

Contemplating the Five Domains model of animal welfare assessment: UK horse owner perceptions of equine well-being

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Abstract

Traditionally, assessment of animal welfare generally focused on physiological signs of health with less consideration of psychological well-being. More recently, the Five Domains model highlighted the concept of all aspects of an animal's life influencing their affective state. In equestrianism, however, there is a lack of awareness of the Five Domains model and, specifically, how different factors may affect the mental well-being of horses (*Equus caballus*). This divide between scientific research and lay horse owners could compromise equine welfare by failing to recognise horses as sentient beings with species-specific needs. The present study therefore aimed to explore how evidence-based information can be effectively communicated to equestrians ($n = 259$) through an online survey and whether increased knowledge of equine welfare needs has any impact on horse caregivers' assessment of their own horses' quality of life. Results showed that a simple educational infographic based on the Five Domains model had a significant impact on equestrians' assessment of equine welfare, although longitudinal, empirical studies are needed. Scores on a Likert scale for health, behaviour/human interactions and overall welfare were significantly lower following the intervention but scores for emotional well-being were significantly higher. This may suggest that, whilst the infographic increased participant awareness of the importance of emotional state and the factors affecting welfare, there were difficulties or inconsistencies in objectively assessing these emotions. This highlights the need for equine welfare science to be communicated more proactively to horse owners in an accessible, engaging format.

Keywords: animal welfare, behaviour change, Five Domains, mental state, owner perception, positive emotions

Introduction

Measuring animal welfare

It is generally reasoned that humans have a moral and legal obligation to meet the needs of the animals that they are responsible for (Cooke 2011) and that these animals should be kept in such a way that prevents unnecessary pain, distress or suffering, whether this be physical or psychological.

Animal welfare has commonly been measured using the 'Five Freedoms' as outcome indicators (Farm Animal Welfare Council [FAWC] 1979), which state that animals should have: Freedom from hunger and thirst; Freedom from discomfort; Freedom from pain, injury and disease; Freedom to act out normal behaviours; and Freedom from fear and distress. However, these Five Freedoms are only an attempt to describe welfare at a particular moment rather than on an ongoing basis (Webster 2016) and are considered to refer to avoiding the negative rather than promoting the positive (Mellor 2016).

The Animal Welfare Act (2006), as part of UK legislation, introduced five welfare needs, elaborating on the Five Freedoms by encouraging owners to not only avoid conditions that may result in suffering, but to take positive steps to

ensure that adequate care is provided. These are: the need for a suitable environment; the need for a suitable diet; the need to be able to exhibit normal behaviour patterns; the need to be housed with, or apart, from other animals; and the need to be protected from pain, suffering, injury and disease.

These five welfare needs are not necessarily adequate either, considering that 'suitable' and 'normal' can be subjective terms. Webster (2016) suggested that 'normal behaviour' should be taken to mean 'choice', incorporating the ability to behave naturally regarding making choices about diet, environment, social contact, comfort and security. Yet through domestication, this has arguably become an unrealistic concept where humans assume a certain level of control over animals, depriving them of choice in many situations.

The Five Domains Model Framework

Since the formation of the Animal Welfare Act (2006), welfare assessment frameworks have been elaborated to consider 'The Five Domains Model Framework', distinguishing between physical factors, eg nutrition, environment, health and behaviour, and mental factors that contribute towards an animal's welfare (Green & Mellor 2011).

Assessing mental state is crucial to improving welfare, with the possibility to experience positive emotions potentially marking the difference between an animal thriving or simply surviving (Hall *et al* 2018). Repeated positive emotional experiences subsequently lead to a state often referred to as ‘happiness’ with the overall objective of the Five Domains Model to promote positive experiences rather than merely minimising negative ones (Mellor 2015).

Webster (2016) argues that defining Quality of Life as the sum of positive and negative experiences can result in welfare assessment being subjective, with the concept of ‘a life worth living’ (FAWC 2009; Wathes 2010) based on human judgement, often influenced by individual level of sensitivity, rather than individual animal. Different experiences can also affect the welfare of an animal in varying ways depending upon their ethology, biology and level of resilience (Dawkins 2017) along with their species-specific needs and whether the presence or absence of a human is positive or negative (Mellor *et al* 2020). Therefore, welfare assessment must be specific to the individual and species concerned.

Human-horse relationship

Domestic horses are unique in that they can be both a companion animal and livestock, commonly used for sport, companionship and recreation but also for transportation and agricultural purposes, with their use differing considerably between developed and developing countries (Hemsworth *et al* 2015). Hall *et al* (2018) observed that assessing quality of life in horses has received less attention from researchers than the welfare of livestock and companion animals.

