Belief in Animal Sentience and Affective Owner Attitudes are linked to Positive Working Equid Welfare across Six Countries

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Belief in Animal Sentience and Affective Owner Attitudes are linked to Positive Working Equid Welfare across Six Countries

Emily Haddy\textsuperscript{a}, Faith Burden\textsuperscript{b}, Zoe Raw\textsuperscript{c}, João B. Rodrigues\textsuperscript{c}, Jaime Humberto Zappi Bello\textsuperscript{d}, Julia Brown\textsuperscript{e}, Juliane Kaminski\textsuperscript{f}, and Leanne Proops\textsuperscript{a}

\textsuperscript{a}Centre for Comparative and Evolutionary Psychology, Department of Psychology, University of Portsmouth, Portsmouth, UK; \textsuperscript{b}Equine Operations, The Donkey Sanctuary, Sidmouth, UK; \textsuperscript{c}Research and Operational Support Department, The Donkey Sanctuary, Sidmouth, UK; \textsuperscript{d}Dirección de Educación Superior, Universidad Popular Autónoma de Veracruz, Xalapa, Mexico; \textsuperscript{e}School of the Environment, Geography & Geosciences, University of Portsmouth, Portsmouth, UK

\textbf{ABSTRACT}
Belief in animal sentience and the quality of human-animal relationships play a significant role in animal welfare. However, the link between an individual animal’s welfare and the beliefs and emotional connection of the owner to the animal is understudied and focussed on single cultures, limiting generalisability. In this study, we explored potential links between owner attitude, beliefs in animal sentience, and working equid welfare across four continents. This study used a welfare assessment protocol alongside a questionnaire exploring owner attitudes to assess 378 participants across six countries. Overall, the general health status and body condition of equids belonging to owners with an affective (versus instrumental) perspective and those owners who believed that their equids could feel emotions, were significantly better. Equids belonging to owners who believed that their animals could feel pain were also significantly less likely to be lame. Potential causal relationships between factors and theories explaining these beliefs are discussed. These results can inform future welfare initiatives by highlighting the importance of the human–equid relationship and the role that beliefs regarding animal sentience play in influencing equid welfare.

\textbf{KEYWORDS}
Animal welfare; working equid; animal sentience; human–animal relationship

\textbf{Introduction}

Human views on animal sentience (the ability of animals to experience a range of feelings, both positive and negative) are linked to welfare (Webster & Webster, 2005). Greater belief in animal mind (the attribution of mental capacities to animals such as intellect, emotion, and reasoning) (Hills, 1995) is a powerful and consistent predictor of lower support for human use of animals and potentially for an increase in the sphere of moral concern to include other species (Jaeger & Wilks, 2021; Knight, Vrij, Cherryman, & Nunkoosing, 2004). Promotion of positive emotional states in animals improves quality of life and is now the focus of research efforts into farm and laboratory animals (Boissy et al., 2007). Owners of different domestic animal species attribute a range of emotions to their animals, both primary emotions that are considered more instinctual and fast acting (such as joy and fear) and secondary emotions that are thought to involve “higher” processing and an element of learning (such as jealousy and pride); with dogs, cats, and horses being attributed the highest number of secondary emotions (Morris, Doe, & Godsell, 2008). Mammals (being considered cognitively closer to humans) and commonly kept pet animals are consistently attributed...
the most emotions (Wilkins, McCrae, & McBride, 2015). The attribution of emotions to animals by humans has been shown to be affected by a variety of individual and cultural differences; these include a person’s belief in animal mind and previous pet ownership (Wilkins, McCrae, & McBride, 2015). Owner recognition of animal emotions affects the treatment that animals receive (Edgar & Mullan, 2011). Alongside the recognition of animal emotions, belief that animals are sentient beings also incorporates recognition of animal pain. Pain for the purposes of this study refers to the nociceptive component of pain and is treated separately from emotion (Gilam, Gross, Wager, Keefe, & Mackey, 2020). The ability of a person to recognize animal pain plays a crucial role in assessment and potential alleviation of that pain (Paul & Podberscek, 2000). Pain perception has been implicated directly as an influence on animal welfare; farmers demonstrating higher levels of empathy regarding animal pain owned cattle with a lower incidence of skin lesions (Kielland, Skjerve, Østerås, & Zanella, 2010).

All domestic animals rely on humans for their welfare and it is now recognized that the quality of human-animal relationships, alongside other factors, plays a significant role in determining their welfare (Hemsworth, Coleman, Hemsworth, & Coleman, 2011; Serpell, 2004). Negative interactions and fear of humans can lower productivity, decrease welfare, and increase the risk of injuries in a range of farmed species (Waiblinger et al., 2006). Conversely, positive attitudes of stockpeople toward animals can promote good welfare, decrease fear responses, and improve yields (Waiblinger, Menke, & Coleman, 2002). It is therefore recommended that assessment of human-animal relations be included in welfare monitoring (Hemsworth, Barnett, & Coleman, 2009).

