above the effects of other more general resources (i.e., job autonomy, social support, and prosocial impact). The job resource job autonomy (measured with 3 items, $\alpha = 0.92$, e.g. "I have influence on what I do at work."; 1 = *never* to 5 = *always*; Kristensen et al., 2005) was significantly related to work engagement ($\beta = 0.31$, $p < .001$, $f^2 = 0.12$), but it was not a significant moderator of the relationships between human–animal work demands and emotional exhaustion. We also included the job resources supervisor support and co-worker support (2 items each, e.g. "I get help and support from my supervisor/colleagues, if needed"; 1 = *never* to 5 = *always*; Kristensen et al., 2005, $\alpha = 0.90$ and $\alpha = 0.84$) and prosocial impact on humans (3 items, $\alpha = 0.86$, e.g. "My work really makes other humans' lives better"; 1 = *disagree strongly* to 7 = *agree strongly*; Grant & Campbell, 2007) as predictors of work engagement. This excluded self-employed individuals and left a subsample of 175 workers. However, none of these resources acted as a significant moderator of the relationships between human–animal work demands and emotional exhaustion. Supervisor support ($\beta = 0.15$, $p < .05$, $f^2 = 0.03$) and co-worker support ($\beta = 0.26$, $p < .01$, $f^2 = 0.10$), but not prosocial impact on humans ($\beta = 0.15$, $f^2 = 0.04$), were significant predictors of work engagement. The relationships of pro-animal impact and work engagement ($\beta = 0.31$, $p < .05$, $f^2 = 0.10$) and of human–animal bond and work engagement ($\beta = 0.19$, $p < .05$, $f^2 = 0.03$) remained significant upon inclusion of these additional variables.

Discussion

Our findings contribute to a better understanding of individual health and motivational outcomes that generalize across different occupations in which workers interact with diverse animal species. Regarding job demands, only animal distress positively predicted workers' emotional exhaustion, while animal work stigma did not. The resources pro-animal impact and human–animal bond both positively predicted work engagement above and beyond the effects of other more general and established job resources. Moreover, higher levels of animal distress damaged the positive relationship between human–animal bond and work engagement.

Theoretical Implications

Our research provides implications for the literature on JD–R theory, stigma in 'dirty' occupations, and human–animal work. We extend the current focus of JD–R theory from occupations in which workers engage with things, information, or people (Bakker & Demerouti, 2017) to occupations in which workers engage with animals, which we have argued is a distinct occupational category. This is illustrated by our study identifying and analyzing job demands and resources that – to our knowledge – had not been studied in the JD–R literature. Overall, our study contributes to broadening scholars' current understanding on health and motivation in a large and understudied group of workers who face specific psychological demands and have specific psychological resources (Kelloway at al. 2023).

First, we identified key job demands in human–animal work. We show that animal distress, which had the strongest overall effect size in our study, can be detrimental for human workers, whereas animal work stigma does not seem to be a significant demand. Moreover, while prior literature has identified (a higher frequency of) killing animals as a stressor in human–animal work (e.g., Andrukonis et al., 2020; Baran et al., 2012; Goñi-Balentziaga et al., 2021; LaFolette et al., 2020; Reeve et al., 2005), we found that animal distress, and not the frequency of killing animals, predicted emotional exhaustion in a post-hoc test. Thus, although many of our participants mentioned euthanasia or killing animals as a negative aspect of their work (see Table 1), animal distress experienced prior to an animal's death might be more detrimental to workers' psychological health than animals' death itself. This result might also be due to mediation, as workers who have to kill animals frequently might witness more animal distress. However, overall, focusing on animal distress enables researchers to focus on more diverse types of human–animal work, not only those where workers have to kill animals. Our findings also imply that animal distress may damage the positive effect that a good human–animal bond has on work engagement. Further, we did not find support for the notion that other job resources that have been proposed to mitigate the demands of human–animal work, such as job autonomy, social support (Goñi-Balentziaga et al., 2021), or positive impact on humans (e.g., finding cures for human diseases in animal experiments; Chang & Hard, 2002) alleviate the detrimental effects of animal distress in our post-hoc analyses; rather, animal distress remained a major stressor. These findings underscore the importance of addressing animal distress as a key factor for worker well-being in human–animal work.