Domestic equids are often entirely dependent upon the human for their nutritional and social requirements yet are generally managed significantly differently to their evolutionary history (Rogers *et al* 2019), possibly due to tradition, a lack of owner education or misunderstanding. Arguably, domesticated species do not need to mirror the behaviour of their wild counterparts completely, yet they retain many behavioural similarities. As a social prey species, historically roaming over large territories, spending 16–20 h a day grazing, horses’ ethological needs still include locomotion, the ability to forage, and the company of their own species (Starling *et al* 2016).

With domestication, it has become difficult to accommodate many of the traits which previously ensured its survival, such as the horse’s innate flight response — resulting in a conflict of interest between horse and human, with owners frequently underestimating the magnitude of compromise (McBride & Mills 2012).

A horse’s flight response was adapted to keep it safe (Starling *et al* 2016) and therefore negative emotions such as fear are crucial for both survival and resilience (Spinka & Wemelsfelder 2011) but owners need help in understanding how to carefully manage emotional state. Challenges are natural and intrinsic, but the key is creating an environment that is stimulating whilst not overwhelming (Spinka & Wemelsfelder 2011), ensuring that negative emotions such as

fear are not intense or prolonged. The Five Domains model provides a useful framework to assess how humans impact upon the psychological well-being of the animals in their care (Webster 2016) and encourages discussion around the impact of each domain on mental state (McGreevy *et al* 2018).

Communicating welfare science to equestrians

Sub-optimal management is generally considered a significant adverse factor affecting equine welfare (Horseman *et al* 2016). A small survey of equine caregivers found that owners’ misunderstanding of equine needs could compromise horses’ basic well-being (Carroll *et al* 2016). Many owners and trainers still believe that stabling horses for 24 h a day, restricting forage and imposing social isolation is acceptable due to cultural norms and lack of scientific understanding (Rogers *et al* 2019).

Although there is a growing awareness that the ways in which horses are typically kept is sub-optimal, there is unfortunately still a definite divide between scientific evidence and lay horse owners (Wylie *et al* 2013). Many equestrians are not aware of scientific research, how it can affect or benefit them and how best to engage with it (Thompson & Haigh 2018), perhaps because science is not always communicated effectively or in a positive and informative way (Pickering & Hockenhull 2020).

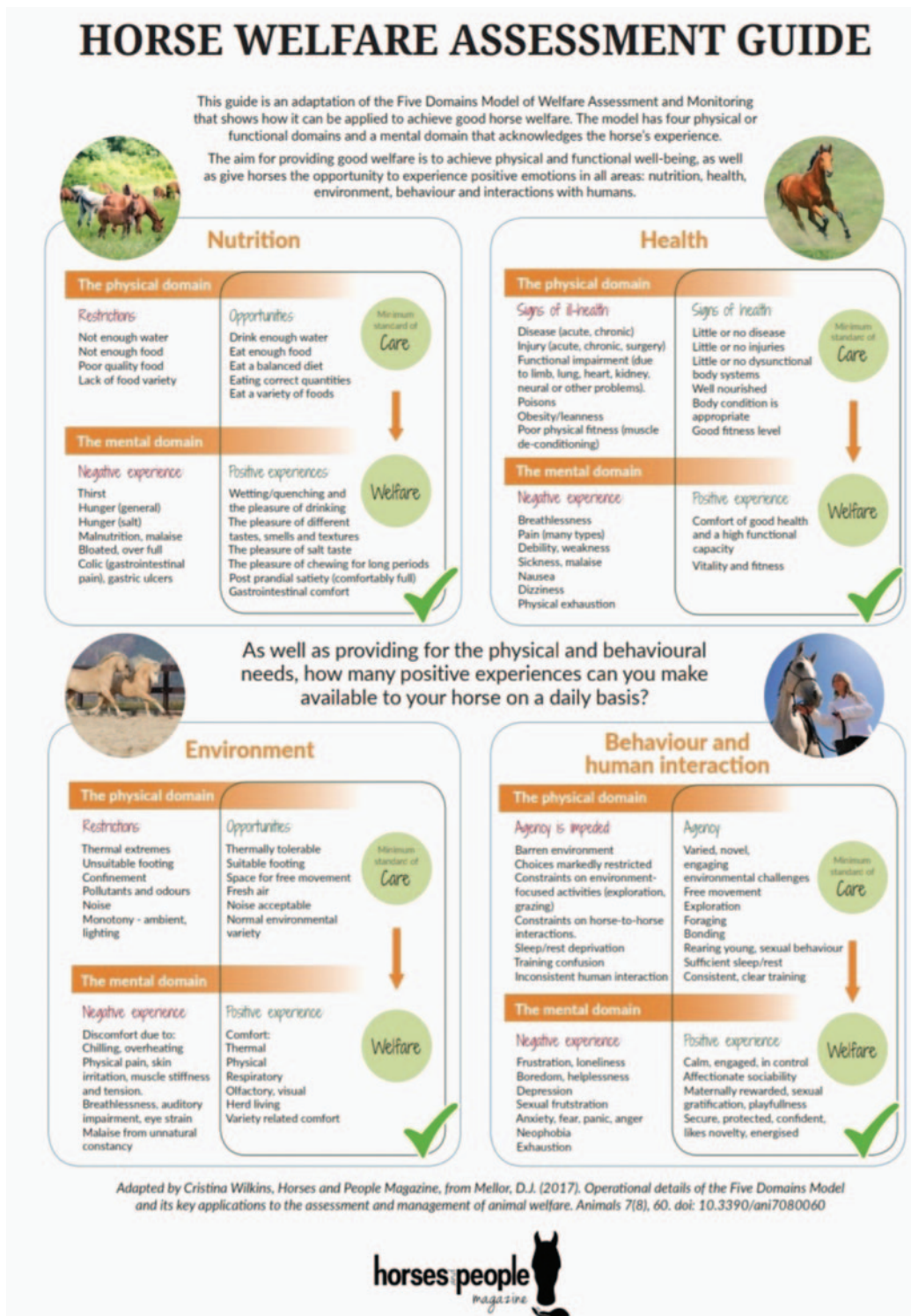
The International Society for Equitation Science (ISES), which promotes ethical equitation, has issued guidelines for improving management and training (Starling *et al* 2016), but these do not seem to have been successfully disseminated to the industry in a way that has been sufficiently understood or engaged with. Pickering and Hockenhull (2018) found that many equestrians were actively seeking evidence-based information but struggled with accessibility, leaving them more likely to use more easily accessible but less reliable sources. Owners can then lack the required knowledge to look after their horses, with factors such as an equid’s sensitivity to noise, touch and smell not often considered in either research, management or training (Rørvang *et al* 2020).

