

## A scoping review of the current literature exploring the nature of the horse-human relationship

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## ABSTRACT

**Objective:** To perform a scoping review of the current evidence on the horse-human relationship.

**Background:** The horse-human relationship has a significant impact on how horse owners care for and make decisions for their horse.

**Evidentiary value:** Identification of consensus and gaps in current evidence.

**Methods:** A literature search was performed in CAB Abstracts and Medline using search terms relating to the nature of the horse-human relationship in horses used for pleasure riding. Publications were reviewed against inclusion and exclusion criteria. Original qualitative or observational research studies relating to the relationship between a horse and owner were analysed. Data were extracted on study method and population characteristics.

**Results:** There were 4,481 studies identified; 27 studies were included in the final data extraction. The studies covered 11 different areas, the most frequent were effect of humans on equine behaviour (5/27), equine training methods and behaviour (4/27) and horses within sport and leisure (4/27). A range of methodologies were used, with the most frequent being thematic analysis (6/27 studies), use of an instrument, tool or scale (3/27) and behavioural scoring (4/27). The majority of studies considered the human's perspective (20/27), six considered the horse perspective and one considered both the horse and human perspective. No studies investigated the same or similar aims or objectives.

**Conclusion:** The current evidence on the horse-human relationship is diverse and heterogenous, which limits the strength of evidence for any particular area.

**Application:** Future research should focus on developing reliable and repeatable tools to assess owner motivations and horse-human relationship, to develop a body of evidence.

## INTRODUCTION

From its first domestication over 6,000 years ago, the horse – *Equus ferus caballus* – has evolved from its primary role as working animal into additional roles as much-loved and reliable companions (Endenburg et al., 1999). The evolution of their use has in turn influenced not only the way we interact with horses today, but also the relationships that are formed between horses and humans (Hausberger et al., 2008). Consequently, it

is important to gain an understanding of horse-human relationships in today's environment, and how these relationships influence decisions made at key stages within a horse's life.

There are currently around 100 million working equids (horses, donkeys and mules) across the world, predominantly located in poorer or developing countries, where they have a major role in rural economies and the lives of the families and communities that depend on them (World Horse Welfare, 2019). In the UK, the role of the horse is, however, very different. A recent survey carried out by The British Equestrian Trade Association (2019) found that there are around 847,000 horses, and 374,000 horse-owning households in Britain. It has also been reported that 96% of UK horse owners ride for pleasure and 53% of these have horses whose main role is for leisure riding and hacking, which represents a major change from a utility-based role, to a companion-based role important in sport and leisure (Dashper, 2014).

A review carried out by Hausberger et al. (2008) explored the various areas of the horse-human relationship which included tools to assess horses' relation to humans, exploration of the bond between a foal and a human, and matching of the horse and rider. This is only a single review and there are no comprehensive peer-reviewed studies of the topic. Performing a scoping review to describe the current research available on the horse-human relationship may be beneficial prior to performing systematic reviews. It would enable us to identify and categorise which aspects of the horse-human relationship have previously been explored, and identify where there are existing bodies of evidence or current gaps in knowledge and research. For this study, the definition of 'relationship' described by Hinde (1979) was used: 'the emerging bond from a series of interactions: partners have, on the basis of the past experiences, and expectations on the other individual's responses'.

A scoping review is similar to a systematic review and follows many of the methodological steps. The review type provides a preliminary evaluation of the size and scope of available literature in order to gauge the nature and extent of research evidence (Grant and Booth, 2009). Arksey and O'Malley (2005) described the motivations as to why a scoping review may be performed which included: to investigate the range, extent and type of research activity; to determine the value of performing a full systematic review; to summarise and distribute findings or to identify gaps in the existing literature. The aim of this scoping review is to investigate and categorise the current published literature regarding the nature of the horse-human relationship in horses used for pleasure riding.

## METHODS & MATERIALS

### *Protocol and registration*

This review has not been registered to an existing protocol. This scoping review was conducted using the methodological framework presented by Arksey and O'Malley (2005) and the results are presented using the PRISMA extension for scoping reviews (Tricco et al., 2018).

This project was reviewed and approved by the Ethics Committee, School of Veterinary Medicine and Science, University of Nottingham.

### Eligibility criteria

To be eligible for the review, papers needed to investigate the relationship, bond or interactions between horse and human for horses used for pleasure. Papers were included if they reported on original research studies, and the full text of the paper was available and published in English. The study focused on the literature around pleasure horses, and therefore studies on animal-assisted therapy, working equids, and horses used for agricultural purposes were excluded (Table 1).

| Inclusion  | Exclusion  |
|--|--|
| Full text available  | Non-English publications   |
| Original research  | Single cases/essays  |
| Qualitative or observational studies with methodology capturing a two-way relationship between horse and human | Reviews  |
|  | Studies of use of equids for animal-assisted therapy <sup>1</sup>  |
|  | Studies of working equids in developing countries <sup>2</sup>   |
|  | Studies of equids for agricultural use <sup>3</sup>  |
|  | Experimental/quasi-experimental studies which did not investigate the horse-owner relationship using an owner/carer in the study design <sup>4</sup> |

Table 1: Inclusion and exclusion criteria used to perform a scoping review of current publications exploring the horse-human relationship.

