Animal Welfare

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The selection, training and welfare of post-racing thoroughbreds and other breeds used in Equine Assisted Services

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Research Article

Cite this article: Neveux C, Hockenhull J, Barker J, Allen K, Mullan S and Valenchon M (2024). The selection, training and welfare of post-racing thoroughbreds and other breeds used in Equine Assisted Services. *Animal Welfare*, **33**, e44, 1–15
https://doi.org/10.1017/awf.2024.51

Received: 31 May 2024
Revised: 26 August 2024
Accepted: 27 August 2024

Keywords:
animal welfare; behaviour; equid-assisted therapy; living conditions; personality; racehorses

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Author contributions:
Conceptualization: CN, JH, SM, MV; Data curation: CN; Software: CN, MV; Formal analysis: CN; Investigation: CN; Funding acquisition: JB, CN; Methodology: CN, JH, SM, MV; Resources: CN; Project administration: KA, JH, JB; Supervision: MV, SM, JH, KA; Validation: JH, SM, MV; Writing – original draft: CN; Writing – review & editing: CN, JH, JB, KA, SM, MV

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Abstract

Post-racing thoroughbreds (TBs) are increasingly being considered for Equine Assisted Services (EAS), but their use has not yet been widely characterised. This study aimed to generate detailed data on TBs and other breeds (OBs) of horses in EAS via an online survey. The survey was completed by 129 EAS practitioners from 15 countries and reported detailed data on 427 EAS equids, including 57 TBs. Most of the EAS horses were housed collectively, had access to free exercise over 12 h per day and had unrestricted access to forage. The most commonly recorded selection criteria for EAS horses consisted of: demonstrating a good personality; enjoying the work; absence of propensity to kick/bite. Detailed data gathered on individual horses showed that in comparison to OBs, TBs were younger, more likely to be a gelding, less likely to be used in ridden programmes, and tended to present more behavioural issues than OBs. The majority of the participants agreed that TBs have specific assets of particular interest to EAS programmes, such as sensitivity, body/movement characteristics or responsiveness/flight response. Finally, a large majority of participants reported that they believe TBs to be suitable for EAS programmes and some would consider working with them. These results showed TBs to already be in use in various EAS programmes and more could be incorporated in the future. In terms of animal welfare and beneficiaries' safety, a selection process could therefore be designed and implemented to choose the most adapted horses for each EAS centre, according to living conditions and EAS activities practised (ridden or not ridden).

Introduction

Animal-assisted services (AAS) are practised with different animals, including dogs, cats, donkeys, horses, and defined as the "mediated, guided or facilitator-led practices, programmes and human services that incorporate specially qualified animals into therapeutic, educational, supportive and/or ameliorate processes aimed at enhancing the well-being of humans while ensuring the welfare of the animals involved in these practices" (Binder *et al.* 2024). These services are said to help beneficiaries (i.e. people that benefit from animal-assisted services) improve their social, cognitive, emotional and/or physical functioning (for reviews, see Mandrá *et al.* 2019; Marchand 2023; Mittly *et al.* 2023; Rehn *et al.* 2023). The overarching term, Equine Assisted Services (EAS), encompasses the three main categories of equine-assisted programmes: Therapy; Learning; and Horsemanship. Therapy involves licenced therapy professionals that incorporate horses within treatment or interventions towards beneficiaries. Learning refers to the use of horses by certified professionals for three equine-assisted learning domains: education; organisations; and personal development. For horsemanship, equine professionals offer individuals or groups with physical and/or cognitive disabilities, non-therapy services that have been adapted from traditional equine discipline and there is also provision of horsemanship riding, driving and vaulting lessons (Ekholm Fry 2021; Wood *et al.* 2021). EAS involves activities completed in the presence of a horse, including ridden/driven activities and ground-based activities, such as grooming, saddling, or walking a horse (Lentini & Knox 2015). EAS centres can offer only ground-based activities or both (Seery & Wells 2024).