Equestrians tend to overestimate their knowledge and lack insight into their abilities (Marlin *et al* 2018), evidencing the Dunning-Kruger effect and raising serious welfare concerns for both horses and riders, suggesting that there is a deficit in equestrian training or education that needs to be addressed. This highlights the need for more extensive research into equestrians’ knowledge, attitudes and practices regarding equine welfare and well-being, to evaluate how they can be brought in line with the Five Domains model, where knowledge gaps lie and what barriers there are to meeting best practices (McGreevy *et al* 2018).

Promoting change within equestrianism

If the industry is unaware that a problem exists, then individuals will not be motivated to address it. The trans-theoretical model of human behavioural change views change as a process (DiClemente & Prochaska 1998) whereby people move from pre-contemplation, where they are unaware of an issue, to contemplation. They then make the decision to

Figure 1



Five Domains infographic used in study (reproduced with permission from C Wilkins, *Horses and People Magazine Australia*).

change and prepare to act. There is a clear need for proactivity within the scientific community and simple but effective resources to explore if improvements can be made in the relationship between horses and humans.

Consequently, the present study aimed to utilise a simple intervention in the form of a short educational message regarding

the Five Domains model of welfare assessment (Figure 1). The study assessed equestrians' perceptions of how well they meet the welfare needs of equids, specifically in relation to affective state, and whether the intervention impacted this.

Increasing understanding of the impact different situations have on mental state in their horses could then provide

Table 1 Demographics of UK participants by age range (years) and qualifications (n = 259).

	18–30	31–44	45–60	61+
Age of respondents (%)	20	34	33	12
	Academic Industry Both None			
Qualification type (%)	15	27	8	53

equestrians with crucial information about how well the individual is coping in their living environment and enable them to make better informed choices (McBride *et al* 2017). If using a simple educational intervention has a significant impact, then this could be a method disseminated with ease and at low cost to the wider equestrian community to encourage awareness and change in other areas where welfare improvement is required.

Materials and methods

Questionnaire

Ethics statement

Following institutional ethical approval by the Ethics and Research Group at University Centre Sparsholt (prior to data collection), a four-part questionnaire, comprising predominantly closed questions with multiple-choice answers and/or Likert scales and four free-text open questions, was distributed through a Google Forms link on social media. It was disseminated to a variety of cross-spectrum, multi-discipline, leisure-rider/owner Facebook groups, open to individuals worldwide available online for one month in July 2019. Convenience snowball sampling was used, with the ability for the survey to be actively shared on social media, with opt-in participation. Participation was voluntary and anonymous, with completion of the form considered as consent to take part in the study.

Demographics

Section one established demographics, including where participants were located, level of equine education (from a multiple-choice list including academic and industry qualifications), current management practices (chosen from specified categories including DIY livery, grass livery, full livery or at home, with the option of adding further detail in an open-text box) and knowledge of equine welfare needs (in a free-text open question). Participants were also asked how their horse(s) were currently managed in terms of access to forage, turn-out and company (chosen from specified categories including stabled or turn-out, individual or with company, with the option of adding further detail in an open-text box).

