



## Equine Research

## How owners determine if the social and behavioral needs of their horses are being met: Findings from an Australian online survey

Kirrilly Thompson<sup>a,\*</sup>, Larissa Clarkson<sup>b</sup><sup>a</sup> Central Queensland University, Appleton Institute, Wayville, South Australia 5034<sup>b</sup> Australian College of Applied Psychology, Melbourne, Victoria, Australia 3000

## ARTICLE INFO

## Article history:

Received 18 July 2018

Received in revised form

10 October 2018

Accepted 6 December 2018

Available online 21 December 2018

## Keywords:

horse  
welfare  
survey  
owner  
anthropomorphism  
decision-making

## ABSTRACT

Horse owners and carers are responsible for judging the health and welfare status of animals in their care, deciding if and when professional advice should be sought and following any recommendations for treatment. However, little is known about how horse owners perceive and determine the well-being of horses in their care, or the themes that inform their beliefs about the social and behavioural requirements of horses. In this article, we present findings of an online survey of horse owners in Australia to consider if horse owners and carers believe the horses in their care have their social and behavioural needs met, how they know, and what improvements they would like to see. Most participants believed that their horses had their social and behavioural needs met, mostly because they had company from another horse, lived in a paddock situation, and/or had contact with another horse. When discussing the improvements they would like to make, participants noted more company, increased paddock time and size, and more/improved training. The extended free-text responses suggest that four themes impact the beliefs and decision-making of horse owners/carers: work, outings, interaction, and nature. We discuss these in relation to the potential for anthropomorphism to have a positive impact on horses' well-being, when integrated into a sophisticated behaviour change and social marketing strategy that communicates the ways in which horses and humans are different and the ways in which they are alike.

© 2018 Elsevier Inc. All rights reserved.

## Introduction

For domestic horses, and many nondomestic populations, welfare and well-being are a direct outcome of human action and inaction. Horse owners and carers are responsible for judging the health and welfare status of animals in their care, deciding if and when professional advice should be sought and following any recommendations for treatment. An understanding of how horse owners and carers determine the health, welfare, and well-being of horses is essential for promoting horse health and welfare, specifically for identifying priority areas for improving horse welfare; barriers and enablers to human behavior change for horse welfare; and communication strategies to successfully engage horse owners in education and training interventions. For these reasons, researchers have sought to determine the validity of subjective

evaluations of horse welfare made by horse owners and carers, and understand more about information-seeking patterns and preferences (Visser et al., 2011), including decision-making processes. For example, McGowan et al. (2010b) found that owners of aging horses in Queensland, Australia were not always able to recognize the significance of clinical signs in their horses or solicit sufficient veterinary care. Despite such research, little is known about how horse owners perceive and determine the well-being of horses in their care, or the themes that inform their beliefs about the social and behavioral requirements of horses.

## Methods

Data presented in this study were derived from a standard online survey methodology. The Australian Horse Industry Council (AHIC) surveyed Australian horse owners across two data collection periods (the first from 8th December 2011 to 7th of March 2012, and the second from 12th November 2012 to the 6th February 2013). The survey was designed with advice from stakeholders and industry expert advisors engaged by the AHIC. It comprised 37

\* Address for reprint requests and correspondence: Kirrilly Thompson, PhD, Independent Research Consultant, PO Box 295, St Agnes, South Australia, Australia, 5097.

E-mail address: [Kirrilly.thompson@gmail.com](mailto:Kirrilly.thompson@gmail.com) (K. Thompson).

questions, of which most were closed ended. As the sampling strategy was based on convenience, a sample size calculation was not conducted before data collection. Invitations to participate were disseminated online through the web sites, newsletters, and Facebook pages of the AHIC and promoted by the Horse Federation of South Australia and shared by supportive individuals in a social media version of “snowball sampling” (Baltar and Brunet, 2012). The survey was delivered online using Survey Monkey® software ([www.surveymonkey.com](http://www.surveymonkey.com)). The same questions were used in both periods, with an additional open-ended question in the second, inviting suggestions for topics to be considered at the annual review of the Australian Horse Welfare Protocol (Australian Horse Industry Council, 2011). Participants who cared for more than one horse were instructed to self-select a horse that they considered most representative of a “typical” horse in their care. No other instructions were given to define “typical” or assist in selection of what we refer to below as a “survey horse.” The implications of this decision are discussed further below.