The benefits for beneficiaries are stated in many EAS programmes and are reported to: remediate some education or learning impairments and improve social cognition for autism spectrum disorder (Srinivasan *et al.* 2018; Xiao *et al.* 2023); promote the physiological functions of body systems for children with Attention deficit/Hyperactivity disorder (for a review, see Helmer *et al.* 2021); enhance children's emotional, social and behavioural functioning (Lee *et al.* 2016; Wilkie *et al.* 2016); improve body balance, mobility and posture (Meregillano 2004;

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Silkwood-Sherer *et al.* 2012); or enhance treatment engagement, therapeutic alliance; and reduce some symptoms in veterans with Post-Traumatic Syndrome Disorder (Marchand 2023). However, a number of systematic reviews have revealed that reported improvements can vary between studies with concerns expressed about experimental design and the standardisation methods of various studies. They also highlighted the need for further rigorous quantitative studies in order to fill in research gaps, define outcomes for humans and evaluate mechanisms of action (O'Haire 2013; Boss *et al.* 2019; Stern & Chur-Hansen 2019; Wagner *et al.* 2022; Marchand 2023; Rehn *et al.* 2023; Xiao *et al.* 2023).

Despite animal-assisted services organisations including guidelines related to protecting animal welfare (HETI Federation 2020; IAHAIO 2021), there is a scarcity of scientific evidence on assessing and optimising AAS animals' welfare. Various authors have suggested the need to improve welfare assessment of animals used in AAS and practitioners' knowledge (Ekholm Fry 2021; Ng 2021). For instance, evidence-based best practice recommendations for AAS dogs in hospitals have been recently proposed (Barker & Gee 2021). In a recent survey, EAS practitioners highlighted equine and client welfare as being the biggest challenge faced by the industry (Seery & Wells 2024). Several studies have considered the impact of the sessions on the horses, but the results are not easy to compare as the use of the horse depends on the type of beneficiaries and the service being provided (therapy, education, horsemanship) neither of which are always adequately described (Ekholm Fry 2021; Ferlazzo *et al.* 2023). Very few studies have undertaken a comprehensive approach, assessing different levels of welfare as proposed by Reimert *et al.* (2023): (i) external and internal factors (such as environment, health or personality); (ii) inferring affective states (such as emotions or subjective affective experiences); and (iii) assessing the balance of positive and negative experiences (referring to the cumulating effect of the affective states to determine the quality of life). Finally, certain aspects of welfare would require to be addressed by EAS practitioners to ensure the specificity of this sector such as the living conditions, the relationship with humans (staff, volunteers and beneficiaries) or the health monitoring come under consideration. As this sector involves working equids, specific attention also needs to be paid to their working conditions: number of sessions per day/week and time to rest; rider's weight; level of stress during sessions; fitted equipment (e.g. basic bridle or specific equipment adapted to beneficiaries); and appropriate training with clear cues (Watson *et al.* 2020, Rankins *et al.* 2021, Olczak Katarzyna & Tomczyk-Wrona Iwona 2022).

For an EAS practitioner, selecting a new horse for their EAS programme is a crucial step, not only for the beneficiaries' safety but also for horse welfare. Yet very little is known about the selection criteria or the characteristics of EAS horses. Two recent online surveys questioned EAS practitioners in the USA and both highlighted that the main acquisition channel is via donation and concluding that the high proportion of donations illustrates a lack of standardisation and selection protocols. They also noted that some of the horse characteristics might not be deliberately chosen by the EAS practitioners (Watson *et al.* 2020, Rankins *et al.* 2021). EAS participants responding to an open-ended question listed various desirable characteristics related to behaviour (e.g. calmness, curiosity, sociability), physical abilities (e.g. slow and smooth movement), training abilities (e.g. easy to handle, responsive to cues) or health (e.g. soundness, good health). On the other hand, undesirable characteristics only consisted of thise related to behaviour (e.g. dangerous behaviours such as biting or kicking, fearfulness, stable vices). Moreover, the same participants gave the two primary reasons for retiring a horse from EAS programmes as behaviour (44%) and unsoundness (33%). On arrival, most horses tend to be given an acclimatisation period lasting from 4 to 42 days followed by a trial period of 3 to 13 weeks. Fifty-three percent of the EAS centres questioned, stated that they had a horse training programme in place with progress recording and over half recognised the industry's need for better-trained horses (Rankins *et al.* 2021).