Peoples’ general attitudes toward animals, however, are influenced by a complex variety of factors (Serpell, 2004). In environmental science, an ecocentric viewpoint sees nature as something of intrinsic value, whereas an anthropocentric view is characterized by a prioritization of human need and protection of those things that are useful to people (Gagnon Thompson & Barton, 1994). These motivations can be associated with people’s attitudes to specific animal species, as demonstrated in the case of anthropocentrism and associated negative attitudes toward wild large carnivores such as wolves who can pose a risk to livestock (Bjerke & Kaltenborn, 1999). Harwood (1928) first documented two opposing attitudes toward animals; anthropomorphism, characterized as the emotional response of a human toward animals and the consideration of the similarity of animals to people, and anthropocentrism, concerned predominantly with economic human interest, driven by need or practical suitability (Serpell, 1986). Anthropomorphic and anthropocentric views can impact upon companion animal welfare, with interpretation of animal behavior in “human” terms contributing to the development of behavioral disorders and compromised welfare (Bradshaw & Casey, 2007). Latterly, these concepts were formalized into a two-dimensional model of human attitudes to animals referred to as “affect”, incorporating affection, sympathy and emotion and “utility”, incorporating views of animals’ instrumental value (Hills, 1993; Serpell, 2004). An animal’s position on this human affect/utility spectrum can have a large impact on the way it is treated with differences seen even within one species depending upon its cultural context. Pet dogs in the UK would be generally valued highly in terms of the affective dimension whereas a street dog living in a country such as Iraq (where canine welfare levels are poorer) would be negatively valued in terms of the same affective dimension (Serpell & Hsu, 2016). These determinants (affective and instrumental) have been used to analyze differences in handler perspective of both army mules and working horses in rural and urban regions of Chile (Lagos, Rojas, Rodrigues, & Tadich, 2021; Luna, Vásquez, Rojas, & Tadich, 2017). It was found that affective handlers referred to their equid in terms of an emotional connection such as describing them as a friend or part of the family whereas utility-focussed instrumental handlers emphasized their equid’s livelihood role, referring to them in terms of a tool or the service they provide. Although the study demonstrated differences in owner perspective in relation to geographical area, the perspectives were not analyzed in relation to welfare. Adult attitudes toward animals and animal welfare are influenced by childhood experience of animals, such as pet keeping, which has been shown to vary by cultural context (Miura, Bradshaw, & Tanida, 2002).
More broadly, the values assigned and the beliefs that people hold about animals are strongly affected by dominant ideological, religious, and cultural norms (Hills, 1993; Szucs, Geers, Jezierski, Sossidou, & Broom, 2012). Therefore, in order to understand the human factors influencing animal welfare, it is vital to take cultural norms into account and to directly explore and compare the relationship between human attitudes and relationship with animals across cultures.

The human-working animal relationship is understudied but is an ideal model in which to explore such links, as the nature of the animals’ working role necessitates close human-animal interaction. Globally more than 600 million people rely on working equids for their livelihoods in low and middle income countries (LMICs) (Sommerville, Brown & Upjohn, 2018). Equids are often used in the poorest, marginalized communities (Stringer, 2014); consequently working equids have been identified as a group of animals suffering from low welfare standards worldwide (Burn, Dennison, & Whay, 2010). On an individual level, the relationship with humans plays an important role in equid welfare (Popescu et al., 2016) and this relationship can be influenced by many factors including human psychological attributes (Luna & Tadich, 2019). Therefore, it is vital to understand owners’ perspectives of, and attitudes toward, their working equids.

Explorations of owner beliefs and attitudes to their equids have been conducted within specific communities or countries (Geiger et al., 2020; Luna, Vásquez, Rojas, & Tadich, 2017; Luna, Vásquez, Yáñez, & Tadich, 2018) but to the authors’ knowledge, this is the first study to compare owner attitudes to working equids across multiple countries. The majority of literature concerning attitudes toward animals (usually centered on domestic or farmed species) has focussed on Western countries (Daly & Morton, 2009; Kauppinen et al., 2013; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Taylor and Signal, 2005), limiting the generalizability of results to LMICs. This study therefore also represents a valuable contribution to the understanding of attitudes toward animals in LMICs. This study utilized a working equid welfare assessment which included an owner questionnaire focussing on owner attitudes, beliefs and values toward their equids as well as a behavioral assessment of the animals’ welfare. Assessments were carried out in Egypt, Mexico, Pakistan, Senegal and Spain/Portugal. The study aimed to determine whether there is a relationship between owner attitudes and the welfare of their working equids and whether these relationships differ across cultures.

**Methods**

**Study population Egypt**

Interviews in Egypt were conducted between the 13th of January and the 23rd of February 2022. All participants were from the city of Luxor. The interviewer accompanied veterinarians from NGO Animal Care in Egypt during free clinics run from their Luxor animal hospital. Participants were randomly chosen from those attending clinics and the on-site washing facilities. Equids who were attending the clinic as a result of a serious injury were not included. Two participants were interviewed outside the clinic, they owned horses from a local riding stable. A total of 65 people participated (women = 1, men = 64) with ages ranging between 18 and 75 (mean 30, SD = 13 years). Twenty (31%) participants described themselves as working in agriculture; many worked on the agricultural land surrounding the city, especially during the sugar cane season, and used their equid to transport produce from the fields to factories for processing. Nineteen participants (29%) described themselves as transporting and selling goods by cart, 7 participants (11%) were involved in the collection of recycling and 6 participants (9%) were carriage drivers.

**Study population Mexico**

Interviews in Mexico were conducted between the 15th of January and the 27th of March 2019. Participants were interviewed from three states: 60 from Querétaro, 39 from Puebla and 21 from Veracruz. The interviewer accompanied veterinarians and veterinary students from the National
Autonomous University of Mexico (UNAM) during clinical treatment work in equid owning local communities. Any owner of an equid sighted during the time the interviewer was in a community was approached for participation. A total of 120 participants were recruited (women = 25, men = 95) with ages ranging between 16 and 84 (mean 47, SD = 16 years). In all states, participants were from rural, often remote communities. In total, 89 (71%) participants described themselves as farmers although often in conjunction with another job, only 9 (8%) owners held a permanent salaried job. In the state of Veracruz, most participants farmed cattle whereas in the more arid mountainous states of Querétaro and Puebla farming was largely arable.

**Study population Pakistan**

Interviews in Pakistan were conducted between the 12th of September and the 30th of December 2021. Participants were interviewed from 17 different brick kiln communities. Interviewers (n = 6) were members of Brooke Pakistan and interviews were conducted during the course of visits to kilns within Brooke Pakistan’s projects which had been running for just over a year. Any owner of an equid sighted during the time the interviewer was in a community was approached for participation. A total of 62 participants were recruited (men = 62) with ages ranging between 18 and 70 (mean 31, SD = 10 years). All participants described their main occupation as working with equids in a brick kiln. However, kiln work is seasonal with equids and owners fulfilling other roles when kilns are not operational, often traveling long distances between the kilns and their home location.