Elsewhere, we have presented the horse husbandry and preventive health practices of participants from this survey (Thompson et al., 2018b), (Data published include those on age, breed, sex and castration, primary use of the horse, permanent identification, registration with a horse organization, supervision, health problems, veterinary examinations, vaccinations, parasite control, hoof care, dental care, and retirement or withdrawal from usual activity). Thompson et al., 2017 had previously discussed results pertaining to shelter, social contact, exercise, watering, and supplementary feeding. In the present study, we consider how participants perceived and determined the well-being of horses in their care. The survey questions discussed in this study are (1) “Do you believe your horse has his social and behavioral needs met completely?” [five-point Likert scale, 475 responses] and (2) “Describe how your horse has his (sic) social and behavioral needs met and/or where you would like to make improvements? [unlimited free text, 441 and 127 responses].” For simplicity, we use the term “well-being” throughout this article to encompass social and behavioral needs, although we acknowledge that this is a necessary oversimplification of a complex, value-laden concept (Fraser et al., 1997) and a more ambiguous term than “welfare” (Hockenhuil and Whay, 2014; Popescu et al., 2014; Sandøe et al., 2003).

### Analysis

The Australian Horse Industry Council engaged the authors at the point of data analysis. Survey responses were provided in Microsoft Excel® (2013) spreadsheets. Data from the five-point Likert scale were analyzed descriptively using IBM SPSS Statistics V.19.

The open-ended questions allowed for unlimited free-text field. Each response was attributed to a category of relevance to the topics of the survey. Consistent with inductive coding approaches commonly used in qualitative data analysis (Green et al., 2007) and applied to other horse owner surveys (Thompson and Clarkson, 2016b), coding categories were developed post hoc by the first author. They were finalized in conjunction with the Survey Project Manager who had been involved in the project from its inception. After the coding categories were established, each open-ended data cell was coded. Three researchers with expertise in the Australian equine industry provided a system of crosschecks to identify and resolve any ambiguity in categories. Coding at multiple categories was permitted. Responses at codes were then subject to basic counts. As participants were not required to answer all questions in the survey, responses are reported as a proportion of responses.

## Results

### Participants

There were 505 surveys returned. Questions about participant demographics were limited to place of residence. In descending order, participants resided in Victoria (23%; 117/501), New South Wales (21%; 106/501), South Australia (18%; 92/501), Queensland (15%; 74/501), Western Australia (11%; 54/501), Australian Capital Territory (7%; 34/501), and Tasmania (5%; 24/501). Four participants (0.8%) did not specify their location.

Further information about participants can be inferred from the breed and application of their “survey horse,” as reported elsewhere (Thompson et al., 2017, 2018b). Participants selected from 59 pre-determined categories and “other” to describe the breed of their survey horse. Four breeds accounted for just more than half (56%; 281/505) of all horses: thoroughbred (24%; 123/505), the Australian stock horse (14%; 72/505), quarter horse (9%; 45/505), and warmblood (8%; 41/505).

Participants were selected from 90 options that best described the usage of their horse. Dressage (17%; 86/505) and pleasure (15%; 76/505; including “trail” use) were the most reported equestrian activities in the first survey period, whereas pleasure (11%; 56/505) and polocrosse (8%; 40/505) were the most reported activities in the second survey period. Participants who specified their horses were thoroughbred indicated that 5% (6/123) were used primarily for racing at the time of the survey.

### Belief that horse has social and behavioral needs met completely

A Likert scale was used to determine how strongly participants believed that their horse’s social and behavioral needs were met completely. A total of 475 participants provided responses. Almost all participants agreed (92%; 437/475). Specifically, 56% (266/475) strongly agreed, 36% (171/475) agreed, 6% (28/475) neither agreed nor disagreed, 2% (9/475) disagreed, and 0.2% (1/475) strongly disagreed.

Four hundred forty-one participants provided a response to the open-ended question about how they knew their horse had its social and behavioral needs met. The top three categories created from their reasons given to support a belief that participants’ horses had their social and behavioral needs met completely were 1) the provision of unmediated company with another horse (i.e., horses in shared accommodation) (59%; 260/441), living in a paddock (which in Australia usually refers to a space larger than a “yard”) (36%; 158/441) and having mediated contact with another horse (i.e., horses separated by fencing, etc., but may be able to touch one another) (24%; 105/441).

### Where participants would like to see improvements for the horses in their care?

One hundred twenty-seven participants provided responses to this open-ended question, that were coded for where they would like to see improvement made to benefit the horse in their care. The three most prevalent responses were categorized as follows: providing company/more company (70%; 89/127), spending more time in a paddock situation, and/or a larger paddock (17%; 21/127), or more/improved training (11%; 14/127). With regard to the top two responses, comments revealed that opportunities for socialization or being paddocked were sometimes not provided because of the perceived risk of physical harm from other horses.