Despite thoroughbreds (TBs) being bred primarily to fulfil a racing career some are never trained or never race. For those that do race, the career longevity is very variable and the median reported age for retirement is five years old. The main reported paths for exiting racing are being retired/rehomed and being deceased. Horses were declared to be retired or rehomed voluntarily mainly due to poor performance, illness or injury, at owner request, or unvoluntarily due to current health or behaviour issues. Horses would then be redirected towards a second career as breeding stock, for performance riding or for recreational/pleasure purposes (Flash *et al.* 2020; Crawford & Ahern 2022). The number of TBs leaving the racing industry each year is estimated at approximately 7,000 in the UK and 40% (2,800) are retrained for equestrian or leisure purposes (Retraining of Racehorses 2024). In Australia, about 6,400 horses were retired from the racing industry during the 2017–2018 season (Shrestha *et al.* 2021). In the UK, a recent census estimated the former racehorse population of 33,600 horses that are involved in various activities including dressage, showjumping, eventing or recreational activities. Most of the reported former racehorses (62.9%) were between 5 and 15 years of age (Horse Welfare Board 2024). These data show that TBs can transition successfully from racing to other disciplines.

The reactivity and personality of TBs have been explored in several studies leading to them having been described as a reactive breed as a result, for example, of the bridge test in which TBs took more time to cross the unknown surface compared to other breeds (Hausberger *et al.* 2004). Two surveys saw them ranked as one of the top breeds for anxiousness/nervousness and excitability (Lloyd *et al.* 2008; Sackman & Houpt 2019). Owners also reported them as being dominant or showing more frequent behaviours associated with dominance/aggression when approached by other horses or people (Lloyd *et al.* 2008; Hellmann *et al.* 2021). However, owners reported that their TBs demonstrated a higher level of 'self-control' compared to horses bred for recreational riding, described as the ability to avoid becoming skittish easily, escape or be impossible to handle (Hellmann *et al.* 2021). TBs were also described as being more socially adept by their owners, i.e. interacting easily with horses, and mixing well with other horses in two surveys (Lloyd *et al.* 2008; Hellmann *et al.* 2021). Finally, TBs obtained high scores on the personality component 'inquisitiveness', i.e. being curious and opportunistic (Lloyd *et al.* 2008).

As reported by Rankins *et al.* (2021), the desirable personality traits of EAS horses seem to be very diverse, but certain characteristics reported by TBs' owners, such as curiosity or sociability, are similar to those of EAS horses. Even though TBs are already utilised in several EAS programmes throughout the world, very few studies have identified how representative they might be compared to other breeds. Seery and Wells (2024) reported that 30% of their survey participants (EAS practitioners) incorporate retired racehorses as part of their horse team. To our knowledge, no precise data on their characteristics, the beneficiaries they work with or the EAS activities they practise as EAS horses are available.

https://doi.org/10.1017/awf.2024.51 Published online by Cambridge University Press

The aim of this study was to: (i) describe the EAS practitioners' horse selection criteria, training methods and welfare practices for their EAS horses; (ii) gather detailed information on the previous experience, current use, living conditions, health and behaviour of EAS horses; and (iii) investigate the place of TBs in EAS programmes and the views of practitioners on the use of TBs in EAS programmes.

Materials and methods

An online survey was designed which consisted of four sections: (1) demographics; (2) selection, training and welfare practices; (3) detailed information on the horses; (4) views on the use of TBs. The survey comprised open and closed questions and the full version can be seen in the Supplementary material.

Prior to data collection, our survey was approved by the University of Bristol Faculty of Health Science Research Ethics Committee (FREC) under the reference n°2021-0087.

Survey design

Section 1 established demographics including participants' country and county and the year in which they started practising EAS. Participants were also asked to describe themselves and to indicate their age category.