For the purposes of this study, the following definitions were used for the exclusion criteria:

<sup>1</sup>Studies of use of equids for animal-assisted therapy: defined as a study, or person or people having intermittent access to an animal with the aim of improving specific physical, mental or social functioning.

<sup>2</sup>Studies of working equids in developing countries: defined as studies of working equids in any countries listed by the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) eligible for Official Development Assistance, 2017 data (ODA list).

<sup>3</sup>Studies of equids for agricultural use: defined as equids that provide support to farmers in developing countries for example carrying feed and water for livestock and connecting farmers to cooperatives and markets (Brooke, 2015).

<sup>4</sup>Experimental/quasi-experimental studies: experimental studies defined as studies which compare different treatments, where the researcher controls treatments using a randomised controlled study or control groups. Quasi-experimental studies defined as those that compare different treatments where the treatments are not randomised or are not controlled by the researcher (e.g. comparing responses pre and post-treatment in same patient).

### *Information sources and search strategy*

A literature search was performed on 13.11.17 and updated on 11.04.19 using CAB Abstracts (1910–present) and Medline (1946–present), which have been reported as the two key databases for veterinary literature (Grindlay et al., 2012). The following search terms were used: human, person, people, individual, horse, equine, equid, equus, equi, relationship, bond, interaction. All references were downloaded and managed in Endnote reference manager (Endnote X8.0.1).

### *Selection of sources of evidence*

Any duplicate papers were removed and the titles were reviewed by the primary researcher (H. Clough). Publications were retained if the titles contained terms relating to the horse-human relationship. Any titles that were ambiguous were retained for abstract review. Abstracts were reviewed and retained if they related to studies of factors associated with the horse-human relationship and the search terms described above. Any studies identified during the abstract review that did not have the full text available were excluded. Any abstracts that were ambiguous were retained for full text review. The full text of included publications were then reviewed against inclusion and exclusion criteria (Table 1) by two researchers (H. Clough and S. Freeman) to agree the final included studies (Figure 1).

### *Data charting process and data items*

The included publications were analysed to generate data extraction tables for the methods and population characteristics of each of the publications. Data extracted for study methods were: title; author; study methodology; aims; measures; and key outcomes as self-reported by the authors. Data extracted on study populations were: author and date; location; study participants; population size; and study perspective. The study perspective was established by identifying the study population and objectives.

No additional analysis was conducted. Methodological quality or risk of bias of included studies was not appraised, consistent with guidance on scoping review conduct (Arksey and O'Malley, 2005; Tricco et al., 2018).

## RESULTS

### *Selection of sources of evidence*

A total number of 5018 studies were found on the initial database searches. There were 132 papers included after the abstract check, however only 112 of these had the full text available (Figure 1). From these 112 full text publications, 85 studies were excluded from final analysis as they did not meet the final inclusion criteria (Table 1); the excluded studies were 33 reviews (two of which were systematic reviews), 14 studies of animal-assisted therapies, six studies of working equids, 28 experimental or quasi-experimental studies and four studies which did not investigate the horse-human relationship (Figure 1). There were 27 papers which met the final inclusion criteria and were therefore analysed and data presented in extraction tables comparing study, method and population characteristics.