Second, regarding job resources, our study is one of the first to provide empirical evidence for the importance of both pro-animal impact and human–animal bond for workers' engagement. Notably, a post-hoc test showed that these two job resources are distinct aspects of providing meaningfulness to others through work (Lee et al., 2020). Contributing to others' benefit through work is one of the most important job resources (Lee et al., 2020) and our study demonstrates that this also applies to humans working with animals. This finding was consistent across both our quantitative and qualitative data (see open text answers in Table 1) and all occupational groups. In our sample, even some researchers who conduct lethal or painful experiments on animals stressed the importance of their work for animals in the future. In addition, by confirming that personal relationships with animals contribute considerably to workers' engagement, our study findings highlight the importance of studying human–animal relations in organizations (Tallberg & Jordan, 2021). The presence of employees' companion animals (i.e., pets not involved in human–animal work) in the workplace has previously been found to increase workers' satisfaction and engagement (e.g., Cunha et al., 2019; Kelemen et al., 2020). Our study replicates this finding for human–animal work in various occupations such as farmers, veterinarians, animal shelter workers, pet shop workers, and zookeepers who emphasized bonding with animals, enjoying their calming presence, and cuddling them as positive aspects of their work. In another post-hoc test, we found that while other social resources, such as supervisor and colleague/team support, are important for work engagement (Lee et al., 2020), human–animal bond is an additional predictor of work engagement. Thus, we show that in human–animal work, a strong human–animal bond is

an important social resource to be considered in future resource taxonomies on job resources. Importantly, however, a strong human–animal bond will serve as resource only when animal distress is low.

Third, by drawing on propositions from JD–R theory, we sought to answer calls and provide guidance on how to combat job-related stressors in human–animal work (Andrukonis et al., 2020). Our findings suggest that job resources may not be able to buffer the detrimental effects of animal distress. Consequently, limiting this stressor may be the most reasonable option to prevent emotional exhaustion among workers. Our findings are consistent with previous research and meta-analyses showing that evidence for the buffering effect proposed by JD–R theory is frequently lacking (Häusser et al., 2010; Xu & Payne, 2020). Huth and Chung-Yan (2023) concluded from their meta-analytic review that there is no consistent evidence for interaction effects between job demands and resources regardless of the employee outcomes tested (e.g., emotional exhaustion and work engagement) and that even if interaction effects are found, they explain only a small amount of variance in the outcome variables under study and thus add little beyond the additive effects (Bakker et al., 2010; Hu et al., 2011; Xu & Payne, 20200). It is possible that stronger resources or a greater number of positive than negative events and experiences in an individual's work may be able to buffer the demand for animal distress (Oishi et al., 2007). However, for most individuals, the peculiarities of their occupations only allow for a certain ratio of demands to resources, so this may not be very realistic. Furthermore, for most individuals in our sample who experienced animal distress, the stressors may be perceived as only partially under their control or uncontrollable. In such cases, buffering effects are less likely (Bakker & Demerouti, 2007). This may be the case, for example, for veterinary nurses, who may be able to alleviate pain symptoms but not animal distress due to poor husbandry by owners. In summary, neither our findings on the buffering effects of job resources nor the enhancing effects of job demands support the propositions of JD–R theory. Rather, it appears that a close human–animal bond with a distressed animal may cause discomfort and reduce motivation. One possible explanation is that close relationships with animals may create moral contradictions when handling or research procedures require causing pain, stress, or death to the same animals (LaFolette et al., 2020). As another explanation for the non-significant boosting and buffering effects, the interaction effects between job demands and resources may be more complex, depending on contextual factors (e.g., conditions of the particular job) and personal factors (e.g., employees' general mental health and self-efficacy) (Demerouti & Bakker, 2023). Moreover, job resources may not have provided the best match with the job demands under study. According to the demand-induced strain compensation (DISC) model (De Jonge & Dormann, 2003), job resources do not arbitrarily mitigate the impact of job demands on outcomes. Instead, they are most effective when they align with the specific cognitive, emotional, or physical dimensions or components of job demands. There is at least some support for this notion (e.g., De Jonge et al., 2008; Feuerhahn et al., 2013). Accordingly, more theory and research are needed to examine the matching principle of resources and demands that work effectively in the unique context of working with animals. There may also have been methodological or statistical reasons for the failure to detect interaction effects as proposed by JD–R theory, as our study, based on a

sample of 205 participants, may have had low statistical power to detect interaction effects (Aguinis et al., 2005; Murphy & Russell, 2017; Xu & Payne, 2020).