Section 2 consisted of a Likert-type question in which participants were asked to rate the most important selection criteria when choosing a horse for EAS purposes (from 0 'Not at all important' to 3 'Critical, meaning critically important') from a list of 17 characteristics adapted from Anderson *et al.* (1999); Reega (2017); Rankins *et al.* (2021): demonstrating a good personality/temperament, demonstrating high sensitivity/reactivity, not demonstrating high sensitivity/reactivity, demonstrating a special bond with humans, demonstrating an ability to 'mirror' human behaviour, demonstrating curiosity, demonstrating shyness, demonstrating gentleness, demonstrating boldness, demonstrating impetuousness/bumptiousness, demonstrating a proactive attitude, demonstrating a passive attitude/stillness, enjoying the work, absence of propensity to kick/bite, physical performances (e.g. stamina), physical shape (e.g. large back) and, the personality of other horses on the EAS centre. Participants could also describe their selection assessment programme for horse suitability via a multiple-choice question with different options. They were asked to identify the three main signs that, for them, would suggest a horse is unsuitable for an EAS programme as well as the typical length of time needed to decide whether or not a horse is suitable or not for EAS. Participants could report whether they had a specific training protocol in place for selected horses as regards the safety and progress of beneficiaries and, if so, to describe it. Participants were also asked for their three most important signs for checking during daily routines to ensure good welfare for their horses (fill-in-the-blank) as well as, according to their experience, the three most important things to ensure positive welfare for EAS horses (fill-in-the-blank).

Section 3 gathered very detailed information on the five horses the participants made the most use of: age, sex, breed, acquisition channel, age when acquired, previous career, training received by the horse for EAS purpose, EAS activities, number of EAS sessions per week, other types of work undertaken in parallel, living conditions, health issues and behavioural issues. In order to maximise participants' understanding, specific definitions of EAS activities were given as follows:

- Ground based: beneficiaries work with loose, non-ridden horse(s) and includes herd meets or single horse meets in a pen (any use of equipment will not be with the intention of learning horsemanship);
- Ground work: beneficiaries work with a non-ridden horse and includes horsemanship skills, such as grooming, tacking with potentially use of rope/head collar etc;
- Ridden work: beneficiaries on horseback leading or being led, with or without equitation skills learned;
- Driven: beneficiaries being on a horse-driven vehicle, driving or not.

Previous studies in the USA have reported that the median number of horses per EAS centre was ten. As EAS centres were expected to be smaller in Europe and because the information requested for each horse in section 3 was considerable, the survey was designed to gather information on a maximum of five of the most frequently used horses.

Section 4 investigated the views of participants on the use of TBs in EAS including their views on the suitability of TBs in EAS programmes, the best features, assets and characteristics that make TBs especially interesting for EAS and if the participants would consider working with TBs in their EAS programmes in the future.

The survey was reviewed by two EAS practitioners prior to being launched and a number of adjustments made to improve the clarity of the questions.

At the time of the survey, the term Equine Assisted Therapy was commonly used in the field. However, since then, a consensus terminology was designed and published (Wood *et al.* 2021) and the use of Equine Assisted Therapy has been subsequently changed to the recommended terminology Equine Assisted Services. Consequently, Equine Assisted Services (EAS) will be used throughout this paper.

Sample

The survey was aimed at Equine Assisted Services practitioners aged 18 years old and over and who either owned their centre or practised independently. The survey was open to participants from any country however the UK, the US, the Republic of Ireland and France were the main targets for reasons connected to the racing industry (high number of racehorses in training or retraining, well-organised racing aftercare sector), and/or connected to the EAS sector (advanced certification processes, known programmes incorporating ex-racing TBs). The questionnaire was also translated into French to increase the response rate in this country.

Distribution

The questionnaire was disseminated to EAS practitioners between November 2021 and April 2022 via an online link on social media with Online Surveys (JISC v2 - UK). Online and offline strategies were used to maximise response numbers. Online strategies consisted of invitations in social media discussion forums, posts on national and international Equine Assisted Services charities' networks and emails to Equine Assisted Services centres (comprising an invitation to participate). Offline strategies included articles in national newspapers and the equine-specific press, notices in

https://doi.org/10.1017/awf.2024.51 Published online by Cambridge University Press

equestrian and racing industry conferences and webinars, and dissemination through researchers' and collaborators' personal contacts.