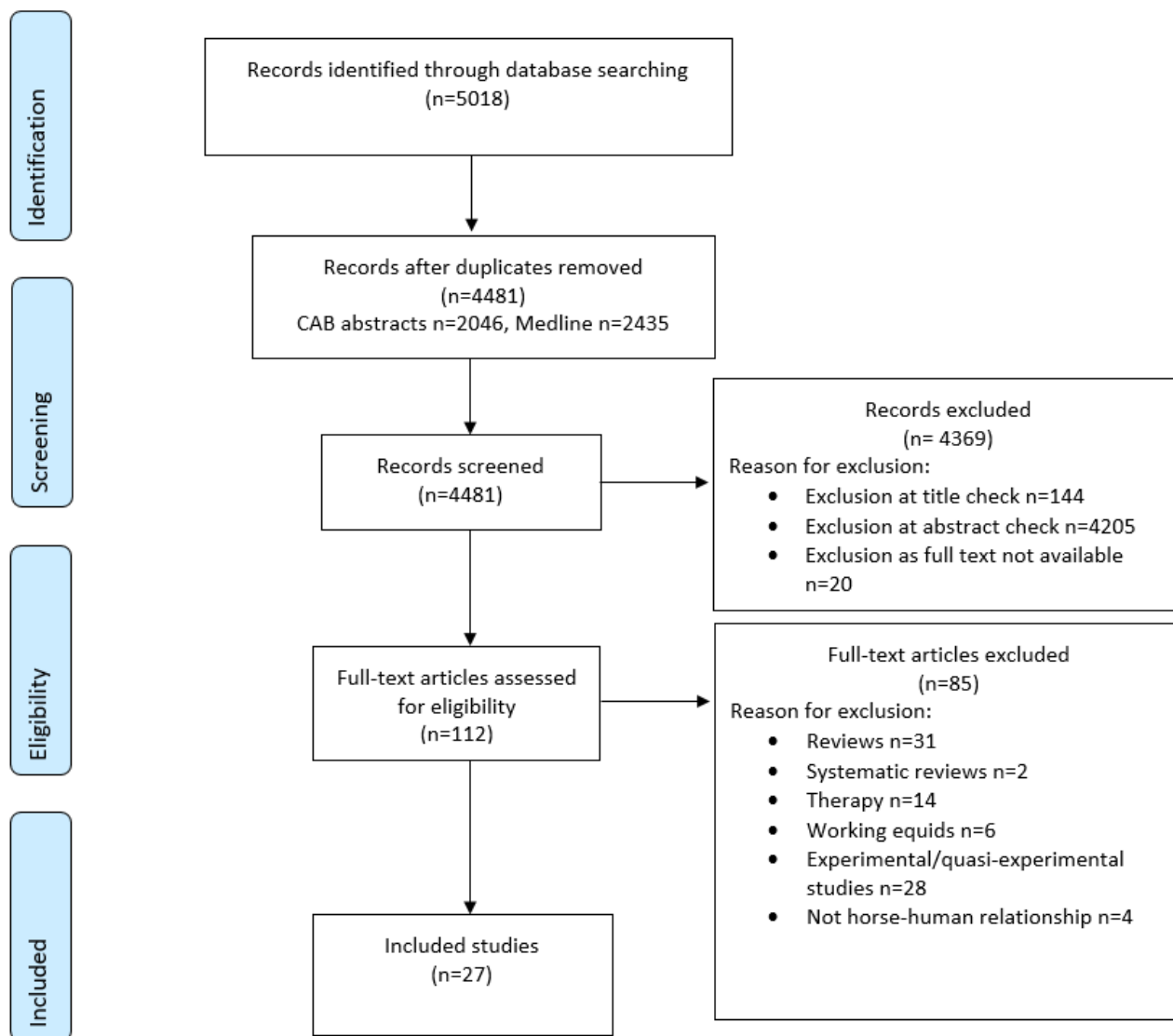


Figure 1: PRISMA flow diagram demonstrating the process used for a scoping review on the current literature exploring the horse-human relationship and how the final 27 included studies were identified.

From: Moher et al., The PRISMA Group (2009).

### Characteristics of source of evidence

The data regarding the study methodology for each of the 27 included studies are presented in Table 2. A range of different study methods were used, including questionnaires (n=11), behavioural observational studies (n=7), focus groups (n=1), ethnographic studies (n=5), interviews (n=2) and mixed methods (n=1).

The measures used in the studies included: thematic analysis (n=7); instrument, tool or scale (n=4); behavioural scoring (n=4); mixed measures (n=3); open and closed questions (n=4); interview scoring guide (n=1); Likert/VAS scale (n=1); component analysis of data (n=1); physiological parameters (n=1); and behavioural scoring and physiological parameters (n=1) (Table 2).

The aims of each of the studies were all individual. There were no studies investigating the same or similar aims and objectives, but there were some similarities between studies and the areas in which they explored. These areas included: the effect of humans on equine behaviour and reactions (n=5); equine training

methodologies and behaviour (n=4); horses within sport and leisure (n=4); equine welfare (n=3); human attachments and bonds to horses (n=3); horse-human ecologies (n=2); the influence of human-animal relationship on psychological wellbeing (n=2); equine euthanasia (n=2); the importance of personality traits to breeders (n=1); and colic decisions (n=1) (Table 2).

| Publication title  | Author            | Methodology/<br>study design | Aim of study  | Measures   | Important outcomes  |
|--|-------------------|------------------------------|---|--|---|
| Equine gatekeepers, animal narratives and foxhunting landscapes                              | Acton, A.         | Ethnographic study           | Exploration of the connection between mounted fox hunting packs and the landscape.                                | Narratives of past and present foxhunters to give an ethnographic account of the role of the horse in the fox hunting culture.                     | Using animals as 'co-actors' rather than subjects in ethnographic approaches promoted appreciation of the environment and the animals within it.  |
| Living the 'Best Life' or 'One Size Fits All' – Stakeholder Perceptions of Racehorse Welfare | Butler, D. et al. | Focus groups                 | Exploring the perceptions of stakeholder in the British racing industry of factors influencing racehorse welfare. | Thematic analysis of three areas: 'best life' and minimum welfare standards; main welfare challenges; and innovative practices to improve welfare. | Overall consensus on minimum welfare standards and 'best life'. Important of tailoring plans for individuals highlighted. 'Best life' scenario relies on horse-human relationship to implement, monitor and change as needed. |
| Companion animals as selfobjects   | Brown, S.E.       | Semi-structured interviews   | Exploring if self-psychology can be systematically applied to human-animal relationships.                         | Scoring guide to selfobject type was developed and used on the interview transcripts.  | Self-psychology could be successfully applied to the human-animal relationship. In this study, animals were found to rival or surpass humans in the ability to provide self-object needs.                                     |