### Themes informing participant beliefs

In addition to the categorical coding of free-text responses, we were able to identify four themes that appeared to influence what participants felt were “good” for horses: work, outings, interaction,

and nature. Although a thorough discourse analysis is beyond the scope of this study and more suited to data derived from interviews, we provide an overview of each theme below with an attention to the nuanced ways in which each appeared to inform the participants' beliefs about equine welfare and well-being.

### Work

A theme of work and training was seen to inform justifications for believing horses had behavioral and social needs met. For example,

"She is ridden a few days a week out of the paddock and gets taken to events when on." (320)

Work was seen as important to mental stimulation:

"they are worked 5/6 days per week in Polocrosse season which keeps them healthy and mentally stimulated" (307)

"Behaviorally he gets worked regularly so he doesn't go sour and we do different work outs so he doesn't get bored and play up" (169)

"enough work to keep her brain ticking over" (90)

Routine and consistency in work appeared to be important to participants:

"Regular and consistent training" (154)

"is worked daily" (267)

"every second day at a minimum she is ridden or handled to assist with her behavior and training" (337)

Some participants expressed a need to balance their horse's workload:

"Do not overwork her and have her is a training routine that specifically suits her" (102)

"Training is always adjusted for behavior for example horse does different work so as not to get bored" (436)

"Training is light and considerate and based on his ability and interests" (357)

Breaks from work were also taken into consideration:

"laying off after the polocrosse season and have time off work" (283)

"is worked mainly during winter and has a break in the summer" (278)

"Is given 4 week rest breaks after any periods of intense competition or work" (215)

### Outings

A theme of outings was also apparent in the open-ended comments. As with work, taking horses for outings in the form of rides or competitions was seen as important for their well-being. Some participants valued outings for their provision of stimulation to horses:

"been out to many shows and experienced lots of sights and sounds" (221)

"Horses then stimulated through competition that they also enjoy" (266)

"Exercised daily out of the home paddock, so they are exposed to outside stimuli" (303)

Outings and competitions were also valued for providing opportunities for conspecific social interactions:

"regularly socializes with other horses at pony club, on trail rides, when visiting neighbouring properties and going away to the stallion" (146)

"She might get floated [transported] out once every two months for a 'play date'" (447)

"He also regularly goes to competitions where he meets other horses as well" (91)

Similarly, some participants emphasized their attempts to maintain conspecific social interactions during outings:

"Always kept in groups; always allowed social interaction; travel to shows in pairs, train in pairs" (180)

"When travelling to competitions/training 2 or more horses" (314)

"Kept with other horses. Competes with other horses. Transported with other horses" (425)

### Interaction

Although company and contact ranked in the top three of responses to how participants knew their horse had its social and behavioral needs met and where they would like to see improvements, the free-text responses illustrated how interactions with humans were valued for horse well-being:

"He lives with and has social interaction with other horses and also has attention from me on a daily basis" (203)

"He also had plenty of socialization with humans, by doing small amount of trick training each day" (486)

Responses ranged from horses receiving attention from humans, to horses appearing to be incorporated into human culture:

"The horse is a well cared for pet and has earned his place as part of the family" (329)

"He is paddocked with other horses and lives in a herd like situation where I am the alpha of the herd (he is the second), I spend time with him in the paddock just socializing..." (409)

"He is fed every day, rugged when cold, given treats like bread, apples, etc. pats and in-depth conversations about nothing in particular. He has his friends—other horses, cats, us...he knows we love him." (142)

### Nature

Ideas of nature, being natural, and living naturally figured in participant comments as a theme legitimating the conditions under which horses are most likely to have their social and behavioral needs met. The concept of nature was deployed in various ways.