**Study population Senegal**

Interviews in Senegal were conducted between the 13th and the 21st of January 2022. Participants were interviewed from 10 communities. The interviewers (n = 4) were trained staff members of Brooke West Africa’s partner organizations and interviews were conducted during the course of visits to areas within Brooke West Africa’s projects which had been running for 5–6 years. Any owner of an equid sighted during the time the interviewer was in a community was approached for participation. A total of 69 people participated (women = 16, men = 53) with ages ranging between 20 and 76 (mean 44, SD = 12 years). Communities were situated in both rural and urban areas. Thirty-two (46%) participants described themselves as farmers, 13 (19%) as cart drivers, 12 (17%) as collectors of waste and 6 (9%) as traders.

**Study population Spain/Portugal**

Interviews in Spain/Portugal were conducted between June 8 and 282018. Participants were recruited from both the South West and North West of Spain and the North East of Portugal. Two participants were interviewed in the Spanish town of Mijas where donkeys are commonly used as taxis for the tourism industry, either ridden or pulling carts. Working donkey owners were recruited through connection with the Spanish Donkey Sanctuary El Refugio del Burrito, who have provided training for working donkey owners in the town for the past 3 years. The remaining 60 participants interviewed were from rural villages, situated in a 100 kilometer border area between the towns of Bragança (Portugal) and Zamora (Spain), with the majority of data collected in the Vimioso and Miranda do Douro regions of Portugal. A volunteer sample of participants was recruited through a local vet who had previously worked in the villages and is now a member of UK The Donkey Sanctuary staff. A total of 62 equid owners participated in the study, (women = 28, men = 34) with ages ranging between 43 and 91 years old (mean 70, SD = 10 years). Communities were rural and often remote, with high migration of younger generations to urban areas, leaving an older population maintaining a traditional agricultural way of life (Haddy, Rodrigues, Raw, Burden, & Proops, 2020). Of the participants interviewed, 56 (90%) were farmers; many were subsistence farmers,
utilizing equids for sowing, plowing and the harvesting of vegetables which fed them throughout the year. Some participants owned vineyards or grew olives for olive oil production as a main source of income; others farmed cattle as their main income source and used the equids to work with the cattle.

**Subject animals Egypt**
A total of 33 donkeys (females = 6, stallions = 27) and 32 horses (females = 15, stallions = 17) were assessed. The primary roles of the equids assessed were as follows: 71% transport of goods by cart, 14% riding, 9% transport of people by carriage and 6% other. The average age of the equids assessed was 6 years (range = 1–20, SD = 4 years).

**Subject animals Mexico**
A total of 56 donkeys (females = 17, stallions = 29, geldings = 10), 7 mules (females = 2, stallions = 2, geldings = 3) and 57 horses (females = 21, stallions = 20, geldings = 16) were assessed. The primary role of the equids assessed were: 39% riding, 36% transport by pack, 15% agroforestry, and 10% other. The average age of the equids assessed (excluding 4 whose ages were unknown) was 8 years (range = 1–33, SD = 5 years).

**Subject animals Pakistan**
A total of 30 donkeys (females = 1, stallions = 29), 22 horses (females = 7, stallions = 15) and 10 mules (females = 3, stallions = 6, geldings = 1) were assessed. The primary roles of the equids assessed were as follows: 100% transport of goods by cart. The average age of the equids assessed was 8 years (range = 2–22, SD = 4 years).

**Subject animals Senegal**
A total of 31 donkeys (females = 6, stallions = 25), 37 horses (females = 7, stallions = 30), and 1 mule (stallion = 1) were assessed. The primary roles of the equids assessed were as follows: 48% agroforestry, 32% transport of goods by cart, 14% transport of people by cart, and 6% other. The average age of the equids assessed was 8 years (range = 2–20, SD = 3 years).

**Subject animals Spain/Portugal**
A total of 59 donkeys (females = 52, stallions = 3, geldings = 4) and 3 mules (females = 1, geldings = 2) were assessed. The primary roles of the equids assessed were as follows: 55% agroforestry, 21% breeding, 13% private riding, and 11% other. The average age of the equids assessed was 11 years (range = 3–30, SD = 6 years).

**Procedure**
The study was approved by both the University of Portsmouth’s Ethics and Animal Welfare Ethics Research Committee (reference numbers SHFEC 2018–121D and 1219E). Approval for the research to take place in each village was granted from relevant authorities and informed oral consent was obtained for all participants. Working equid owners were interviewed by an assessor and, in the case of Spain/Portugal, Mexico, and Egypt, a translator who was a fluent native speaker. Interviews in all locations were conducted in participants’ first language and the results translated and recorded in English by interviewers (with the exception of Senegal where results were recorded in French and later translated to English by authors). For owners that had multiple equids, one equid per owner
was selected to take part in the assessment. For the first part of the interview, the owner was asked to hold their equid whilst a short behavioral (Appendix A) and physical (Appendix B) welfare assessment was carried out. The welfare assessment protocol was taken from the Equid Assessment Research and Scoping (EARS) tool, developed by NGO The Donkey Sanctuary and designed for use across multiple equid species and contexts (for full details of the tool see Raw et al., 2020). The equid’s attitude and reaction to external stimuli from a distance was recorded. Reaction to observer approach, body position, acceptance of chin contact and reaction to the researcher walking down the side of the animal was recorded. Equids were scored for body condition, using touch and observation to assess body fat reserves. Equids were examined for any skin alterations such as open wounds or scars and owners were asked to move the equids in a straight line to assess obvious signs of lameness. It should be noted that not all results of the welfare assessments are included in this paper because these results are part of a larger welfare project. Only the broader welfare metrics presented here were analyzed in relation to owner attitudes and beliefs. The full welfare assessment results for the Spanish/Portuguese and Mexican samples respectively can be found in (Haddy et al., 2021; Haddy, Rodrigues, Raw, Burden, & Proops, 2020).