Welfare perceptions

Section two included closed questions on welfare perceptions and how well participants felt they currently met the needs of their own horses, including emotional well-being with a question regarding their assessment of the impor-

tance of horses experiencing positive emotions. A Likert scale of 0–10, with 0 being ‘not at all’ and 10 ‘all the time’, was used to determine how well participants felt that they met their horses’ welfare needs. These were broken down into each of the Five Domains: Nutrition; Environment; Health; Behaviour; and Emotional state with a separate question asking them to score their horse’s overall welfare.

Educational infographic

Section three incorporated a short intervention in the form of an educational info-graphic (Figure 1) about the Five Domains model of welfare assessment.

Post-intervention

Section four posed the same closed questions as section two regarding welfare perceptions to assess any impact of the infographic.

Methods of data analysis

Data from Google Forms were downloaded into a Microsoft® Excel spreadsheet. Any partially completed responses or duplications were not included. As the majority of data gathered were ordinal categorical data, thematic analysis and coding were used with categories developed *post hoc*. The frequency of each thematic category was calculated, as well as the total percentage of respondents’ answers for each question.

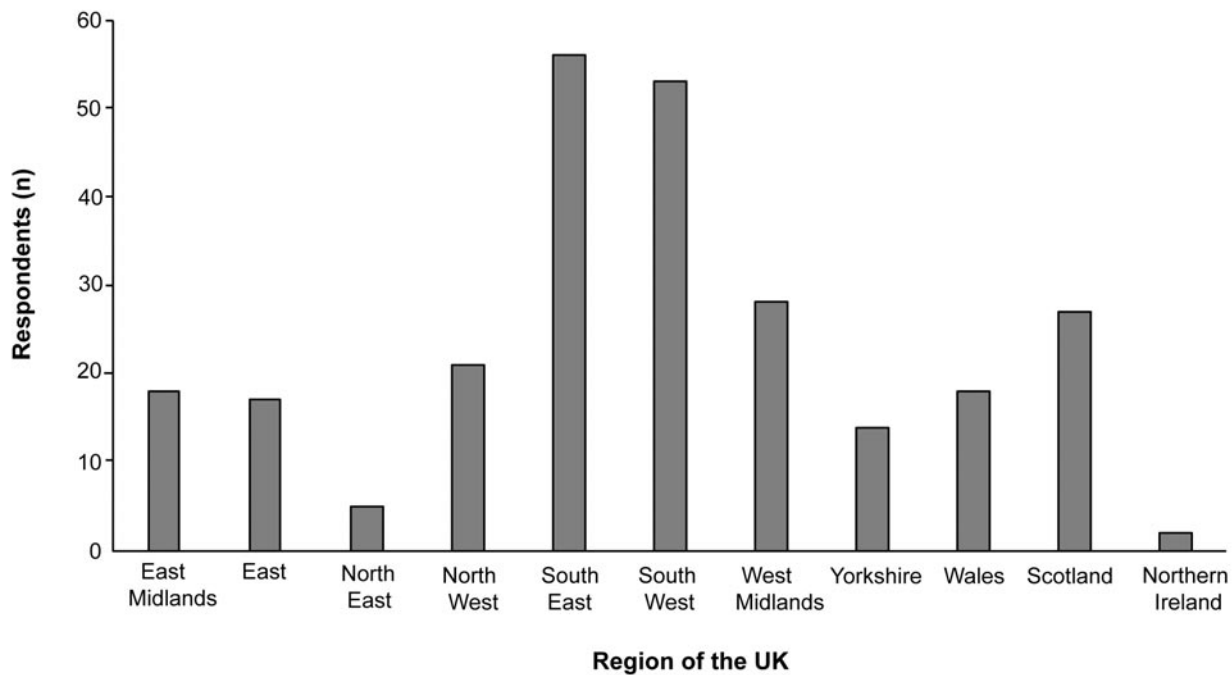
Scores and responses as codes were subject to basic counts. As the data were not continuous and not normally distributed, non-parametric tests were used for pre- versus post-intervention paired data, generated using Minitab 19 software using Wilcoxon signed-ranks tests. Differences between scores for multiple categories, such as each of the separate five domains and each separate qualification category, were identified using Friedman tests for equal sample sizes for total answers across each category and Kruskal-Wallis for unequal sizes for comparisons between demographics.