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| <p>An investigation of human-animal interactions and empathy as related to pet preference, ownership, attachment, and attitudes in children</p> | <p>Daly, B. and Morton, L.L.</p> | <p>Five instrument questionnaire</p> | <p>Investigation of the relationship between children and pets in regards to pet preference, ownership, attachment and attitudes.</p> | <p>The pet ownership survey (Daly and Morton, 2003)<br/> The Bryant Index of Empathy (1982)<br/> The pet preference inventory (Daly and Morton, 2003)<br/> The Lexington Attachment to Pets Scale (Johnson et al., 1992)<br/> The Pet Attitude Scale (Templer et al., 1981).</p> | <p>Those who were highly attached to their pets were more empathetic than those who were less attached. Girls were more empathetic than boys. Empathy was higher for those who expressed a preference for horses and birds.</p> |
| <p>Tools of the trade or part of the family? Horses in competitive equestrian sport</p>   | <p>Dashper, K.</p>               | <p>Ethnographic study</p>            | <p>Exploring horses in competitive equestrian sport and altering the horse-human relationship.</p>                                    | <p>Loosely structured interviews around four broad themes: participants' involvement in equestrian sport, how that involvement fits in with or clashes with other areas of life, goals and motivations within the sport, and attitudes to the horses they ride.</p>              | <p>The emerging key themes included: the changing nature of equestrian sport; the influence of owners and the feelings of mutual respect and affection that can develop between horses and humans.</p>                          |

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| Listening to horses: Developing attentive interspecies relationships through sport and leisure                               | Dashper, K.         | Ethnographic study | Considering some ways in which human participants try to develop attentive relationships with their equine partners.                                  | Transcription and thematic analysis of interviews and field notes taken in a three-year period.  | Participants were acutely aware of their horses as individuals with personalities, likes, dislikes and how this impacted owners' decision making ability. Horses were described by the participants as 'persons'. Emerging themes included: guardianship, affection and relationship building.   |
| "Riding up forested mountain sides, in wide open spaces, and with walls": developing an ecology of horse-human relationships | Davis,D. et al.     | Ethnographic study | To demonstrate the complex ways in which riding terrains affect shared ecologies of horse-rider relations, identities, and psyches.                   | Analysis of narrative data using a grounded, practice theory.  | Dressage riders were described as becoming attuned, focused and in touch with their horses. Event riders described the importance of shared trust, fearlessness and their confidence in the horse. Endurance riders were described as relating stamina, conditioning and stoic endurance for survival. Overall finding that horse and human paired together, defined, distinguished, and identified by the environments that they were in. |
| Training methodologies differ with the attachment of humans to horses  | DeAraugo ,J. et al. | Questionnaire      | Using attachment theory to investigate whether the attachment between rider or handler and horse differed according to the preferred training method. | Nine items used to assess attachment using a seven point scale. Scores were calculated for avoidance and anxiety and statistically analysed. | Behavioural training participants scored more highly on the attachment-avoidance scores. The behavioural and eclectic training methods were associated with higher levels of education.  |

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| <p>Examining Canadian equine industry participants' perceptions of horses and their welfare</p> | <p>DuBois,C. et al.</p> | <p>Questionnaire</p>        | <p>Exploring the perceptions of horse sentience and welfare status of animals in the Canadian equine industry.</p> | <p>39 questions on participants demographic and experience, and their opinions on sentience and welfare, including use of scenarios.</p> | <p>Horses were mainly considered companion animals, and most participants strongly believed horses could feel pain, fear and boredom. Participants agreed that there were welfare issues within the issues, specifically horse that were unwanted, not trained appropriately, or there was a lack of knowledge by the owner/care giver. Participants' opinions were affected by the role they assigned to horses and how they were involved in the equine industry.</p> |
| <p>Importance of personality traits in horses to breeders and riders</p>                        | <p>Graf,P. et al.</p>   | <p>Online questionnaire</p> | <p>Evaluating the importance of personality traits in horse to breeders and riders.</p>                            | <p>41 item web-based questionnaire containing open and closed questions and Likert and ranking scales.</p>                               | <p>Temperament, character traits and willingness to work were assigned more weight. Less weight was given to performance traits like quality of trot or show-jumping. The relative weighting of traits varied between the different groups of rider. Ease of daily work, safer handling and horse-human relationship were commonly listed in answer to why personality traits are important.</p>  |

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| <p>A brief note on some possible factors involved in the reactions of horses to humans</p>                | <p>Hausberger, M. et al.</p>               | <p>Behavioural observation</p> | <p>Assessing the possible factors involved in the reactions of horses to humans.</p>  | <p>Observation and scoring of posture using Waring and Dark's (1978) observations.</p>  | <p>More horses showed a friendly behaviour opposed to an aggressive behaviour towards an unfamiliar human. Inter-individual variations in reaction were clear and had a good consistency. Factors involved in those variations included the breed and the usual caretaker. Horses depending on the same caretaker for their daily routine were found to have similar responses which differed from that of other groups.</p>  |
| <p>Equipment and training risk factors associated with ridden behaviour problems in UK leisure horses</p> | <p>Hockenull, J. and Creighton, E. (a)</p> | <p>Questionnaire</p>           | <p>Identifying risk factors associated with ridden behaviour problems in UK leisure horses from the training approaches and equipment used.</p> | <p>16 questions regarding the type of work undertaken with the horse, the types of equipment and training methods used on it and the regularity that professional services (farriers, saddlers and dentistry professionals) were employed. Respondents were also asked to assess the frequency that their horse performed 15 different behavioural problems over the last week it was ridden using rating scales.</p> | <p>Risk factors associated with the ridden behaviour problems included: the design and fit of the saddle, with dressage and working hunter saddles associated with a reduced risk of ridden behaviour problems compared to general purpose saddles. The horse's foot care and shoeing routine was associated with three of the four groups with behavioural problems. An increased time (7 weeks or more) between farrier visits was associated with an increased risk of discomfort behaviour. The use of artificial training aids was associated with an increased risk of behaviour problems. Spending more time with the horse outside of training situations was associated with a reduced risk of problems.</p> |