Data analysis

Data were downloaded into an Excel® file and organised by section. All survey responses were reviewed and formatted for data analysis (e.g. ensuring a written response was switched to make it numerical). For each question type, some responses were removed because the respondent entered a partially completed response or had misunderstood the question. In order to characterise the participants, summary statistics were used to describe the distribution for each question. For the yes/no questions and the single/multiple selection questions, each response was transformed to numerical data and frequency distributions were calculated. Categories from the selection criteria Likert scale were transformed into numerical data (0 = 'Not at all important', 1 = 'Quite important', 2 = 'Very important' and 3 = 'Critical'). The median, interquartile range and mode were then calculated for each category as well as the overall reliability coefficient (Cronbach alpha) showing internal consistency of the developed scale. One-sample Wilcoxon rank tests were then performed on each criterion to determine if the responses differed significantly from the theoretical value. Data gathered in section 3 were categorised by horse breed (TBs vs the general population composed of all other horse breeds). Horses given no designated breed and retired horses were removed. Pearson Chi-squared tests were performed to compare categorical data and *t*-tests were used to compare continuous data. The significance level was set at $P < 0.05$. Statistical analyses were conducted using Stata/MP 17.0 for Windows® (StataCorp LLC, USA). For all sections, open-ended responses provided for 'other', fill-in-the-blank and free text responses were analysed separately using an inductive content analysis. The categories were defined using open coding, then the categories were revised and finally frequency distributions were calculated for each category. In order for the specific views of participants to be expressed some responses from the fill-in-the-blank and free text questions were reported as sentences or quotes.

Results

Participants' demographics

In total, 2,380 individuals opened the first page of the online survey but only 129 EAS practitioners responded to the entire survey and submitted their responses. The USA was the most highly represented country (n = 42; 32.55%), followed by France (n = 36; 27.9%), the UK (n = 20; 15.50%), Canada (n = 7; 5.43%), Republic of Ireland (n = 5; 3.87%), Australia and South Africa (n = 4; 3.10% each), New Zealand, Switzerland and Spain (n = 2; 1.55% each) and Italy, Germany, Belgium, Romania and Egypt (n = 1; 0.8% each). The majority of the participants defined themselves as women (n = 115; 89.15%), with the remainder defining themselves as men (n = 13; 10.08%) or cis women (n = 1; 0.78%). Participants' age category ranged from 20–29 to 70–79 years old: 11 from 20–29 (8.53%), 34 from 30–39 (26.36%), 25 from 40–49 (19.38%), 37 from 50–59 (28.68%), 19 from 60–69 (14.73%) and 3 from 70–79 (2.33%). Participants indicated having started practising EAS: over 31 years ago (n = 5; 3.88%), between 26 and 30 years ago (n = 4; 3.10%), between 21 and 25 years ago (n = 8; 6.20%), between 16 and 20 years ago (n = 7; 5.43%), between 11 and 15 years ago (n = 33; 25.58%), between 6 and 10 years ago (n = 24; 18.60%), between 1 and 5 years ago (n = 35; 27.13%) or less than 1 year ago (n = 13; 10.08%).

Selection, training and welfare

Selection of equids

As reported in Table 1, three criteria for selecting a horse for EAS programmes obtained the highest median score (0–3 scale): (1) demonstrating a good personality/temperament; (2) enjoying the work; and (3) absence of kicking/biting. The scale reliability and internal consistency was > 0.70 and considered as acceptable (Cronbach's alpha = 0.78; n = 113, items = 17), and showed the suitability of this scale for measuring the selection criteria of EAS horses. Most of the selection criteria values differ significantly from the hypothesised value (1.5, Wilcoxon one sample rank test).

The participants were asked to cite the three main signs that make a horse unsuitable for the EAS programme in a fill-in-the-blank response. One hundred and twenty-six participants answered

Table 1. Four-point Likert scale results on the question on the selection criteria when choosing a horse for EAS programmes as rated by survey participants on a scale from 0 = 'Not at all important', 1 = 'Quite important', 2 = 'Very important' and 3 = 'Critical'. The median score is indicated with the interquartile range (25–75%). The mode represents the most frequent response. The one-sample Wilcoxon rank test results are indicated with the P-value. Significant values in bold