Subsequently owners were verbally asked a set of seven base interview questions which focussed on their perceptions of and attitudes toward their equid alongside basic demographic information (Appendix C). Owners were asked whether they believed that their equid bonded with other equids and/or with humans and whether their equid spent time with other animals outside of work. They were also asked the open-ended questions “what does your working equid mean to you?” and “how would you describe the personality of your equid?” Answers to these open questions were copied verbatim. Demographic information collected included owner age, gender, occupation and whether their equid contributed a source of income (if so, additionally, whether this was the main source of household income). Throughout the interview, responses were audio recorded for later verification, transcription, and content analysis of qualitative data. The average duration of interviews was between 20 and 40 min.

Data was collected using a tablet with Open Data Kit (ODK) Collect, a free, open-source application for Android devices developed by the University of Washington, Department of Computer Science and Engineering (Hartung et al., 2010). ODK Collect allows the generation of forms containing the specific indicators and questions needed for an assessment. Researchers can custom-build the order of assessment sections and add links between related questions. Assessment results were available to download as Excel files.

**Content analysis**

Audio recordings were transcribed and content analysis used to identify common themes and consensus relating to owner perception of their equids. Answers to the open question “What does your working equid mean to you?” were analyzed using directed content analysis, with utility/instrumental (hereafter referred to as instrumental) and affective perspectives as a guide for coding (Hsieh & Shannon, 2005). Answers were separated into instrumental and affective perspectives according to the language used by the owner, with additional subthemes identified. In an iterative process, themes were discussed between authors and refined accordingly. References to the equids working or economic role such as “good worker,” “working tool” or “a way to have money” were coded as instrumental. References to an emotional connection between the owner and the equid such as “companion,” “friend,” “member of the family” were coded as affective. Owners who used both affective and instrumental content in their answers were coded as affective, as their answers displayed a level of emotional connection toward their equid despite also seeing them in terms of their working role. Those who did not use language enabling differentiation between perspectives were excluded from the analysis (N = 8, participants from Mexico and Portugal).
**Statistical analysis**

The data were not normally distributed as assessed by a Kolmogorov–Smirnov test so non-parametric Mann Whitney U tests were used to assess differences in the welfare markers general health status and body condition score based on the owner attitude variables owner perspective (affective or instrumental) and belief that equids feel emotion. Chi-square tests (with Bonferroni correction for multiple tests) were used to test for differences in the welfare markers lameness and social contact based on the owner attitude variables belief that equids feel pain and belief in equid capacity for forming social bonds. For analyses according to whether owners believed that their equid felt emotions and pain, “not sure” and “no” answers were grouped together. For analyses of social contact, both free interaction with other animals and visual contact with other animals were grouped together as social contact. To determine whether belief in animal emotions, belief in animal pain and instrumental/affective perspectives represent related measures of the same underlying concept, a series of exact McNemar tests were performed. Analyses were performed using SPSS version 26.0 (IBM Corporation 2019).

**Results**

**Qualitative results**

In line with the motivational determinants hypothesized by Serpell (2004) owners displayed two main attitudes toward their working equids. At one end of a scale were owners who talked about their equid purely as a working tool (instrumental) and at the other end were those who described a strong emotional connection to their animals (affective). For anonymization, participants are referred to by their participant number (P). Affective owners frequently referred to their animals as friends “she has been with me a long time, she is my friend” P339 or as family “like a family member” P138. Twenty-three (6%) participants specifically used the word “companion” or “company” in response to being asked what their equid meant to them “For me he is a companion” P361. Other participants commented that they gain pleasure from keeping an equid or that the equid means a lot to them. Comments such as “I look after her with love and tenderness” P342 make apparent the emotional connection between owner and equid.

In contrast, instrumental owners referred to their equid in a utilitarian capacity, often describing them in terms of being an instrument, “It is a working tool” P85. Eighty-six (23%) participants used forms of the word “work” in their answers which demonstrates the primary significance of the equid to owners in terms of its role. Some participants likened their equid directly to machinery “It is my tractor so it is important” P333. Others described that having their equid meant they had to do less labor themselves “I work with the donkeys to avoid physical effort.” P317 and some referred directly to the income generated by their animal “my main source of earning” P140. It was clear that many participants relied heavily on their equid for their livelihood “the only source of income for my family” P150, and some referred to the activities that having an equid (and the associated income that they produce) has enabled them to undertake “our children’s education is through this animal” P137.

**Quantitative results**

A total of 309 (82%) owners thought that their equid felt emotions, the remaining 69 (18%) did not believe that their equid felt emotions or were unsure. Overall, 347 (92%) owners thought that their equid felt pain, the remaining 31 (8%) did not or were unsure. In Pakistan, a ceiling effect was found, whereby 100% of owners reported that they thought their equids felt both emotions and pain. Due to this ceiling, for analyses comparing aspects of welfare with owner belief in equid emotions or pain, the sample from Pakistan is excluded. More owners showed an instrumental perspective of their equids (N = 221 (60%)) than an affective perspective (N = 149 (40%). See Table 1 for a breakdown of
these responses by country. Comparisons of participants’ beliefs in animal emotion, animal pain and affective versus instrumental perspectives revealed significant differences between participant responses to these questions indicating that these three beliefs are independent and do not reflect the same (or a highly related) underlying concept (Emotion/Pain: \( x^2 = (1, N = 378) = 21.31, p < .001 \); Emotion/Perspective: \( x^2 = (1, N = 370) = 126.25, p < .001 \); Pain/Perspective: \( x^2 = (1, N = 370) = 173.40, p < .001 \).  

**General health status**  
The general health status of the assessed equids was deemed to be poor in 58 (15%) animals, fair in 139 (37%) animals and good in 181 (48%) animals (Table 1).