Results

Participant demographics

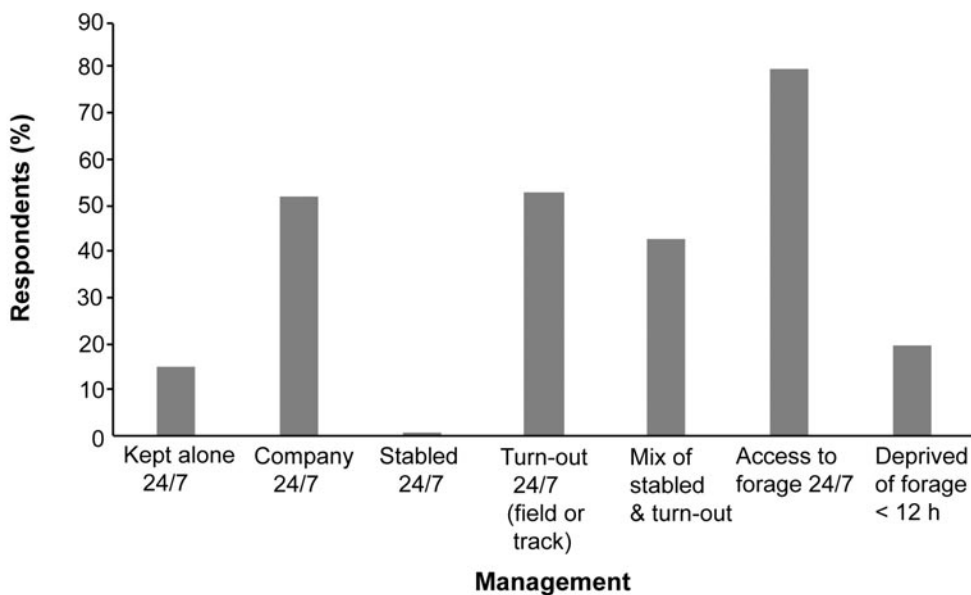
Of the 439 surveys returned, 438 generated useable results. Due to the demographic weighting of participants with 59% (259/438) being from the UK (Table 1) and very small numbers spread amongst other countries to allow for analysis of other country data, the current analysis focuses on UK respondents (with other respondents analysed in a further study) only resulting in a smaller sample (n = 259; mean [\pm SD] age: 43 [\pm 14.64] years), with 30% of respondents being from the southern counties (Figure 2). More than one-quarter (27%) of respondents had industry-related qualifications, 15% had academic qualifications, 8% had both and half (50%) had no formal equine-related qualifications (Table 1). There was no significant difference between qualifications and overall welfare scores. The majority of respondents (80%) gave their horses access to forage 24/7 and more than half (52%) kept their horses with another horse, although 15% kept their horse on its own 24/7 (Figure 3).

Figure 2



Geographical distribution of respondents.

Figure 3



Current horse management practices of UK participants (n = 259).

Assessment of the Five Domains

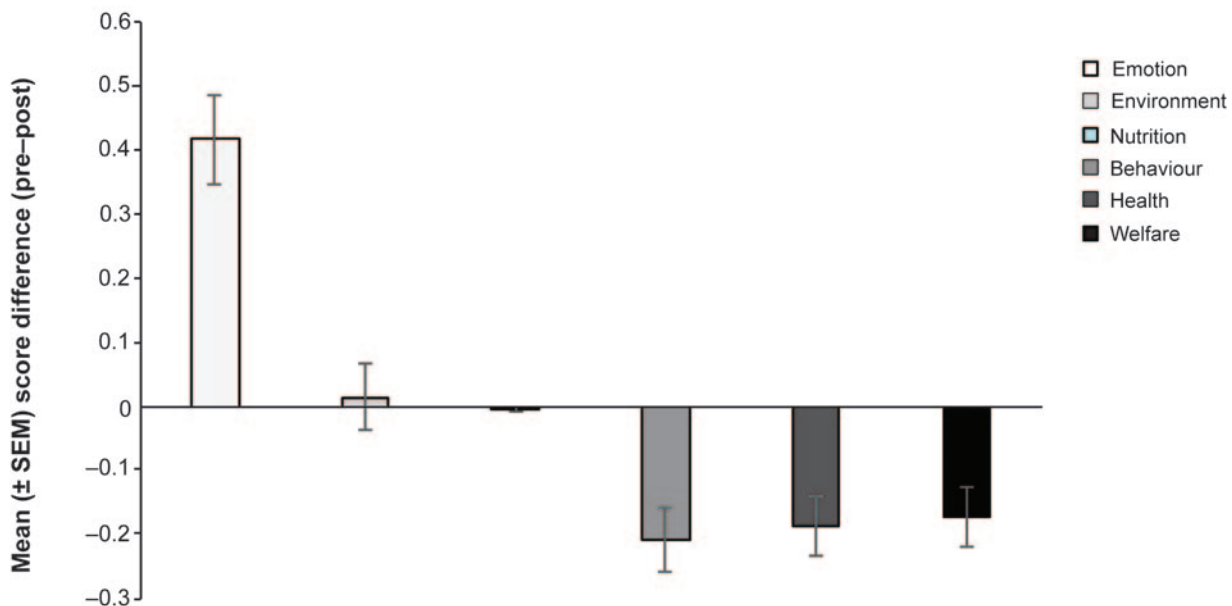
Respondents were asked how relevant they felt horses' ethological needs were to domestic horses, with 63% (164/259) answering that they felt they were very relevant (10/10 on a 0–10 linear scale, from 'not at all' to 'very') and 7% (18/259) scoring relevance as less than 6/10.