Nature was seen as a kind of template for determining horses' environmental needs:

"has natural environment..." (270)

"Believe horse's social needs are almost completely met by providing environment which closely approximates conditions of free-ranging feral horses" (163)

Nature was also deployed in relation to horses' behavioral needs:

"Horse is able to express almost all innate behaviors including choice of companion, grazing duration, free exercise, protection from elements" (163)

"he spends all day in a large paddock with other horses and is free to express natural behavior during that time" (177)

Freedom to behave according to a horse's nature also featured in participants' responses in ways which could be further related to a horse's psychological, emotional, or "mental" needs:

"he gets to be a horse" (318)

"I like to keep my horse in a herd in a large paddock where he can "be a horse" and interact with the others" (361)

However, some participants saw "nature" more critically, as a conceptual ideal:

"Able to live as naturally as possible..." (181)

"...Allowed to roam, exercise, graze as close as possible to natural behavior" (182)

"Living out in a large paddock with her herd, which consists of other mares and currently a foal. Keeping things as natural as I can make them" (481)

## Discussion

This study sought to determine how horse owners in Australia perceived and determined the well-being of horses in their care, where they saw opportunities for improvement, and what kinds of themes informed their beliefs about the social and behavioral requirements of horses. The finding that 92% of participants believed that their horse's social and behavioral needs were met is encouraging when taken at face value. However, a mixed-methods study comparing self-reports of horse signs of well-being (stereotypic and repetitive behaviors) to objective reports from a trained observer found that caretakers "clearly underestimate expression of bad-being in horses" (Lesimple and Hausberger, 2014). Further research using a similar mixed-methods model could determine the variance between subjective and objective evaluations of horse well-being according to a variety of indicators and across different sectors and activities, especially those peculiar to Australia such as campdrafting and polocrosse as well as horse ownership in regional, rural, and remote areas where access to veterinarians and participation in competitions is often subject to the tyranny of distance.

The top three reasons given for participant justifications of horse well-being were unmediated contact with another horse, paddock housing, and mediated contact with another horse (i.e., contact over a fence). This is consistent with the finding reported elsewhere that the most frequently specified form of accommodation for horses in this survey was in a paddock (Thompson et al., 2017). It is unclear, however, if participant use of the term "paddock" was associated with enough room for the horse to trot and canter at will, or if paddocks were assumed to be spaces with ample grazing.

In relation to the Five Freedoms framework for analyzing animal welfare (McCulloch, 2013), there is some alignment with participants' justifications for determining if their horses have their social and behavioral needs met—assuming that paddocking and company/contact are taken to provide freedom to express (most) natural behavior and that paddocking is taken to provide freedom from hunger or thirst as well as freedom from discomfort. However, the top three reasons do not seem to reflect freedom from pain, injury, or disease or freedom from fear and distress. Nonetheless, the absence of evidence for these concepts in an open-ended question cannot be taken to imply their unimportance to participants.

The top three improvements suggested by participants were (more) company, paddock housing, and horse training (the latter excluded human training). This may reflect the fact that most participants stated that they kept their horses in pairs or singly (Thompson et al., 2017). Again, conspecific socialization and less restrictive housing were emphasized, although training was

considered an area for improving the fulfillment of horse social and behavioral needs. As training involves human interaction, this may be revealing of the "work" theme identified in extended comments, although it may be related to nature, where natural horsemanship training is often valued by practitioners for approximating "natural" (and therefore more "ethical") interactions (Birke, 2007, 2008; Latimer and Birke, 2009). However, the impact of training on perceptions of horse well-being requires further determination. Given that some participants expressed concerns about injuries to horses from being in paddocks and/or with company, horse welfare may be improved through the dissemination of information about herd behavior and strategies to minimize these risks (Hartmann et al., 2009; Jørgensen and Bøe, 2007; Rivera et al., 2002), or alternatives for enriching the experiences of horses kept in stables or otherwise restricted spaces, and/or with limited opportunities to interact with conspecifics (Goodwin et al., 2002; Thorne et al., 2005).

As the four themes were inferred from a question to which not all participants responded, it would be disingenuous to present them quantitatively, comment on frequency, or make associations. However, there is one particular aspect of the four themes, which can be extrapolated for further conceptual discussion and practical application—the coexistence of a theme of nature with three other themes more relevant to human culture. As such, the thematic examples above of "work," "outings," and "interaction with humans" are anthropomorphic. Routinely defined as "the attribution of human characteristics to nonhumans," anthropomorphism is often considered erroneous, unscientific (Tyler, 2003), and/or a threat to animal welfare (Bradshaw and Casey, 2007), especially within behaviorism and ethology (Wynne, 2007). However, rather than being considered as the misguided assertion that nonhumans can be like humans, anthropomorphism should be taken as an acknowledgment of doubt that nonhumans cannot be like humans (Endenburg, 2000). That is, we don't know if a horse enjoys interacting with humans, going on outings, or socializing the same way humans do, but neither can we say that they do not.