*Sentience:* The general health status of equids whose owners believed that their equid felt emotions was significantly better than the health status of equids whose owners did not believe they felt emotions (Emotions: Mdn = 3. No Emotions: Mdn = 2; \( U = 6687, p < .001 \) (Figure 1a). When analyzed individually by country (Figure 1b), in Egypt (Emotions: Mdn = 2. No Emotions: Mdn = 2; \( U = 219, p = .009 \)), Senegal (Emotions: Mdn = 2. No Emotions: Mdn = 2; \( U = 279, p < .001 \)), and Spain/Portugal (Emotions: Mdn = 2. No Emotions: Mdn = 1.5; \( U = 104.5, p = .006 \) better equid health status was seen in equids whose owners believed in equid emotions compared to those who did not, whereas there was no difference in health status based on owner belief in equid emotions in Mexico (Emotions: Mdn = 3. No Emotions: Mdn = 2; \( U = 822.5, p = .25 \)).

*Owner Perspective:* Equids whose owners showed an affective perspective also had significantly better general health status than equids whose owners showed an instrumental perspective (Affective: Mdn = 3. Instrumental: Mdn = 2; \( U = 12910.5, p < .001 \) (Figure 1c). When analyzed individually by country (Figure 1d), in Egypt (Affective: Mdn = 3. Instrumental: Mdn = 2; \( U = 228, p < .001 \)) and Senegal (Affective: Mdn = 3. Instrumental: Mdn = 2; \( U = 325, p = .005 \)) better equid health status was seen in equids whose owners had an affective perspective compared to those who had an instrumental perspective, whereas there was no difference in health status based on owner perspective in Mexico (Affective: Mdn = 3. Instrumental: Mdn = 3; \( U = 1647.5, p = .557 \)), Pakistan (Affective: Mdn = 3. Instrumental: Mdn = 3; \( U = 255, p = .117 \)) and Spain/Portugal (Affective: Mdn = 2. Instrumental: Mdn = 2; \( U = 362.5, p = .734 \)).

**Body condition score**  
In the body condition assessment, 31 equids (8%) were very thin/poor, 152 (40%) were thin/moderate, 141 (37%) were ideal, 37 (10%) were fat and 17 (5%) were very fat/obese, with animals in this latter category found only in Spain/Portugal (Table 1).

*Sentience:* Equids whose owners thought they could feel emotions had a significantly higher body condition score than equids whose owners thought they couldn’t feel emotions (Emotions: Mdn = 3. No Emotions: Mdn = 2; \( U = 8506.5, p = .005 \) (Figure 2a). When analyzed individually by country (Figure 2b), in Egypt (Emotions: Mdn = 2. No Emotions: Mdn = 2; \( U = 207.5, p = .005 \)) and Senegal (Emotions: Mdn = 2. No Emotions: Mdn = 2; \( U = 413, p = .04 \)) equids whose owners thought they could feel emotions had higher body condition scores than equids whose owners thought they could

| Table 1. Summary of owner attitudes and beliefs and equid welfare scores across countries. |
|----------------------------------|----------|----------|----------|----------|----------|
| **Owner Attitude and Belief Measures** (percentage of owners) | Egypt | Mexico | Pakistan | Portugal/Spain | Senegal | Average |
| Affective Perspective | 32% | 49% | 23% | 59% | 33% | 40% |
| Belief in Emotions | 77% | 84% | 100% | 87% | 61% | 82% |
| Belief in Pain | 89% | 93% | 100% | 82% | 94% | 92% |
| **Equid Welfare Scores** (Mean ± SD) | | | | | | |
| General Health Status | 2.05 (±.76) | 2.56 (±.63) | 2.42 (±.80) | 2.21 (±.58) | 2.20 (±.78) | 2.23 (±.73) |
| Body Condition Score | 2.25 (±.77) | 2.71 (±.70) | 2.13 (±.59) | 3.81 (±.94) | 2.20 (±.68) | 2.62 (±.93) |
There was no difference in body condition score based on owner’s belief in equid emotions in Mexico (Emotions: Mdn = 3. No Emotions: Mdn = 3; U = 911, p = .70) and Spain/Portugal (Emotions: Mdn = 4. No Emotions: Mdn = 4; U = 191, p = .58).

Owner Perspective: The body condition score of equids whose owners showed an affective perspective was also higher compared to equids whose owners showed an instrumental perspective (Affective: Mdn = 3. Instrumental: Mdn = 2; U = 11473.5, p < .001) (Figure 2c). When analyzed individually by country (Figure 2d), in Egypt (Affective: Mdn = 3. Instrumental: Mdn = 2; U = 261, p = .002), Senegal (Affective: Mdn = 3. Instrumental: Mdn = 2; U = 336, p = .007) and Spain/Portugal (Affective: Mdn = 4. Instrumental: Mdn = 3; U = 246, p = .02) body condition scores were higher for equids whose owners showed an affective perspective compared to an instrumental perspective. In Mexico (Affective: Mdn = 3. Instrumental: Mdn = 3; U = 1665, p = .66) and Pakistan (Affective: Mdn = 2. Instrumental: Mdn = 2; U = 330, p = .90) body condition score did not vary based on owner perspective.

Lameness
Across the equids sampled, 65 (17%) equids assessed were lame, with 3 animals unable to be assessed for lameness due to situational constraints. Significantly more lame animals belonged to owners who did not believe that equids felt pain than to owners who felt their equids could feel pain (x^2 = (1, N = 375) = 10.78, p = .001). There was no significant difference in lameness between equids whose owners showed an instrumental versus affective perspective (x^2 = (2, N = 370) = 2.04, p = .36). Due to the small sample sizes of lame animals in most countries, country-level analyses were not viable.
A total of 250 (66%) owners believed that their equids formed bonds with other animals, 126 (34%) believed that their equid either did not form any type of social bonds or bonded only with humans. Equids whose owners believed that their equid formed bonds with other animals had significantly more social contact with other animals ($\chi^2 (1, N = 374) = 47.66, p < .001$).

**Discussion**

Despite the important role of culture in influencing attitudes toward animals, research conducted across multiple cultures is rare (Sinclair et al., 2022). These results offer a first insight into the link between owner attitudes and equid welfare, and how these relationships compare across countries and their represented cultures. Overall, the general health status and body condition scores were significantly better for equids who belonged to affective owners versus instrumental owners, and owners who believed their equids could feel emotions compared to those whose owners did not. However, when analyzed by country, these relationships were inconsistent. Equids who belonged to owners who believed that they could feel pain were significantly less likely to be lame. Equids who belonged to owners who believed that they formed bonds with other animals were also significantly more likely to experience social contact with other equids.