Finally, our study adds to research on work stigma with a specific focus on human–animal work. Animal work stigma does not seem to relate to workers' psychological health, although dirtiness and stigma have been ascribed to numerous occupational groups that perform human–animal work (Baran et al., 2012, 2016; Lopina et al., 2012). In our sample, only two laboratory animal technicians and one animal-assisted therapist mentioned negative stereotypes as negative aspects of their work. One explanation for this disparity between our findings and prior literature might be that dirty work scholars have mostly adopted ethnographies and in-depth interviews (Zhang et al., 2021) and have conceptualized certain occupations as stigmatized, rather than examining individual workers' perceptions of occupational stigma. In addition, animal work stigma is not constantly salient in workers' daily interactions with animals; rather, the salience of such stigma might vary between types of animal-related 'dirty' work (Baran et al., 2012). However, although several studies suggest that intentional killing of animals makes jobs especially dirty (Baran et al., 2016) and that those performing the central dirty task of killing animals more frequently would be more often reminded of the stigma and experience more negative consequences (Baran et al., 2012), we did not find support for this explanation in a post-hoc test when considering only individuals who kill animals as part of their work. Even for them, animal work stigma was not a meaningful predictor of emotional exhaustion. Thus, while our findings contradict insights of previous studies, they also provide support for the notion that animal dirty work is different from human dirty work as it may involve a different set of moral norms that allow for treating animals in ways that are not regarded as appropriate for humans (Tallberg & Jordan, 2022).

Practical Implications

Our study findings emphasize that animals play a crucial role as social actors in organizational spaces. In particular, by highlighting the importance of human–animal bonds and pro-animal impact, as well as of animal distress, our study provides strong support for granting spaces for positive human–animal relations in workplaces. Steps towards this may include reducing animal distress by providing animals with an appropriate diet, enabling them to express natural social behaviors, and keeping them in good health. This may contribute to not only improving animals' lives but also to maintaining the psychological health of humans working with animals. Our study findings thus highlight the need for organizations to comply with current animal welfare guidelines and move beyond minimum requirements. For instance, research institutions should avoid animal experiments or significantly limit the suffering of animal testing and animals used in experiments. Further, animal welfare legislations should be improved and enforced to reduce animal distress that workers such as veterinarians, farm workers, pet shelter workers, and pet groomers have to witness. Lastly, there is a need to create jobs that benefit both humans and animals and are characterized by multispecies respect (Coulter, 2017).

Limitations and Avenues for Future Research

The findings of our study should be interpreted in light of their limitations. First, the two-wave design of our study prohibits causal inference and does not rule out potential reverse and reciprocal effects. For instance, emotional exhaustion may be a response to job demands, such as animal distress, but exhausted employees may also be more likely to perceive stress in the animals they work with (Guthier et al., 2020). However, the direction of the relationships tested in our study is consistent with theorizing and previous research (Demerouti & Bakker, 2023). A second limitation is the sole use of self-reports for data collection. However, given that we aimed to investigate workers' subjective perceptions of demands and resources in their work and the well-being and motivational outcomes, this approach is warranted. Nevertheless, future research could combine self-ratings with other sources of data (e.g., observations of animal distress; peer-ratings of emotional exhaustion; Cooper et al., 2020; Podsakoff et al., 2012).

Third, some of our measures were adjusted or modified to fit the context of human–animal work, but further studies should be conducted to support their validity. For example, we used a measure that allowed for examination of various facets of animal distress across species and contexts. However, a possible limitation of this measure is that having specific facets of animal distress at higher levels, e.g., complete deprivation of water, might be more severe for animals than having several other stressors on lower levels. Furthermore, although the measurement model that included the housing factor did not exhibit a good fit, it is unlikely that this implies the perception of animals enduring uncomfortable temperatures or confinement in small cages is not perceived as a stressor for the humans caring for them. Instead, it suggests that the measure we used may need refinement.

Moreover, we collected data at two time points to separate the measurement of the independent and dependent variables and thereby, limit biases that may have resulted from single-source data collection (Cooper et al., 2020; Podsakoff et al., 2012; Spector, 2019). Based on methodological recommendations and following similar studies (e.g., Cooper et al., 2020; Santuzzi & Barber, 2018), we implemented a four-week time lag between the two measurements. We deemed this time interval to be suitable to clear the participants' memories (Podsakoff et al., 2012). Apart from the temporal separation of the key variables in our model, we showed the construct validity of our measures and included statistical control variables that were also measured with the same (self-report) method to reduce the threat of common-method bias.

Lastly, our sample did not include slaughterhouse workers, who have been used as a main example of 'dirty' human–animal workers in previous research (Baran et al., 2016). Slaughterhouse workers might be more likely to experience animal work stigma, potentially partially due to lower socio-economic status or education. Our post-hoc tests revealed that animal work stigma was not related to emotional exhaustion in workers with lower education or in workers who kill animals. Nevertheless, animal work stigma might be more pronounced in specific groups of workers. As another limitation, the results regarding emotional exhaustion as a criterion may be subject to biases due to self-selection or survival effects (Brewer & Shapard, 2004; Maslach et al., 2001). Workers who are highly exhausted due to the high demands

that they experienced in interacting with animals may have likely left their occupation and not be part of our study sample. Therefore, the participants in the study might be the more resilient workers (Bakker et al., 2008).