Thinking that horses (like humans) need outings, work and interactions with humans to have their social and behavioral needs met might be considered anthropomorphic. Certainly, these themes hardly approximate what horses do in "nature," at least as it is usually understood as being devoid of humans (Eder, 1996). However, it is humans who are responsible for the social and behavioral well-being of domestic horses, and with whom horses co-create a shared interspecies existence (Birke and Thompson, 2018). Moreover, humans and horses share much in common, as encapsulated in Darwin's oft-cited comment that "the difference in mind between man and the higher animals, great as it is, is certainly one of degree and not of kind" (Darwin, 1871: 101). As mammals, humans and horses can be seen to experience the world through the same senses, albeit they may process and respond to stimuli differently. This has been demonstrated by (Shapiro 1997) in relation to a shared phenomenological basis behind relationships forming between humans and dogs. Furthermore, Lesimple and Hausberger, 2014 note that identification is crucial for "decoding" the internal mental state of animals.

Anthropomorphism can also add a moral imperative to human relationships with animals, whereby humans should do no harm, so long as animals are not held morally accountable for their actions (Waytz et al., 2010). Indeed, Tyler notes that anthropomorphism "shackles thought concerning the possible relationships between human and nonhuman animal beings" (Tyler, 2003: 267). Rather, anthropomorphism can be seen as a meaning-making tool that can motivate and strengthen interspecies relationships such as those between humans and horses (Waytz et al., 2010). It therefore seems somewhat short-sighted to judge instances of anthropomorphism as necessarily "wrong," "bad," or incongruent with animal welfare. As argued by Endenburg, anthropomorphism may play an important

role in the formation of the human-animal bond. So we need to (and probably most owners do) anthropomorphize; we probably have no other opportunity to form a bond. If this is true, the question is how to prevent denying the needs of companion animals while anthropomorphizing them. The denial of the needs of animals can easily happen as a consequence of attributing human emotion, thoughts, and behaviors to animals, knowing that we anthropomorphize them and consider the animals as it is (Endenburg, 2000: 44).

Although anthropomorphism has been associated with poor animal welfare outcomes (Serpell, 2002), conceptual perspectives linking anthropomorphism to interspecies relations, identification, and ethics suggest that it may be beneficial to improving animal welfare. Moreover, an uncritical rejection of anthropomorphism may result in the presentation of animals as nonsentient machines—a form of “mechanomorphism” (Karlsson, 2012). In fact, a totalitarian avoidance of anthropomorphism to an extreme such as mechanomorphism could lead to poor outcomes for equine welfare and well-being.

To prevent these unhelpful extremes, further research is required to determine exactly how anthropomorphism might be utilized to improve horse welfare and well-being, as has been found for improving dog adoption rates (Butterfield et al., 2012). Indeed, there may be a role for sophisticated education and communications interventions for horse owners and carers based around human-horse similarity and difference. This might translate to a “like us/unlike us” messaging strategy such as “like us, horses dislike being cold but unlike us, horses feel cold at much lower temperatures.” Messaging could operate through more abstract categories of similarity and difference, such as horses and humans being socially similar but physiologically different, and therefore having similar social needs (such as the ability to connect with and retreat from others) and different physiological or cognitive needs (such as a horse’s need to eat almost continually or a human’s need to rationalize behaviors and/or attribute intentions). These kinds of interventions should be carefully developed using participative design methodologies and subject to rigorous user testing to evaluate their relevance in the global horse economy as well as to local “value frameworks” (Heleski and Anthony, 2012). Such considerations are essential to avert unintended consequences, misinterpretations, or misapplications.

### Limitations

The quality of data reported in this study was compromised by the sample size. Our sample of 505 participants represents 0.13% of ~400,000 horse owners reported in Australia (Smyth and Dagley, 2015). This is modest compared to online survey samples of horse owners in Australia which are two (Thompson and Clarkson, 2016b) or six times (Smyth and Dagley, 2015) greater in size, although the present sample is more than three times the number of participants reported for surveys elsewhere (Carroll et al., 2016).

As the sampling strategy was nonrandom and participation was opt-in, the data are subject to selection biases. Data most likely reflect the views of those horse owners that are active in the online horse community; who engage with information disseminated by the AHIC and the Horse Federation of SA; and who have an interest in horse welfare, health, and husbandry; especially as owners who volunteer their time to complete a survey on horse health are in all likelihood already trying to provide the best health care for their horse (McGowan et al., 2010a). Indeed, analysis of findings from 930 responses to another survey of horse owners in Australia initiated by the AHIC found that “horse health, welfare, or biosecurity” issues had the most resonance with participants out of four broad topics (Thompson and Clarkson, 2016a).