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| <p>The strengths of statistical techniques in identifying patterns underlying apparently random behavioural problems in horses</p> | <p>Hockenull, J. and Creighton, E. (b)</p> | <p>Data analysis of an online questionnaire</p> | <p>Determining how principal components analysis has been used to identify relationships underlying individual behavioural problems in horses.</p>    | <p>Principal component analysis of data from three linked cross-sectional questionnaires.</p>                                    | <p>44 individual behavioural problems, including stable related and handling behavioural problems, pre-feeding behavioural problems, and ridden behavioural problems, were reduced to 12 behavioural problem components. Each component was composed of groups with behavioural problems that may share a common underlying aetiology. The study findings demonstrated the value of statistical techniques in identifying associations between apparently random behavioural problems.</p> |
| <p>Stranger danger? An investigation into the influence of human-horse bond on stress and behaviour</p>                            | <p>Ijichi, C. et al.</p>                   | <p>Behavioural and physiological measures</p>   | <p>Determining whether horses' owners confer a 'safe-base' and improve horse behaviour and physiological stress response to novel handling tests.</p> | <p>Measures of behaviour, eye temperature and heart rate whilst navigating novel obstacles with owner or unfamiliar handler.</p> | <p>There was no statistically significant difference in the behavioural or physiological measures of stress between when the horses were handled by their owner or an unfamiliar person.</p>   |
| <p>Factors influencing the attitude of equestrians towards sport horse welfare</p>   | <p>Iking, C. et al.</p>                    | <p>Online questionnaire</p>                     | <p>Assessing factors influencing the attitude of equestrians towards sport horse welfare.</p>   | <p>150 questions with the majority using five point Likert scale.</p>  | <p>The factors with the greatest impact on attitudes to horse welfare were the affection for animals, the attitude towards 'classically organised' equestrianism and the utility orientation. Gender, income, agricultural background, tradition, brand orientation and the importance of breed and pedigree were also found to have a significant influence. Age and involvement in horse-riding as a hobby were found to have no effect on attitudes to horse welfare.</p>               |

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| Separating a horse from the social group for riding or training purposes: a descriptive study of human-horse interactions | Jorgensen, G.H.M. et al. | Behavioural observation | Determining the difficulty of haltering and separating a horse from a group for riding or trainer purposes and how horse-human interactions could affect this. | In each group, the horse owner or keeper (handler) was asked to enter the group, approach his/her horse, halter it and lead it out through the gate, then keep the horse standing out of sight from other horses for 2 minutes. Interactions were video recorded and behaviours were scored. | Only 1 out of 100 horses moved away from the handler when approached. 96% of the target horses followed their handler without showing any resistance. In 75% of the tests, the other horses did not interact with the target horse and/or handler. Separating a horse from its group can be considered relatively safe and unproblematic if there are good management practices and trained handlers. |
| Investigating horse-human interactions: the effect of a nervous human   | Keeling, L.J. et al.     | Behavioural observation | Evaluating the effect of a nervous human on horse-human interactions.  | Heart rates and direct behavioural observations made and scored on a three, four or five point scale.  | There was an increase in heart rate for both the person and the horse when walking past a potentially challenging situation. The findings indicate that analysis of heart rate recorded simultaneously from people and horses under different experimental handling or riding conditions presents a useful tool to investigate horse-human interactions.  |
| My Horse Is My Therapist: The medicalization of pleasure among women equestrians  | Lee Davis, D. et al.     | Ethnographic study      | Exploring the role that horse-human interactions may play in well-being and impairment among a sample of everyday riders.                                      | Thematic analysis of lifecycle narratives.   | The themes that were identified included: pleasure; fun; joy; benefits; and therapies.  |