	Median (IQR)	Mode	z	*P*-value
Demonstrating a good personality/temperament	3 (2–3)	3	8.04	**< 0.001**
Enjoying the work	3 (2–3)	3	8.12	**< 0.001**
Absence of propensity to kick/bite	3 (2–3)	3	7.09	**< 0.001**
Demonstrating gentleness	2 (1–3)	2	4.126	**< 0.001**
Demonstrating curiosity	2 (1–2)	2	1.93	**0.05**
Demonstrating a special bond to humans	2 (1–2)	2	0.46	0.66
The personality of your other horses	2 (1–2)	2	0.28	0.79
Demonstrating an ability to mirror human behaviour	1 (1–2)	1	–2.46	**0.01**
Demonstrating a proactive attitude	1 (1–2)	1	–3.31	**< 0.001**
Physical shape (large back…)	1 (0–2)	0	–2.86	**< 0.01**
NOT Demonstrating high sensitivity/reactivity	1 (0–2)	1	–3.92	**< 0.001**
Demonstrating high sensitivity/reactivity	1 (0–2)	1	–4.8	**< 0.001**
Demonstrating a passive attitude/stillness	1 (0–1)	1	–6.02	**< 0.001**
Demonstrating boldness	1 (0–1)	1	–6.8	**< 0.001**
Physical performances (stamina…)	1 (0–1)	0	–6.29	**< 0.001**
Demonstrating shyness	0 (0–1)	0	–8.78	**< 0.001**
Demonstrating impetuousness/bumptiousness	0 (0–1)	0	–8.5	**< 0.001**
Overall reliability coefficient (17 items, n = 113)	Alpha 0.7830		Standardised Item Alpha 0.7817	

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(124 participants gave three responses while two participants offered one response) for a total of 374 responses. Seven responses were excluded due to the question having been misunderstood. The 367 selected responses were regrouped into categories and presented in decreasing order of popularity: aggressiveness towards humans (24.80%; 91/367); health issues (13.35%; 49/367); anxiety/fear (8.99%; 33/367); high reactivity (7.36%; 27/367); behavioural characteristics (such as cranky, vicious, high energy, unsafe behaviours) (7.08%; 26/367); depression (6.27%; 23/367); unfriendly/untrusting towards humans (5.72%; 21/367); social issues (such as aggression towards other horses, gregariousness, not social, 5.45%; 20/367); disinterest in work (5.45%; 20/367); previous trauma (5.18%; 19/367); horse body shape or locomotion (4.36%; 16/367); horse training issues (2.45%; 9/367); unpredictability (1.91%; 7/367); aged horse (1.09%; 4/367); and money-related issues (such as ongoing onerous medical care or feed) (0.54%; 2/367). Two participants indicated 'None' meaning that no sign would make a horse unsuitable for EAS purposes.

When participants were asked about the steps of their assessment programmes for horse suitability among pre-selected responses (multiple selection), the most common methods were observation in a group of horses (73.64%; 95/129), followed by observation of reactions to various objects used in EAS programmes (71.32%; 92/129), observation in the horse work environment (69.77%; 90/129), ground trial with an experienced specialist (57.36%; 74/129), ridden trial with an experienced rider (41.86%; 54/129), ground trial with a horse novice (28.68%; 37/129), ridden trial with a novice rider (24.81%; 32/129) and driven trial with an experienced driver (5.43%; 7/129). Twelve participants (9.3%) stated that they had no assessment process regarding the suitability of their horses. In the free text open-ended box, five participants explained that each horse underwent a trial period which varied between 30 and 90 days. Others revealed that they also evaluated the horse's capacity to interact with humans and with other horses, their health, their emotional reactions while others considered feedback from the previous owner about the horse's behaviour.

When participants were asked about the length of time it took to decide upon a horse's suitability or otherwise for EAS programmes (fill-in-the-blank question), the majority (72.27%; 86/119) declared it typically took less than six months. However, there was great variation shown in the answers provided, i.e.: 'immediate to a few sessions' (16.81%; 20/119), 'a few weeks' (18.49%; 22/119), 'one to two months' (15.97%; 19/119) to 'three to six months' (21.01%; 25/119). For 11.76%, it can take from several months to several years (14/119): 'Seven months to eleven months' (4.20%; 5/119), 'One year to two years' (5.04%; 6/119), 'Several years' (2.52%; 3/119). Some participants also declared it to be a time-frame highly specific to each horse (14.3%; 17/119) or that the suitability assessment was carried out on an ongoing basis (1.7%; 2/119).