Despite the anonymity provided by the online survey format, there may also have been a social desirability bias in effect whereby

participants tended to provide the responses they thought would be perceived most favorably by the researchers (Krumpal, 2013). In further research, self-report data could be triangulated with objective data on horse health, welfare, and well-being to determine levels of overestimation or underestimation by horse owners and carers in Australia.

A larger, single-period survey with ample demographic questions may have been more representative of horse owners and carers in Australia, enabling findings to be stratified by different kinds of participants (age, gender, generation of horse ownership, income, education) and types of participation in the horse sector (e.g., amateur, professional, racing, sport, competition, and leisure). Although resolving these sampling issues may provide a more comprehensive overview of horse owners in Australia, there is a concurrent need for further dedicated research detailing the beliefs, attitudes, knowledge, motivations, and justifications for horse owner and carer behaviors, attitudes, and beliefs. This is warranted given the changing nature of the equine economy, and worldwide variations in equestrian cultures (Adelman and Thompson, 2017). Qualitative research with samples much smaller than the present study would be most effective at eliciting these important sociocultural and psychological dimensions to horse owner practices (Christley and Perkins, 2010; Collins et al., 2012; Thompson and Adelman, 2013).

Data were also compromised by the wording and format of survey questions. Although the first question reported here involved a straightforward Likert scale, the inclusion of the word “completely” in the question may have overcomplicated participants’ choice of responses ranging from “strongly agree,” through “neither agree nor disagree” to “strongly disagree.” Pilot testing should be used in further surveys using alternative wording such as “does your horse have their social and behavioral needs met” with a Likert scale ranging from “always” through “not sure” to “never,” or from “fully” through “mostly” and “somewhat” to “not at all.” Separate questions for social needs and behavioral needs should also be considered, depending on the research aims and how well participants can be expected to discern between the two types of needs.

The second question reported in this study was double-barreled and free-text responses were unlimited. During coding, researcher interpretation was required to determine which aspects of the response were directed at which part of the question, if at all. A different proportion of responses may have been identified if the second question had been asked discretely. However, the range of responses would most likely be unaffected. Further survey research could take advantage of the reasons for determining a horse having its behavioral needs met identified here, with a yes/no format, to evaluate their spread across the horse owning population. The same could be conducted for assessing any improvements that could be made, with the addition of a question asking how likely it is that those changes will be made or what resources would be required. In a survey with hundreds of participants, much of the qualitative insight is lost through a process of aggregate coding required for effective data presentation. Open-ended questions should therefore be limited by text in future online surveys of this type. Alternatively, questions about the subjective decision-making processes, values, attitudes, and beliefs of people responsible for horses could be asked within an interview or focus group methodology with a smaller sample size consistent with qualitative approaches.

As noted elsewhere in relation to the broader survey (Thompson et al., 2018b), the concept of a “typical horse” for the purposes of completing this online survey may have reduced the sensitivity of the research tool where participants were responsible for the care of more than one horse (Thompson et al., 2018a). Where this was the case, responses to the closed-ended question may have been an aggregate, although the open-ended response fields should have allowed for the capture of greater variability in horse-keeping practices.

## Conclusion

This study provided important insight into how 505 horse owners in Australia perceived the well-being of horses in their care, how 441 horse owners made their determinations, and the improvements that 127 horse owners would like to see. Their extended responses yielded important insights that could be integrated into horse welfare initiatives and interventions. In particular, the identification of four themes across the responses prompts a reconsideration of anthropomorphism and what role it may play in supporting the health, welfare, and well-being of horses.

## Acknowledgments

The authors wish to thank the horse owners who generously participated in the online survey without which we would not have this insight into the perceptions and decision-making of horse owners and carers. The authors are grateful to the Australian Industry Horse Council and the Horse Federation of South Australia for the opportunity to analyze, report, and present these data. The authors wish to thank Julie Fiedler for her project management and Katherine Andrews for her valuable research assistance with earlier versions of the study. Findings were presented at the International Society for Equitation Science conference in Wagga Wagga, New South Wales, Australia in November 2017 and at the First International Conference on Human Behavior Change for Animal Welfare in Dorking, Surrey, UK in September 2016. The authors wish to thank the audience members for their comments on those occasions.

## Ethical considerations

The analysis and presentation of data was approved by the Central Queensland University Human Research and Ethics Committee. All data were handled in accordance with The National Statement on Ethical Conduct in Human Research (NHMRC, 2007).