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| <p>Pet ownership and adolescent health: cross-sectional population study</p> | <p>Mathers, M. et al.</p> | <p>Questionnaire</p> | <p>Assessing whether adolescent health and wellbeing was associated with having a pet in the household.</p> | <p>Body mass index was measured by a trained researcher. The average daily physical activity level was measured using Multimedia Activity Recall for Children and Adults, and self-report. Blood pressure was measured using digital BP monitor. Health status was measured by the paediatric Quality of Life (QOL) inventory. QOL measured using the KIDSCREEN tool and self-report.</p> | <p>Owning a pet or time spent caring for/ playing with a pet was not related to adolescent health or well-being. Having horse(s) was associated with slightly higher self-reported paediatric Quality of Life.</p> |
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| <p>Euthanasia in aged horses: relationship between the owner's personality and their opinions on, and experience of, euthanasia of horses</p> | <p>McGowan, T.W. et al.</p> | <p>Questionnaire</p> | <p>Exploring the relationship between the owner's personality and their opinions on, and experience of, euthanasia of horses.</p>   | <p>Questionnaire on euthanasia of horses and a self-assessment five factor personality test.</p>   | <p>Most owners considered euthanasia of a horse to be a difficult decision, which they based on the horse's current health, anticipated future quality of life, and veterinary advice. Owners reported the loss to be a distressing experience rather than providing a sense of relief. Female owners who found it more difficult to make the decision were more likely to have neurotic personalities and based their decision more on their relationship with the horse and the horse's quality of life. Veterinarians play an important role in the diagnosis of health factors that influence the decision to euthanase. The personality of the owner may influence the extent to which they find euthanasia distressing, especially in female horse owners.</p> |
| <p>Survey of human-horse relationships and veterinary care for geriatric horses</p>   | <p>Mueller, M.K. et al.</p> | <p>Questionnaire</p> | <p>Exploring the relationship between horse owners/lessees and geriatric (&gt;20-years-old) or non-geriatric horses, and factors influencing veterinary care decision making.</p> | <p>Online questionnaire using human-horse attachment scale, and modified version of Pet Bereavement Questionnaire, as well as owner and horse demographics and details of veterinary care.</p> | <p>Geriatric horses were more frequently consider to be companion animals, retired or part of a business compared to non-geriatric. No significant differences in degree of horse-human attachment between geriatric and non-geriatric horses. Higher levels of bereavement associated with euthanasia compared to when horses died, and for geriatric horses compared to non-geriatric. Participants made a number of accommodations for their care and management of geriatric horses.</p>   |



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| <p>Cross-modal perception of human emotion in domestic horses (<i>Equus caballus</i>)</p>       | <p>Nakamura, K. et al.</p>      | <p>Behavioural observation</p>                                     | <p>Investigating whether horses can cross-modally perceive human emotions.</p> | <p>Horses were shown human facial expressions on screen and voices from a speaker from their caretaker or stranger using positive (happy/gentle) or negative (angry/scolding) expressions. These were played in the congruent condition (both audio and visual, positive or both negative) and incongruent (e.g. positive facial expression with negative voice) conditions. Horses behavioural response measured by total looking time and response latency.</p> | <p>Horses looked at the screen for longer when the caretaker incongruency condition was used compared to the congruency condition. Horses looked at the speaker faster with incongruent condition compared to congruent condition for both caretaker and stranger. Study concluded that horses can cross-modally recognise emotions of both caretakers and strangers.</p> |
| <p>Could it be colic? Horse-owner decision making and practices in response to equine colic</p> | <p>Scantlebury, C.E. et al.</p> | <p>Mixed-methods: interviews and cross sectional questionnaire</p> | <p>Assessing horse owner decision making in response to equine colic.</p>      | <p>15 interviews were analysed to conceptualise the processes involved in horse-owner management of colic. Cross sectional survey of 673 horse owners designed to test the concepts found.</p>  | <p>Veterinary-client communication was important during a colic episode in assisting owners during the decision making process. From the interviews, the cost of veterinary assistance and treatment influenced the timing of the decision to call the veterinary surgeon and consenting to surgery. Money was not an influencing factor in the survey.</p>               |

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| <p>Behaviour patterns of horses can be used to establish a dominant-subordinate relationship between man and horse</p> | <p>Sighieri, C. et al.</p> | <p>Behavioural observation</p> | <p>Investigating how humans can enter the social hierarchy of the horse by mimicking the behaviour and stance it uses to establish dominance.</p>              | <p>Methods based on the three elements fundamental to the equilibrium of the herd: flight, herd instinct and hierarchy. The trainer–horse relationship was established in three phases: retreat, approach and association. Response time was measured for each phase.</p> | <p>All horses responded to their trainer. 4/5 completed the three phases (retreat, approach and association) on the same day. One horse took several days, however all phases were completed. Observations suggest that it is possible to manage unhandled horses without coercion by mimicking their behavioural patterns.</p>  |
| <p>Austrian Veterinarians' Attitudes to Euthanasia in Equine Practice</p>  | <p>Springer, S. et al.</p> | <p>Questionnaire</p>           | <p>Examining Austrian equine veterinarians attitudes to equine euthanasia in a range of scenarios and identifying factors affecting end of life decisions.</p> | <p>Online questionnaire with 56 questions covering demographic information, medical/technical, agreement with normative and descriptive statements, case scenarios and open-ended questions.</p>  | <p>Veterinarians consider medical, social and economic factors to be of great importance on the decision making process and especially recognise the impact of the emotional bond between horse and owner. Requests for 'convenience' euthanasia (including changed circumstances, last will of the owner and financial reasons) are typically rejected. Participants' gender, duration of working experience, and the proportion of their working time spent with horses was significantly associated with responses to euthanasia scenarios.</p> |

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|---|----------------------|-------------------------|--|--|--|
| Over-riding concerns: developing safe relations in the high-risk interspecies sport of eventing | Thompson, K. et al.  | Interviews              | Developing safe human-horse horse-human relationships in eventing by understanding how risk perception and experience subjectively is implicated in through and by the horse-human relationship. | Immersion, coding, categorising and generation of themes. The analysis of the interviews was sensitised around the perceptions of risk, experience of risk, rider concerns and rider mitigation. | Findings were consistent with the following three theories of voluntary risk taking: edgework; sensation-seeking; and flow. Further mixed methods research has been suggested to fully evaluate the use of existing risk theory for understanding participant experiences of high-risk sports like eventing. |
| Developing a horse welfare assessment protocol  | Viksten, S.M. et al. | Behavioural observation | Development of a horse welfare assessment protocol.  | 15 animal based, 24 resource based and eight management based measures used. This was repeated after 16–25 days with the same horses.  | The ability to use this assessment tool for up to 22 horses a day. Changes to draft protocol were made and include an ethogram to assess the human-animal relationship.  |

Table 2: Data extraction table for method characteristics of 27 publications that met the final inclusion criteria for a scoping review of literature exploring the horse-human relationship.