Equids whose owners believed that their animal felt emotions were in significantly better health status and body condition than those whose owners did not. Viewing an animal as emotional is a mechanism by which owners attribute “personhood” to their pets (Fox, 2006). Some participants attributed emotions to their equids, describing them to be “happy” for a variety of reasons, one also commented that following the loss of their stable companion one equid had been grieving. Owners of domestic equids in the UK commonly attribute both primary and secondary emotions such as
jealousy and pride to their equid (Morris, Doe, & Godsell, 2008). In response to being asked whether they thought their equid felt emotions, two participants commented that “apart from the soul, donkeys are like us” P349, others said “like people” P338. This increased identification with the equids may increase emotional connection between owners and equids and in turn explain the improved welfare status seen. Higher levels of empathy and pain recognition in equid owners has been associated with better animal welfare, with one study demonstrating that owner empathy explained over 60% of the variance in horses’ welfare (Luna, Vásquez, Yáñez, & Tadich, 2018). It has also been suggested that owner empathy may play a bigger role in influencing welfare-related decisions than owner socio-economic status (Lanas, Luna, & Tadich, 2018). It is possible that higher empathy levels lead to a stronger emotional bond (Hemsworth, Coleman, Hemsworth, & Coleman, 2011) and consequently a greater desire for good welfare.

In this study, owners who thought that their equid felt pain were also less likely to have a lame animal than those owners who did not think equids felt pain. Links have been demonstrated between the ability to recognize pain in animals and the use of practices to minimize it (Huxley & Whay, 2006). This suggests that owners who believe in their equids capacity to feel pain may be less likely to leave their equids in pain, with lameness being a visually obvious and relatable indicator of discomfort. Higher pain recognition in owners has been linked to better welfare in equids with the suggestion that improving owner perception of pain in horses is a potential strategy to improve working horse welfare (Luna, Vásquez, Yáñez, & Tadich, 2018).

One potential explanation for the results seen is simply that if owners do not believe that their animal has the capability to feel emotions and/or pain then there is no perceived need to protect them from suffering. There is however another possible theory, that of cognitive dissonance. Cognitive dissonance theory addresses the scenario in which an individual holds contradicting beliefs or acts in a way that is inconsistent with an internally held belief. This awareness of mutually incompatible thoughts creates an aversive state which requires resolution (Festinger, 1957). However, resolution can take various forms, one of which is dissociation. This is typified in the “meat paradox” (Loughnan, Haslam, & Bastian, 2010), whereby an individual may dissociate meat from its living animal origin to avoid the uncomfortable experience of cognitive dissonance brought on by the fact they don’t want to cause pain to animals and yet they eat meat (Kunst & Hohle, 2016). Cognitive dissonance may be particularly relevant to the relationship between owner attitudes and animal welfare. The majority of working equids are found in LMIC’s (Burn, Dennison, & Whay, 2010) and are used by some of the poorest, most marginalized members of the world’s society (Stringer, 2014). The lack of resources available to these owners has been cited as a likely cause of many of the welfare problems commonly seen in working equid populations (Pritchard, Lindberg, Main, & Whay, 2005). If an owner held the belief that their equid could feel pain and yet had no resources available to prevent their animal suffering (for example by providing treatment, resting the animal or providing better fitting working equipment), the conditions would exist for the creation of cognitive dissonance. Similar to meat eaters, denial of their animal’s ability to feel pain would reduce this unpleasant state and account for the results seen. Within the parameters of the current study, it was impossible to discern whether reduction of cognitive dissonance or a genuine lack of knowledge about animal sentience is affecting owner beliefs. Both are plausible hypotheses, although running educational initiatives for owners aiming to improve their knowledge and recognition of animal sentience would potentially be a more effective future strategy if a lack of knowledge was the primary barrier to behavior change. Thus, assessment of targeted support to facilitate behavior changes would be a valuable next step.

The two main perspectives that owners held (instrumental and affective) were seen in owners across all countries. Owners with an affective perspective had equids with significantly higher body condition scores and a better general health status than those with an instrumental perspective. In respect to body condition, “affective” owners are expected to have more of an emotional attachment to their equid and it is generally perceived that equids enjoy receiving food: “he is asking for food all the time!” P326. This may increase the propensity of feeding in “affective” owners; with “treating”
behavior seen in companion animal owners who are emotionally attached to their pets (Downes, Devitt, Downes, & More, 2017). It is also possible that the equids of “instrumental” owners were used more frequently for working. “Instrumental” owners may also intentionally keep their equids in a leaner body condition as they may believe this maximizes their productivity (pers. comm.). In the context of the Spanish/Portuguese study population, where the mean BCS was 3.81 (overweight), owners with an affective perspective may present a welfare challenge, however in most working equid populations being underweight is a far more common welfare problem (Burn, Dennison, & Whay, 2010). Similarly, the level of emotional attachment between “affective” owners and their equids suggests that “affective” owners may not wish to see their equid suffering from the effects of poor health. Some participants expressed worry and distress at the thought of their equid falling ill, “It is like my children, when it got ill I couldn’t sleep” P155.

The relative consistency of the link between welfare metrics and the three key owner measures of perspective, belief in equid emotions and pain may have suggested that these three measures are proxies of the same underlying concept however, interestingly, our results showed that these three measures are independent and do not reflect the same (or a highly related) underlying concept. It would therefore be of interest to explore in more depth how beliefs in animal sentience and affective attitudes to animals interact to influence animal welfare.