## Conflict of interest

The authors declare no conflict of interest.

## References

Adelman, M., Thompson, K., 2017. *Equestrian Cultures in Global and Local Contexts*. Springer Press, Cham, Switzerland.

Australian Horse Industry Council, 2011. *Australian Horse Welfare Protocol*. Geelong, Victoria.

Baltar, F., Brunet, I., 2012. Social research 2.0: virtual snowball sampling method using Facebook. *Intern. Res.* 22, 57–74.

Birke, L., 2007. "Learning to speak horse": The culture of "natural horsemanship". *Soc. Anim.* 15, 217–239.

Birke, L., 2008. Talking about horses: Control and freedom in the world of "natural horsemanship". *Soc. Anim.* 16, 107–126.

Birke, L., Thompson, K., 2018. *Un)stable Relations: Horses, Humans and Social agency*. Routledge, New York, USA.

Bradshaw, J., Casey, R., 2007. Anthropomorphism and anthropocentrism as influences in the quality of life of companion animals. *Anim. Welf.* 16, 149–154.

Butterfield, M.E., Hill, S.E., Lord, C.G., 2012. Mangy mutt or furry friend? Anthropomorphism promotes animal welfare. *J. Exp. Soc. Psychol.* 48, 957–960.

Carroll, H., Bott, R., Mastellar, S., McNeill, L., Djira, G., 2016. Perceptions of equine well-being in South Dakota. *J. Anim. Sci.* 94, 24–25.

Christley, R., Perkins, E., 2010. Researching hard to reach areas of knowledge: Qualitative research in veterinary science. *Equine. Vet. J.* 42, 285–286.

Collins, J., More, S., Hanlon, A., Wall, P., McKenzie, K., Duggan, V., 2012. Use of qualitative methods to identify solutions to selected equine welfare problems in Ireland. *Vet. Rec.* 170, 442.

Darwin, C., 1871. *The Descent of Man and Selection in Relation to Sex*. John Murray, London.

Eder, K., 1996. *The Social Construction of Nature: A Sociology of Ecological Enlightenment*. Sage, London.

Endenburg, N., 2000. Changing roles of animals in society. In: Hellebrekers, L.J. (Ed.), *Animal Pain: A Practice-oriented Approach to an Effective Pain Control in Animals*. Van Der Wees uitgeverij, Utrecht, The Netherlands, pp. 39–50.

Fraser, D., Weary, D.M., Pajor, E.A., Milligan, B.N., 1997. A scientific conception of animal welfare that reflects ethical concerns. *Anim. Welf.* 6, 187–205.

Goodwin, D., Davidson, H., Harris, P., 2002. Foraging enrichment for stabled horses: effects on behavior and selection. *Equine. Vet. J.* 34, 686–691.

Green, J., Willis, K., Hughes, E., Small, R., Welch, N., Gibbs, L., Daly, J., 2007. Generating best evidence from qualitative research: the role of data analysis. *Aust. NZ J. Public Health* 31, 545–550.

Hartmann, E., Christensen, J.W., Keeling, L.J., 2009. Social interactions of unfamiliar horses during paired encounters: Effect of pre-exposure on aggression level and so risk of injury. *Appl. Anim. Behav. Sci.* 121, 214–221.

Heleski, C.R., Anthony, R., 2012. Science alone is not always enough: The importance of ethical assessment for a more comprehensive view of equine welfare. *J. Vet. Behav.: Clin. Appl. Res.* 7, 169–178.

Hockenull, J., Whay, H.R., 2014. A review of approaches to assessing equine welfare. *Equine Vet. Educ.* 26, 159–166.

Jørgensen, G.H.M., Bøe, K.E., 2007. A note on the effect of daily exercise and paddock size on the behavior of domestic horses (*Equus caballus*). *Appl. Anim. Behav. Sci.* 107, 166–173.

Karlsson, F., 2012. Critical Anthropomorphism and Animal Ethics. *J. Agric. Environ. Ethics* 25, 707–720.

Krumpal, I., 2013. Determinants of social desirability bias in sensitive surveys: a literature review. *Qual. Quant.* 47, 2025–2047.

Latimer, J., Birke, L., 2009. Natural relations: horses, knowledge and technology. *Sociol. Rev.* 57, 2–27.

Lesimpe, C., Hausberger, M., 2014. How accurate are we at assessing others' well-being? The example of welfare assessment in horses. *Front. Psychol.* 5, 21.