A Wilcoxon signed-ranks test found that there was a significantly lower welfare score post- compared to pre-interven-

tion (n = 259, $w = 33670.00$; $P < 0.001$) with the median being 9 before and 8.5 after.

There was no significant difference in scores for all categories between those stating they were aware of the Five Domains model prior to participating in the study and those that were not ($w = 8,292.50$; $P = 0.384$), despite 60% of respondents not being previously aware of the Five Domains model, although respondents were not asked

Figure 4



Mean differences in scores for each of the Five Domains and overall welfare assessment pre- and post-intervention, with a negative result showing a decrease in score after intervention.

Table 2 Variation in scores for each domain pre- and post-intervention (n = 259).

Domain	Mean (± SD)	Min	Median
Pre-intervention nutrition	9 (± 1.0418)	5	9
Post-intervention nutrition	9.0039 (± 1.062)	5	9
Pre-intervention health	9.2432 (± 0.8252)	6	9
Post-intervention health	9.0502 (± 0.9157)	5	9
Pre-intervention environment	8.6525 (± 1.2116)	4	9
Post-intervention environment	8.668 (± 1.1605)	5	9
Pre-intervention behaviour	8.9382 (± 1.0362)	5	9
Post-intervention behaviour	8.722 (± 1.0855)	5	9
Pre-intervention emotions	8.0502 (± 1.3926)	1	9
Post-intervention emotions	8.4942 (± 1.218)	1	9

whether they had heard of the Five Freedoms, which would have been an interesting comparison. There was also no significant difference in scores for all categories between those with equine-related academic qualifications, industry qualifications or no formal equine qualifications, for overall welfare (n = 256, df = 2; $P = 0.790$) or emotional state (n = 256, df = 2; $P = 0.154$).

There was a significant difference between scoring for different categories of the Five Domains (n = 259, df = 1; $P = 0.009$) pre-intervention, with scoring in the emotional category lower than in any other categories, but not for overall welfare score. There was a significant difference, pre-intervention, between scoring for emotions and overall

welfare (n = 259; $P < 0.001$), but no significant difference post-intervention (n = 259; $P = 0.369$), with emotional score significantly higher post-intervention (n = 259; $P < 0.001$). There was also a significant difference in assessment of behaviour/human interactions (n = 259; $P = 0.017$) and in health assessment (n = 259; $P = 0.018$) with both significantly lower post-intervention (Figure 4), but no significant difference in assessment of environment (n = 259; $P = 0.998$) or nutrition (n = 259; $P = 0.889$) (Table 2).

Equine emotional state

Participants were asked whether they felt horses experienced emotions and how important they felt it was for horses to experience positive emotions. The majority (98%; 255/259) agreed that horses could experience emotions.

Pre-intervention, there was a significant difference in scores of how often respondents felt their horses felt positive emotions and overall welfare score (n = 259; $P < 0.001$), with welfare scores higher. Post-intervention, there was no significant difference between emotional assessment and overall welfare score (n = 259; $P = 0.323$) as their overall welfare score had decreased in line with emotional assessment.

There was no significant difference in how important respondents felt it was for their horse to be able to experience positive emotions pre- or post-intervention (n = 259; $P = 0.902$).

Discussion

The results of this study help to determine equestrians' perceptions of what constitutes good or bad welfare, how they viewed the welfare of horses in their care, what factors influenced their beliefs about equine needs, and whether educating them on science-based welfare assessment protocol would influence these attitudes.

Demographics

While self-reporting surveys inherently incorporate a bias to those interested in the subject of the study, the extent of respondents from all levels of educational backgrounds and age ranges suggests a good representation from the equestrian industry, although gender breakdown was not reported. The lack of any significant difference between participants with equine-related academic qualifications, industry qualifications or no formal equine qualifications, could suggest that equine education is not teaching appropriate welfare awareness and identifying a need for this to be addressed.

There was a relatively even spread of ages between 18 and 75, although 67% of respondents were between 31 and 60 years of age, corresponding with the British Equestrian Trade Association's 2019 National Survey reporting a rise in numbers of horse riders between 25–44 years of age and with Pickering and Hockenhull (2020)'s study where participating horse owners showed a median of 26–45 years of age.