Equids whose owners believed that they formed social bonds with other animals had significantly more social contact with other equids than equids whose owners did not. It is impossible to determine whether owner belief in social bonding defined the level of social contact available to equids or whether, as a result of having seen their equids exposure to conspecifics, owners were able to observe social behaviors in their animals which formed the basis for their opinion on social bonding. Regardless, social contact in equids is important for welfare, with provision of social contact being strongly recommended in the UK Code of Practice for Welfare (DEFRA, 2017). Social deprivation is described as one of the most serious stressors in horses, being linked to the prevalence of stereotypical behavior (Cooper, McDonald, & Mills, 2000; Luescher, McKeown, & Halip, 1991). Horses are herd animals having evolved in harems presided over by a dominant male whereas donkeys evolved a flexible social structure that varies depending on resource availability (Linklater, 2000). In areas with plentiful food small herds of donkeys/asses form and in areas with limited resources, solitary individuals or small family units may be found (Burden & Thiemann, 2015). However, it has been shown that donkeys form strong social bonds on the basis of reciprocal social preference and recognition (Murray, Byrne, & D’Eath, 2013). These bonds are often so strong that the stress of the death of the other animal in a pair bond leads to the development of hyperlipemia, a potentially fatal condition (Burden & Thiemann, 2015). Donkeys show preference for forming social bonds with other donkeys (Proops, Burden, & Osthaus, 2012) but in the absence of their own species, equids will form bonds with other equid species. The keeping of multiple types of equids together was commonly seen in the study populations, as was the keeping of equids with other livestock species such as cattle and sheep. Social enrichment by providing contact with another equid could potentially be a method of improving welfare (although caution regarding aggression between entire stallions is needed) so further investigation of the link between owner belief in equid bond formation and level of social contact merits further investigation.

In instances where relationships were not seen between owner attitudes and welfare metrics, resource limitation may play a role. Limited resources in the form of cost, feeding constraints, or access to veterinary treatment may mean that affective owners and believers in animal sentience may not be able to provide for their animals as well as they would like to. This may be particularly pertinent in locations such as the brick kilns study population in Pakistan, as kilns may be located far away from access to veterinary treatment and where extremely long working days are routine. Stronger relationships were seen in those locations with a wider spread of welfare results (notably Egypt and Senegal). The higher incidences of poor welfare states documented in these countries could have resulted in the ability to demonstrate the relationships between welfare states and owner attitudes better than those countries with very
few animals on the poorer end of the welfare scale. As is the case with studies involving self-reported owner information there is the potential for response bias to have influenced the results, and these effects may have been stronger in some cultures than others. Although it was made clear that the research was independent, data collection was most often associated with or facilitated by equid welfare NGOs which may have increased the likelihood that owners gave answers that they felt would be positively received. Cultural differences in patterns of survey response are widely acknowledged and acquiescence response bias (overuse of the positive end of the scale or strong agreement “yay-saying” bias) (Kemmelmeier, 2016) is higher in societies which are high on family collectivism and uncertainty avoidance (Smith, 2004). In the case of this study, Pakistan showed a ceiling effect in owner response to both belief in equid emotions and pain. This could reflect a cultural acquiescence response bias because Pakistan is one of the highest scoring countries for culture-level acquiescent bias according to the estimate of social axioms bias (Smith, 2004). This explanation is further supported by the fact that, despite all owners reporting that they thought their animals felt emotions and pain, the Pakistan population had the lowest number of owners showing an affective perspective (a feature much more resistant to acquiescent bias due to the open questions used to assess perspective) and the lowest body condition scores. Differing levels of owner exposure to welfare initiatives is also a limiting factor with some data collected within NGO project areas, although, of these areas, Pakistan was the only location to show a ceiling effect.

The results highlight the importance of the owner-equid relationship and its implications for equid welfare. Working equids are utilized globally in a wide variety of countries and cultures which are likely to differ widely in their culturally related perspectives. Understanding the social and cultural norms of an area is vital, as these norms have a large impact on people’s attitudes toward many societal issues currently addressed by initiatives across NGO sectors (Sinclair & Phillips, 2017) including specifically the success of animal welfare NGO initiatives (Sinclair & Phillips, 2018). It is also acknowledged that sub-cultures vary even within one culture or country, and the samples presented here were not large enough to fully represent this diversity. Therefore, further research across more cultures and areas of the world would be valuable to determine whether the same relationships between levels of welfare and owner attitudes are seen in other areas with different religious, political, and ideological roots. However, it is also necessary to operationalize the findings of research to help determine the potential applicability of influencing owner attitudes as an avenue for welfare improvement across all areas in which equid welfare NGOs work.

**Conclusion**

The findings suggest that working equid welfare is linked to the attitudes and beliefs of equid owners within populations across countries. Equids whose owners believed that they felt emotions were in significantly better health and had higher body condition scores than those whose owners did not. Similarly, equids whose owners showed an emotional bond with them were in significantly better health and had higher body condition scores than those whose owners that focused on their equids’ utility. Equids of owners who believed that they felt pain were significantly less lame than those of owners who did not. Overall, these results highlight the importance of the relationship between owner and equid and the role that owner attitudes play in influencing equid welfare. Understanding owner beliefs and attitudes toward working equids and their underlying determinants may help to increase the efficacy of future welfare initiatives.