McCulloch, S.P., 2013. A critique of FAWC's five freedoms as a framework for the analysis of animal welfare. *J. Agric. Environ. Ethics.* 26, 959–975.

McGowan, T.W., Pinchbeck, G., Phillips, C.J.C., Perkins, N., Hodgson, D.R., McGowan, C.M., 2010a. A survey of aged horses in Queensland, Australia. Part 1: management and preventive health care. *Aust. Vet. J.* 88, 420–427.

McGowan, T.W., Pinchbeck, G., Phillips, C.J.C., Perkins, N., Hodgson, D.R., McGowan, C.M., 2010b. A survey of aged horses in Queensland, Australia. Part 2: clinical signs and owners' perceptions of health and welfare. *Aust. Vet. J.* 88, 465–471.

NHMRC, 2007. *National Statement on Ethical Conduct in Human Research*, in: National Health and Medical Research Council. Australian Government Canberra, Australia, Canberra.

Popescu, S., Diugan, E.A., Spinu, M., 2014. The interrelations of good welfare indicators assessed in working horses and their relationships with the type of work. *Res. Vet. Sci.* 96, 406–414.

Rivera, E., Benjamin, S., Nielsen, B., Shelle, J., Zanella, A., 2002. Behavioral and physiological responses of horses to initial training: the comparison between pastured versus stalled horses. *Appl. Anim. Behav. Sci.* 78, 235–252.

Sandøe, P., Christiansen, S.B., Appleby, M.C., 2003. Farm animal welfare: The interaction of ethical questions and animal welfare science. *Anim. Welf.* 12, 469–478.

Serpell, J.A., 2002. Anthropomorphism and anthropomorphic selection—beyond the "cute response". *Soc. Anim.* 10, 437–454.

Shapiro, K., 1997. A phenomenological approach to the study of nonhuman animals. In: Mitchell, R., Thompson, N., Miles, H. (Eds.), *Anthropomorphism, Anecdotes, and Animals*. SUNY Press, Albany, pp. 273–291.

Smyth, G., Dagley, K., 2015. Demographics of Australian horse owners: results from an internet-based survey. *Aust. Vet. J.* 93, 433–438.

Thompson, K., Adelman, M., 2013. Epilogue: A research agenda for putting gender through its paces. In: Adelman, M., Knijnik, J. (Eds.), *Gender and Equestrian Sport*. Springer, New York, pp. 195–211.

Thompson, K., Clarkson, L., 2016a. Issues faced by horse owners in Australia: Implications for vet-client communication. *Aust. Equine Vet.* 35, 41–47.

Thompson, K., Clarkson, L., 2016b. Views on equine-related research in Australia from the Australian equestrian community: perceived outputs and benefits. *Aust. Vet. J.* 94, 89–95.

Thompson, K., O'Dwyer, L., Bowen, H., Smith, B., 2018a. One dog, but which dog? How researchers guide participants to select dogs in surveys of human–dog relationships. *Anthrozoös* 31, 195–210.

Thompson, K.R., Clarkson, L., Riley, C.B., van den Berg, M., 2017. Horse-keeping practices in Australia: findings from a national online survey of horse owners. *Aust. Vet. J.* 95, 437–443.

Thompson, K.R., Clarkson, L., Riley, C.B., van den Berg, M., 2018b. Horse husbandry and preventive health practices in Australia: An online survey of horse guardians. *J. Appl. Welf. Sci.* 4, 1–15.

Thorne, J., Goodwin, D., Kennedy, M., Davidson, H., Harris, P., 2005. Foraging enrichment for individually housed horses: Practicality and effects on behavior. *Appl. Anim. Behav. Sci.* 94, 149–164.

Tyler, T., 2003. If horses had hands. *Soc. Anim.* 11, 267–281.

Visser, K., VanWijk, E., Kortstee, H., Versteegen, J., 2011. Passion for horses: Improving horse welfare communication through identifying information search patterns, knowledge levels, beliefs, and daily practices of horse enthusiasts. *J. Vet. Behav.: Clin. Appl. Res.* 6, 297.

Waytz, A., Morewedge, C.K., Epley, N., Monteleone, G., Gao, J.-H., Cacioppo, J.T., 2010. Making sense by making sentient: effectance motivation increases anthropomorphism. *J. Pers. Soc. Psychol.* 99, 410–435.

Wynne, C.D., 2007. What are animals? Why anthropomorphism is still not a scientific approach to behavior. *Comp. Cogn. Behav. Rev.* 2, 125–135.