Assessment of welfare

Recent research outside the UK has found that understanding what factors influence emotional state can impact people's attitudes towards horses and their management or treatment (Hötzel *et al* 2019). A study by Lofgren *et al* (2020), which surveyed equestrians' perceptions of what constituted good welfare in a range of different descriptive scenarios, found that turn-out and the ability to express natural behaviour were listed as the most positive aspects, despite these factors being essentially the same and demonstrating a contrast between emotional aspects and welfare needs.

In agreement with such findings, the present study found that, pre-intervention, whilst most horse owners believe that horses can experience emotions, there was a level of uncertainty as to what situations would be most likely to affect such states. Post-intervention, frequency of how often they felt their horse experienced positive emotions was higher, bringing into question whether equestrians can accurately and objectively assess this despite an increased awareness of affective state.

Post-intervention, scores were much more varied, suggesting a level of uncertainty in assessing emotion may have been introduced. This highlights the need to develop robust, objective methods of measuring equine emotional state and for an increased level of behavioural analysis to be a component in judging equine welfare. It is also vital to take into consideration that differing equine temperaments and individual resilience levels may mean that horses under an identical management system may be experiencing different welfare states (Marchant-Forde 2015).

When respondents were first asked to assess how often they felt their horse experienced positive emotions and their score for overall welfare assessment, there was a significant difference. After the Five Domains intervention, when asked to score again, there was no significant difference between assessment of emotions and welfare, perhaps suggesting that pre-intervention, participants viewed mental state as less

significant to overall welfare. It could also be suggested that participants may have been unsure of the factors that might influence equine emotions whereas, post-intervention, emotional state was considered more significant to overall welfare and a better understanding of how each domain could affect psychological well-being may have been triggered.

Scores for behaviour and human interactions were significantly lower after the intervention, potentially suggesting an increased awareness of the need for consistency in training, enrichment and mental stimulation. It may also suggest that respondents had previously attributed more significance to their interpersonal interactions with their horse during the limited time they spent with them, rather than consideration of the remainder of the day. Horse owners and caregivers are only likely to spend a few hours of the day with the individuals they are responsible for (Hotchkiss *et al* 2007), yet the welfare of those horses should also be considered in their absence and the educational intervention seems to have influenced respondents' consideration of these aspects.

Post-intervention scores for equine health were lower, which may have been due to respondents now considering factors such as the need for movement or the impact of psychological well-being on overall health despite scores for emotions being significantly higher after the infographic intervention. Respondents seemed to consider their horses' emotions more, but it is unclear as to their definitions of positive emotional states and indicators of good welfare. Exploring this in greater detail is beyond the scope of this study, but certainly warrants further investigation.

The study only assessed any change in attitudes immediately after the intervention and did not ask how likely participants were to make active, concerted efforts to change behaviour following the study, what those changes might be or what would prevent them making changes. Longitudinal and empirical studies to assess knowledge and behaviour several weeks or months after the intervention would therefore be beneficial in evaluating its effectiveness.

Owner interpretation

Having separate questions for health, nutrition, behavioural and environmental needs relied on participants having the ability to differentiate between the different types of needs, assuming that they would be aware of the emotional state of their horses and be able to accurately identify signs of poor mental health in their horses.

Whilst owners demonstrate concern for their horse's welfare, many fail to recognise the clinical signs that indicate compromised health (Rioja-Lang *et al* 2020) or negative emotions (Lesimple & Hausberger 2014; Busby *et al* 2017).

Over-exposure to abnormal behaviour can also hinder caregivers' ability to identify poor well-being (Rogers *et al* 2019). If owners do not recognise that there is a problem, then they may not be motivated to address it, with many owners still believing that if a horse is performing well, its welfare must also be good (Heleski & Anthony 2012) and thinking that welfare is not compromised until a horse is physically suffering from grave neglect and malnutrition.

Behaviour is a diagnostic tool that is sometimes ignored or misinterpreted. The main challenge to improving equine welfare and recognising poor psychological well-being is developing a proper understanding of the Five Domains and other welfare assessment frameworks such as, in the UK, the five welfare needs outlined in the Animal Welfare Act (2006) and what these mean, both for welfare and enforcement (N de Brauwere, personal communication 2019). If welfare organisations produce materials that reflect the Five Domains and if people involved in enforcement of equine welfare legislation are upskilled, this could encourage awareness and enable the model to be developed into a tool for evidence-based welfare assessment to potentially develop legislation in the UK and other countries.

Practical application

Whilst the older concept of the Five Freedoms is more widely known internationally (Mellor 2016), in equestrian society there is a lack of awareness of, and compliance with, the Five Domains (McGreevy *et al* 2018) and in the present study the majority (60%) of participants were not aware of the Five Domains. Whilst familiarising equestrians with the Five Domains model will not necessarily lead to change, without evidence of the problem, there is little understanding of how it affects horses and why change is required.