Our study offers various avenues for future research. For instance, many participants named animal aggression as a negative aspect and demand of their work (see Table 1). This suggests that animal aggression might be a particular stressor on its own that warrants further attention. Regarding job resources, participants often mentioned the calming presence of animals while working outdoors, supporting previous findings on nature's role in strain reduction (Thompson & Bruk-Lee, 2019). Thus, future research might focus on the connections between working with animals and workers' need for biophilic work designs.

Based on previous research and the propositions of SDT (Ryan & Deci, 2017), we found evidence that forming strong bonds with animals one works with presents a job resource that helps to satisfy workers' basic psychological need for relatedness and positively predicts work engagement. Importantly, however, this positive effect was found only as long as animal distress was reported to be low. Thus, it seems that human–animal bonds do not uniformly act as job resources, but rather that their effects depend on the situation or context. We believe that this finding points to a general limitation of the JD–R theory. Job demands (i.e., job aspects that are effortful and associated with costs) and job resources (i.e., aspects that can be effective in achieving work goals and stimulating personal growth and development) are partly defined by their functions (i.e., their effects on outcomes). However, in some situations, job characteristics that usually qualify as job resources (e.g., human–animal bonds) may have direct detrimental consequences or may worsen the negative effects of job demands on outcomes (van Veldhoven et al., 2020). In such situations, these job characteristics may by definition not qualify as resources but might rather be experienced as demanding (Schaufeli & Taris, 2014; van Veldhoven et al., 2020). Future research should take a more nuanced perspective to understand human–animal interactions and consider the situation- and context-dependent effects that determine the appraisal of job characteristics and their consequences for worker health and motivation (Schaufeli & Taris, 2014; van Veldhoven et al., 2020).

Moreover, we suggest that future research expands the current model to include a more holistic perspective on how other personal, organizational, and contextual demands, resources, and processes (e.g., regulatory efforts) interact with human–animal work to predict individual outcomes (Demerouti & Bakker, 2023). Furthermore, an avenue for future research involves examining configurations of various job demands and resources. Drawing from the work of Ong and Johnson (2023), a profile analysis approach could be employed, using a person-centered theoretical framework to investigate configurations of job demands and resources that contribute to motivational and health outcomes. Another promising direction for future research involves broadening the scope of outcomes from an animal-centered perspective. This entails exploring the influence of job demands and resources on animal outcomes, delving into questions such as whether bonds between humans and animals yield positive welfare implications for the latter (Hosey & Melfi, 2014; Kandel et al., 2023).

Appendix A. *Means, Standard Deviations, and Loadings of Human–Animal Work Demands and Resources Items*

Variables and items	Mean	SD	Loading
Animal distress			
Feeding			
1. Animals are hungry or do not have an appropriate diet.	2.44	1.40	0.88
2. Animals do not have enough clean water.	1.69	1.01	0.88
Housing[a]			
1. Animals have comfort when resting. (R)[a]	2.34	1.43	0.30
2. Animals are exposed to uncomfortable temperatures.[a]	2.17	1.36	0.89
3. Animals have enough space to move around freely. (R)[a]	2.19	1.35	0.63
Health			
1. Animals have injuries or behavioral disorders.	3.33	1.57	0.81
2. Animals have injuries or diseases due to their living conditions.	2.30	1.37	0.78
3. Animals suffer pain because of handling or medical procedures.	2.50	1.42	0.80
4. Animals are scared or emotionally distressed.	2.95	1.40	0.89
Behavior			
1. Animals can express normal social behaviors. (R)	2.27	1.26	0.75
2. Animals can express behaviors that are natural for their species. (R)	2.11	1.21	0.79
3. Animals are not handled well or forced to interact with humans.	2.40	1.40	0.72
Animal work stigma			
1. I had many interpersonal interactions that left me feeling stigmatized due to my work with animals.	2.30	1.48	0.93
2. I felt stigmatized within various community settings due to my work with animals.	2.45	1.61	0.93
3. I had many experiences that made me feel stigmatized due to my work with animals.	2.30	1.50	0.95
Pro-animal impact			
1. My work really makes animals' lives better.	5.96	1.44	0.91
2. I have positive impact on animals in my work on a regular basis.	6.02	1.39	0.85
3. My work has positive impact on a large number of animals.	5.62	1.57	0.91
Human–animal bond			
1. I know the animals I work with well.	5.67	1.41	0.78
2. I develop close bonds with animals at my work.	5.32	1.76	0.89
3. I feel a strong personal connection with the animals I work with.	5.36	1.61	0.95

Note (R) = reverse-coded; [a] not included in final model and analysis; response format for animal distress items from 1 (*never*) to 7 (*always*) and for the other items from 1 (*disagree strongly*) to 7 (*agree strongly*).

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Declarations

Ethical Approval This is an observational study. The University of Mannheim Research Ethics Committee has confirmed that no ethical approval is required.

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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