Training of equids

Among the participants, 81.1% declared that they had a training process in place to enable preparation of the horse as regards beneficiaries' safety and welfare (103/127). For 97.1% training is carried at their own facility by themselves or their team members (100/103). When asked to describe training methods (free text), participants gave rise to a plethora of different practices. The 192 responses were categorised and are presented here in decreasing order: ground education (such as in hand or free in a round pen, 20.83%; 40/192); introduction to new stimulation (such as tools or equipment used in EAS: cones, poles, umbrellas, balls or wheelchairs, lift training, mounting ramp, 17.71%; 34/192); ridden work (11.46%; 22/192); basic handling (such as leading and getting used to side leaders, 9.38%; 18/192); acclimatisation to facilities (8.33%; 16/192); simulation of session with likely client base/volunteers (6.25%; 12/192); herd introduction (4.69%; 9/192); behavioural assessment (4.69%; 9/192); simulation of session with an EAS professional (3.13%; 6/192); physical training and/or care (3.13%; 6/192); permit the horse to observe other horses in sessions (3.13%; 6/192); education with positive reinforcement (2.60%; 5/192); crowd training (such as a loud group of beneficiaries, 2.08%; 4/192); education with an external trainer (1.04%; 2/192); herd separation training (1.04%; 2/192); and driven work (0.52%; 1/192).

Welfare of equids

The participants were asked for their three most important signs to check during the daily routine for ensuring a horse has good welfare in a fill-in-the-blank response. This was answered by 124 participants (123 participants gave three responses and one supplied one response) for a total of 370 responses. Sixty-three responses were focused on safety/management practices (e.g. feed and forage availability, no hazards, gates that close properly) and did not respond directly to the horse-centred question (63/370). Therefore, these responses were not included and only 307 were selected, regrouped into categories and ranged in decreasing order. In their daily routine, the three signs most frequently reported as being checked by our participants to make sure their horse have good welfare are: horse soundness (41.04%; 126/307; general health, injuries, illness, shoe check); horse general attitude (35.83%; 110/307; posture and interest in environment, normal social interaction in herd, behaviour during warm up and EAS sessions); horse appetite (16.29%; 50/307; normal eating/drinking behaviour and defaecation check); and daily interactions with humans (6.84%; 21/307; engaging with horse handler and beneficiaries, willingness to participate to the session). Then, participants were asked, according to their experience, to cite the three most important things to ensure positive welfare of EAS horses in a fill-in-the-blank question. This question was answered by 122 participants (three responses each) for a total of 366 responses. Thirty-six responses were excluded due to a lack of detail (e.g. routine, good husbandry, safe environment) (36/366). The 330 categorised responses corresponding to the main things that the participants considered to ensure positive welfare of EAS horses are presented in Table 2. The are presented in descending order of popularity. In the same question, three participants added an extra comment: "*horses need to be allowed to be horses*", [horses need to be] "*treated as sentient beings, not tools*" and "*does he look happy*".

Detailed information on horses

Thoroughbreds versus other breed horses

The survey generated data on 427 equids. We chose to compare the data on thoroughbreds (TBs) versus other breed horses (OBs), considered as the general population of EAS horses composed of ponies, draft horses or warmbloods. Therefore, other equids (donkey; n = 2, mule; n = 1), crossbred horses (n = 26) or horses for which no breed was properly defined (n = 5) were removed. All horses indicated as retired (n = 6) were also removed. There were data on 57 TBs and 330 other breed horses (142 warmbloods, 141 ponies and 47 draft horses).