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Appendix

Appendix A. Behavioural Assessment Criteria

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>General attitude of the equid at a distance.</td>
<td>(1) At ease – Relaxed, calm and/or resting.</td>
</tr>
<tr>
<td>Assessor observes the equid from a distance of 3–5 meters before</td>
<td>(2) Alert – Actively interested in surroundings. Responsive to environmental stimuli. Ears moving,</td>
</tr>
<tr>
<td>approaching.</td>
<td>eyes open, movement to keep away flies.</td>
</tr>
<tr>
<td></td>
<td>(3) Apathetic – depressed and withdrawn. Lack of response to surroundings, head lowered, eyes may</td>
</tr>
<tr>
<td></td>
<td>be closed, lack of movement to keep away flies.</td>
</tr>
<tr>
<td></td>
<td>(4) Agitated – Aggressive and hyper-reactive to stimuli.</td>
</tr>
<tr>
<td>Response to observer approach</td>
<td>(1) Friendly – head turns toward the assessor.</td>
</tr>
<tr>
<td>Assessor approaches the equid’s head at an angle of 20° (rather than</td>
<td>(2) Does not move – no reaction to assessor presence.</td>
</tr>
<tr>
<td>directly in front of the equid). Assessor stops 30 cm from the equids</td>
<td>(3) Turns head away – moves head away from assessor.</td>
</tr>
<tr>
<td>head and records reaction at the time of stopping.</td>
<td>(4) Turns whole body away – moves entire body away from assessor.</td>
</tr>
<tr>
<td></td>
<td>(5) Aggressive – flattens ears, attempts to bite or kick assessor.</td>
</tr>
<tr>
<td>Response to walking down the side of the equid</td>
<td>(1) Positive – calm and stationary, ears rotate toward the assessor, maintains contact with</td>
</tr>
<tr>
<td>Assessor walks alongside the equid without touching it, from the head</td>
<td>assessor.</td>
</tr>
<tr>
<td>to the rear at a distance of 30 cm from the equid.</td>
<td>(2) Neutral – No reaction to the movement of the assessor.</td>
</tr>
<tr>
<td></td>
<td>(3) Negative – avoidance responses, ears flattened, attempts to flee, trying to bite or kick</td>
</tr>
<tr>
<td></td>
<td>assessor.</td>
</tr>
<tr>
<td>Tail tuck</td>
<td>(1) Absent – tail relaxed</td>
</tr>
<tr>
<td>Assessor records whether equid (donkeys and mules only) shows a tail</td>
<td>(2) Present – clamps or tucks tail in hindquarters</td>
</tr>
<tr>
<td>tuck response to assessor presence.</td>
<td></td>
</tr>
<tr>
<td>Head and neck position</td>
<td>(1) Head above withers</td>
</tr>
<tr>
<td>Assessor records the position of the equid’s head and neck.</td>
<td>(2) Head level with withers</td>
</tr>
<tr>
<td></td>
<td>(3) Head lower than withers</td>
</tr>
<tr>
<td>Ear position</td>
<td>(1) Both ears forwards</td>
</tr>
<tr>
<td>Assessor records the position of the equid’s ears.</td>
<td>(2) Both ears facing sideways</td>
</tr>
<tr>
<td></td>
<td>(3) Both ears backwards but not flattened</td>
</tr>
<tr>
<td></td>
<td>(4) Both ears flattened toward neck</td>
</tr>
<tr>
<td></td>
<td>(5) Combination – ears in different directions</td>
</tr>
<tr>
<td>Chin contact</td>
<td>(1) Accepts chin contact</td>
</tr>
<tr>
<td>Assessor raises a cupped hand toward the equid’s chin and if contact</td>
<td>(2) Avoids chin contact</td>
</tr>
<tr>
<td>is accepted, touches the chin.</td>
<td></td>
</tr>
<tr>
<td>Movement of the equid’s tail</td>
<td>(1) Hanging still</td>
</tr>
<tr>
<td>Assessor records tail movement</td>
<td>(2) Swishing</td>
</tr>
<tr>
<td>Response to external stimuli</td>
<td>(1) Response to stimuli present</td>
</tr>
<tr>
<td>If assessor had observed response to environmental stimuli during</td>
<td>(2) Response to stimuli absent</td>
</tr>
<tr>
<td>assessment this was recorded, if not assessor clapped hands above head</td>
<td></td>
</tr>
<tr>
<td>and recorded the equid’s reaction.</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
Appendix B. Physical Assessment Criteria

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| **Signs of fear and distress present**  
Assessor recorded any other behavioral signs of distress or fear observed during the assessment. | (1) None  
(2) Showing the whites of the eyes  
(3) Unpredictable or sudden movements  
(4) Sudden startle responses when standing quietly – rapidly lifting the head  
(5) Aggressive behavior – ears flattened, attempts to bite and/or kick  
(6) Trembling  
(7) Head shyness – the equid avoids any contact with its head  
(8) Complete withdrawal |
| **Behavioural signs of insect nuisance**  
Assessor counts the number of behavioral signs of insect nuisance during one minute | (1) Number of behaviors observed – behaviors include head shaking, tail swishing, foot stamping & skin flickering. |
| **Point Count of flies**  
Assessor takes a point count of flies on one side of the equid, immediately after the behavioral observation of insect nuisance. | (1) Point count of flies |

### Harmful Practices
Assessor examines the equid for signs of harmful practices that may affect welfare

| (1) None  
(2) Signs of hot brand  
(3) Signs of firing  
(4) Signs of limb tethering or hobbling  
(5) Signs of amputations or mutilations including ears, tail, and nostrils  
(6) Signs of the use of live serreta (abrasive metallic pieces) or metallic chains in the noseband or chinstrap regions  
(7) Other |

### Body Condition Score
Assessor examines the equid by observation and touch to assess body fat and condition. No half measures were included

| (1) Very thin/Poor – ribs, spine and hips prominent, pelvis hollow  
(2) Thin/Moderate – ribs, spine and hips visible, pelvis flat  
(3) Ideal – spine just visible, pelvis slightly rounded  
(4) Fat – spine not visible, pelvis rounded  

### Indicators of the presence of endo or ecto-parasites
Assessor examines the equid’s skin and coat for signs of parasites.

| (1) No indicators  
(2) Signs of endo-parasites  
(3) Signs of ectoparasites – flies  
(4) Signs of ecto-parasites – midges  
(5) Signs of ecto-parasites – lice  
(6) Signs of ecto-parasites – ticks  
(7) Signs of ecto-parasites – other |
## Appendix C: Questionnaire

Name of the location?
Species?
Equid sex/gender?
Equid Age (approximately)?
What is the primary role of the equid?
How would you describe the personality of your equid?
Do you think that your equid feels emotions?
Do you think that your equid feels pain?
Do you think that your equid bonds with others? (equids, people, other non-equid animals)
Does your equid spend time with other animals outside of work?
What does your working equid mean to you?
Does working with this equine contribute a source of income?
Is this your main source of income?
Owner Gender?
Owner Age?
Owner Occupation?