### Population characteristics

Table 3 presents the population characteristics of these studies. All 27 studies were published within the last 17 years. Fifteen studies were published within the last 5 years (2014–2019), eight studies were published between 2009 and 2013 and four studies were published before 2009. The majority of these studies were carried out in Europe (n=15), with eight of these conducted in the UK. Most studies focused on one perspective rather than the two-way interaction involved in the horse-human relationship; perspective of the human (n=20), perspective of horses (n=6), perspective of both (n=1) (Table 3).

| Author and year of publication | Location                            | Participants  | Total population size (Number relating to horse in multi-species studies) | Perspective |
|--------------------------------|-------------------------------------|---|---|-------------|
| Acton (2014)                   | England, UK                         | Horse, rider and landscape in foxhunting culture  | N/A   | Human       |
| Butler et al. (2019)           | England, UK                         | Trainers, owners, vets, stable staff, equine charity, Racing Welfare and British Horse Racing Authority staff | 42  | Human       |
| Brown (2007)                   | Alabama, USA                        | Members of a social media group for rescuing horses   | 24 (10 interviews pertained to horses)                                    | Human       |
| Daly and Morton (2006)         | Ontario, Canada                     | Children aged 8–14 years  | 155 (58 stated preference for horse as a pet)                             | Human       |
| Dashper (2014)                 | England, UK                         | Elite horse riders  | 26  | Human       |
| Dashper (2017)                 | England, UK                         | Amateur horse riders and caregivers   | 17  | Human       |
| Davis et al. (2013)            | Midwestern, USA and Northern Norway | Horse people competing in different disciplines   | 60  | Human       |
| DeAraugo et al. (2014)         | Global                              | Horse riders and handlers   | 538   | Human       |
| DuBois et al. (2018)           | Canada                              | Canadian citizens, over 18 years of age, with an interest in horses   | 901   | Human       |
| Graf et al. (2013)             | Global                              | Sport riders, leisure riders, and breeders  | 1087 participants   | Human       |
| Hausberger and Muller (2002)   | Saumur, France                      | Adult horses  | 224 horses of mixed breeds  | Horse       |

|                                  |   |  |  |                 |
|----------------------------------|---|--|--|-----------------|
| Hockenhull and Creighton (2012a) | UK  | Leisure horse owners and their horses                      | 1326 owner reports on horses   | Human           |
| Hockenhull and Creighton (2012b) | UK  | Leisure horse owners – component analysis of three studies | Stable related and handling – 1230 horses<br>Pre-feeding behaviour – 890 horses<br>Ridden behaviour – 791 horses | Human           |
| Ijichi et al. (2018)             | Gloucestershire, UK   | Livery horses at equestrian establishment                  | 46 horses of mixed breeds and experiences  | Horse           |
| Ikinger et al. (2016)            | Germany   | Riders   | 2947   | Human           |
| Jorgensen et al. (2011)          | Eastern Norway  | Horses   | 20 groups of horses of mixed breeds  | Horse           |
| Keeling et al. (2009)            | Sweden  | Horses, handlers and riders                                | Leading – 10 horses of mixed breeds and 20 handlers<br>Riding – 17 horses and 17 riders                          | Horse and human |
| Lee Davis et al. (2015)          | Midwestern USA and Arctic Norway  | Non-professional riders                                    | 60 interviewed, 52 lifestyle narratives reported (interviews from 8 men were not analysed)                       | Human           |
| Mathers et al. (2010)            | Victoria, Australia   | Students aged 13–19  | 928 students, 61 of which owned horses   | Human           |
| McGowan et al. (2012)            | Queensland, Australia   | Horse owners of aged horses                                | 111 owners   | Human           |
| Mueller et al. (2018)            | Study conducted in USA – geographical location of participants not reported | Horse owners who owned/leased >1 horse                     | 2395 participants  | Human           |
| Nakamura et al. (2018)           | Tokyo, Japan  | Horses and caretakers from University equestrian teams     | 19 horses, their caretakers and strangers  | Horse           |
| Scantlebury et al. (2014)        | North West, UK  | Horse owners with colic experience                         | 15 interviewees<br>673 horse owners – questionnaire  | Human           |
| Sighieri et al. (2003)           | Arezzo, Italy   | Unhandled mares  | Five Haflinger mares   | Horse           |

|                           |           |  |  |       |
|---------------------------|-----------|--|--|-------|
| Springer et al. 2019      | Austria   | Member of the Austrian Equine Veterinary Association | 64 veterinarians involved in equine work | Human |
| Thompson and Nesci (2016) | Australia | Eventers   | 21 participants                          | Human |
| Viksten et al. (2017)     | Sweden    | Swedish riding school horses                         | 37 horses of mixed breeds                | Horse |

Table 3: Data extraction table of population characteristics from 27 publications that met the final inclusion criteria of a scoping review of literature exploring the horse-human relationship.