Many equestrians are resistant to change due to concerns over human and horse safety. Uncertainty often provokes them to return to the familiar, even if, with new knowledge, they are aware it is no longer the best approach (Randle *et al* 2017). However, owners express an interest for practical information on implementing welfare improvement measures (Pickering & Hockenull 2020) and, when provided with measures to improve management, many owners will attempt to apply these suggestions (van Dierendonck & Moons 2018).

Often, attitudes towards welfare are based on the ability of the species to feel emotion (Cornish *et al* 2018), despite sentience remaining a misunderstood and indeterminate concept by both scientists and lay people. Increasing understanding of animal emotions can develop a sense of moral obligation that can lead to human behavioural change and encourage incremental improvements in the treatment of animals within their care (Cornish *et al* 2018).

Evaluating the harms and benefits in relation to the use of horses by humans using a systematic approach is crucial (McGreevy *et al* 2018), with routine assessment helping with early diagnosis of compromised welfare. Communicating the Five Domains model to horse owners may be one way of motivating them to routinely assess welfare and, where necessary, change their management practices to help their horses achieve physical and mental homeostasis (Hötzel *et al* 2019). However, the model still relies on the human's ability to evaluate the impact of different experiences or situations and generic terms such as 'distress' require clarification (Mellor 2015).

Whilst the Animal Welfare Act (2006) makes it an offence for animals to be subjected to unnecessary suffering

(including mental suffering), there is no definition of, or objective way of measuring, mental suffering. Furthermore, the legislation only applies to the UK, where extremely limited resources within Local Authorities, Police and the Royal Society for the Prevention of Cruelty to Animals (RSPCA) mean that enforcement of the Act is difficult.

Prosecutions are rare for forensic cases of animal suffering where physical signs are limited or non-existent and Ledger and Mellor (2018) called for the courts to modify their reliance on clinical evidence. They instead suggested that the Five Domains model be utilised to assess animal welfare in a forensic capacity, with experts evaluating negative subjective experiences as part of their assessment, in line with recognition of animals' sentience. This method has been used with some success in Canadian courts to highlight the connections between physiological and functional health and behaviour and the associated negative affective experiences in animals which have experienced neglect, cruelty or abuse.

Whilst the topic of equine welfare is often associated with enforcement and can be controversial (Hockenull & Whay 2014), it should be the foundation of all care and use. The Five Domain Model has been incorporated into the New Zealand Thoroughbred Racing Welfare Assessment Guidelines and workshops on these new guidelines have generated interest from equine welfare organisations globally, which may help to drive further equine welfare initiatives, elsewhere (Mellor & Burns 2020). Updating and implementing welfare assessments challenge accepted practices, encourage awareness, and invite debates about welfare (Heleski & Anthony 2012).

The Five Domains model focuses fundamentally on the external circumstances which impact upon internal states, both physical and mental, either positively or negatively, to enhance or compromise welfare (Mellor 2017). An understanding of how physiological and psychological health interact is seen as crucial to ensuring good animal welfare and the results of this study suggest that owners can be guided through simple and accessible interventions to reach this understanding.

The Five Domains can then be used as a guide by both owners and professionals for monitoring all aspects of a horses' well-being with increased ease, accuracy and regularity. This could then help to shift the baseline of what is normal and acceptable by taking practical steps to minimise negative experiences and promote positive ones, a move that is vital in meeting our ethical obligation to improve the welfare of sentient animals in our care.

Animal welfare implications

This original research project found that many horse owners struggle to assess their horse's welfare objectively as potentially unscientific measurements are used, and that they also fail to understand the importance of meeting an animal's needs for positive psychological health. This study evidences the need for improved communication of scien-

tific concepts to the equestrian industry and for the development of an objective method of measuring equine emotional state. This could result in increased social responsibility towards equine welfare and sentience, subsequently improving the welfare of horses.

Conclusion

This study has provided a valuable insight into how equine owners and caregivers currently assess equine welfare and their perceptions of equine emotional state. Knowledge of the Five Domains model, imparted through a simple, accessible infographic, can go some way towards impacting these views by encouraging consideration of the ability of horses to experience positive and negative emotions as a result of situational factors. This could significantly affect welfare assessment, although the study acknowledges the limitations surrounding practical application and dissemination of such resources. Lasting behavioural change could be hindered by other factors outside the control of many equestrians, such as livery restrictions and resistance to new ideas, and these factors must be addressed through further research into identifying individual motivations and how opportunities for welfare improvement can be made more readily available. Additionally, development of an objective method of assessing equine emotional state is vital if horses whose lives might presently be dominated by negative affective states are to be given the chance to experience more positive emotions and enjoy meaningful lives.

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