## DISCUSSION

The human animal relationship has become an increasingly popular area for scientific research (Hosey and Melfi, 2014; Dashper, 2017). Research in this area has predominantly explored the relationships that humans have with companion animals, and only more recently the relationship that humans have with horses. The exploration of the horse-human relationship through a scoping review identified a diverse and heterogeneous body of published literature. Scoping reviews, unlike systematic reviews, do not strive for evidence synthesis or appraisal of research quality of the studies, but instead pose a transparent and thorough map of research areas identified (Arksey and O'Malley, 2005). Heterogeneity across the 27 publications identified in this scoping review highlights the benefits of performing a scoping review prior to an extensive literature review. Very limited comparisons of aims, objectives and methodologies could be drawn across the publications, but this study provides the framework to define more specific research questions and systematic reviews for future research, by extracting key information and grouping and categorising data. The research areas identified by this review as having the most studies were: equine behaviour and reactions towards humans (5/27); equine training methodologies and behaviour (4/27) and horses within sport and leisure (4/27).

Broad search terms and inclusion criteria were used for this scoping review to gain an understanding of the current scientific research involving the horse-human relationship and what, if any, specific research areas could be identified. This also raised challenges: it led to a large variability in the studies that were identified using the search terms, including literature on working equids and animal-assisted therapies. It was decided after the initial database search and categorisation of research areas that these research areas would be excluded from the final scoping review, allowing the focus to remain on the relationship between humans and horses applicable to the main horse owning population within the UK. It is important however, to appreciate that the relationship humans have with working equids and the use of equids in animal-assisted therapies, are important areas of research within the horse-human relationship. These require further investigation to gain a better understanding of the available research within the areas themselves, independent of this study. The results of the initial searches from the scoping review highlighted the numbers of publications in each area, which will be helpful to inform future systematic reviews.

For this review, 27 studies met the inclusion criteria. Only two databases were used for the literature search; these databases were deemed the most appropriate for veterinary literature (Grindlay et al., 2012) and therefore most suitable for a scoping review. The searches used in this study did not identify some studies which would have met inclusions criteria for example; Chamove et al. (2002) and Maurstad et al. (2013), as the

journals were not within the Medline or CAB Abstracts databases. A more detailed systematic review would require inclusion of other databases that may be more inclusive of other social science journals and studies, such as the International Bibliography of the Social Sciences. This scoping review has demonstrated the diversity of the publications in this area and therefore the challenges in defining databases and search strategies for an area that is currently ill defined and multi-disciplinary in nature. A systematic review investigating human-animal relationships, bonds and interactions performed by Hosey and Melfi (2014) identified 116 publications involving companion animals (dogs, cats and equids), of which 22 involved the human-animal relationship. This review did not state how many of these publications involved equids exclusively, however it suggests that 27 publications identified by this current review represents a reasonable body of the current evidence. There were however methodological differences, including the databases searched (Proquest and Google Scholar) and the lack of defined inclusion and exclusion criteria in the study by Hosey and Melfi (2014).

Of the publications reviewed in the current study, only one involved the dyadic relationship of human and horse, with the majority focusing only on one perspective (horse or human). The lack of exploration of the two-way interaction between humans and animals was also identified by Dwyer et al. (2006), subsequently leading to the development of the Monash Dog Owner Relationship Scale (Dwyer et al. 2006). Further research into the two-way relationship between horses and humans may be beneficial to understand how best to match horses with owners or riders, and to prevent incompatibilities that may become detrimental to the horse or human.

A diverse range of publication aims, objectives and methodologies were identified in this review, and there was significant diversity in the research areas and topics. Some major gaps in the research and lack of evidence for a number of areas were identified, and these were used to identify areas which should be considered for future research:

1. Development of a reliable and repeatable tool for categorising horse owners' motivations and reasons for being involved with horses.
2. Development of a reliable and repeatable system for categorising the different roles and activities that horses are used for.
3. Development of a tool for defining the different types of relationships people form with horses and other equids.
4. Identification of the horse factors and the owner factors that influence the horse-human relationship, and how these interact and affect owner decision making.

It can be concluded that the research surrounding the relationships between horse and human is extremely diverse and heterogeneous, with a paucity of evidence in most areas. From this scoping review of the literature, key areas of current research evidence were identified and defined, but gaps within the research body exploring the nature and factors influencing the horse-human relationship were also documented. The main limitations were around the challenges in identifying suitable publications, and social science databases should be included in future reviews. This review highlights the need for further investigation (systematic reviews) into the main research areas defined by the review, but also the need for new studies to fill significant gaps within the research. Gaining an understanding of the relationships we have with animals is important to help us understand how and why health and welfare may be compromised by inadequate or inappropriate decision making. The horse-human relationship is clearly a key component of this but is lacking a significant evidence-base. Exploration into the relationships that horse owners have with their horses, and the influence this may have on their decisions was identified as an area with little published literature.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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