The TB horses were significantly younger than OBs (median 14 vs 17 and range 3–28 vs 3–30 years, $t(383) = 2.78$; $P = 0.006$) but

https://doi.org/10.1017/awf.2024.51 Published online by Cambridge University Press

Table 2. Categorised fill-in-the-blank responses (n = 330) of 122 participants in response to the question "In your experience, what are the three most important things to ensure positive welfare of EAS horses?" The categories and sub-categories are presented in a decreasing order according to the frequencies of responses and illustrated by quotes

Category	Sub-category	Examples of quotes
Living conditions (49.39%; 163/330)	Social interactions (19.09%; 63/330)	"horses housed in herd", "having sufficient time with the herd", "companionship", "healthy connection with other horses", "reliable herd social structure", "having the right herd mates for that particular horse", "happy herd dynamic (no bullying or fighting for resources)"
	Adequate feeding (17.27%; 57/330)	"unrestricted access to water and grazing", "sufficient and balanced nutrition", "access to hay and fresh water", "access 24/7 to feed", "quality hay and fresh water", "individualised nutrition plan"
	Turn out (13.03%; 43/330)	"having sufficient turn out", "freedom to move", "access to large paddocks and pastures", "being outside all the time", "space to move and shelter from extreme elements", "satisfying physical and locomotor needs", "live outside in herd"
Working conditions (23.94%; 79/330)	Working organisation 18.18%; 60/330	"manage the workload (number of sessions/day/weeks)", "diversify the activities", "give down time", "adapt the rider's weight to the horse", "adapt the beneficiaries to the horse", "respect individual differences to tolerate threshold", "have a predictable routine"
	Choice to engage/ disengage 5.76%; 19/330	"Giving the horse the choice to engage", "able to get away", "able to choose not to be involved", "freedom to choose when they work", "access to space to move and disengage", "right of refusal", "voluntary participation"
Human engagement 18.18%; 60/330	Human training and horse monitoring 14.85%; 49/330	"listening the horse and respect his habits", "knowing the horse behaviours/physical abilities", "being trained to handle horses properly", "monitoring the horse response to humans during sessions and take care of problems immediately", "consistency in reaction towards the horse", "build a strong positive relationship with the horse", "adapt the session to horse behaviour"
	Adequate training 3.33%; 11/330	"Maintaining good ground manners", "constructive training/conditioning", "appropriate handling", "horse education"
Health monitoring 8.48%; 28/330	Regular care 8.48%; 28/330	"Appropriate medical care", "attending veterinarian", "hoof and teeth care", "monitor the body condition", "reiki check-up after each session", "natural plant medecine"

their age did not differ significantly when the EAS centre owners and/or EAS practitioners acquired them (median 9 vs 9 and range 2–20 vs 0–26, t(356) = 0.57; $P = 0.57$). Both groups have a higher percentage of geldings than mares, but TBs comprised significantly more geldings than OBs (Geldings: 78.57 vs 59.57%; Mares: 21.43 vs 40.12%; Stallions: 0.00 vs 0.30%, $\chi^2 = 7.41$, df = 2; $P = 0.025$).

The proportion of TBs and OBs acquired via different methods differed significantly ($\chi^2 = 24.98$, df = 5; $P < 0.001$) and are represented as follows: donation (TBs = 34.55%, 19/55; OBs = 26.15%; 85/325), purchase (TBs = 29.09%, 16/55; OBs = 49.23%; 160/325), rescue programmes (TBs = 14.55%; 8/55; OBs = 5.85%; 19/85), loan (TBs = 9.09%; 5/55; OBs = 14.15%; 46/325) and bred on the practitioners' facilities and then used for EAS purpose (TBs = 0%; 0/55; OBs = 2.15%; 7/325). Some participants ticked 'other' (TBs = 12.73%; 7/55; OBs = 2.46%; 8/325) and filled in a free text box with responses such as: "[horse is] *part of the riding centre where the sessions are held*", and "[horse] *placed for retirement after injuries*" or "*owner died, and I promised a home forever*".

When asked about the horses' previous career, the responses differed significantly between the two groups ($\chi^2 = 258.92$, df = 6; $P < 0.001$). Participants indicated that most of the TBs came straight from racing (80.70%; 46/57) but some of them had a second career before starting EAS programmes (competition: 8.77%; 5/57; breeding: 3.51%; 2/57 or leisure: 1.75%; 1/57). Participants mentioned that 1.75% of the TBs (1/57) had no previous career and stated they did not know the previous career for two horses (3.51%). OB horses came from diverse activities before starting EAS (racing: 1.85%; 6/324; competition: 19.44%; 63/324, riding school: 19.44%; 52/324; leisure: 25.31%; 82/324; breeding: 3.70%; 12/324). Participants mentioned that 21.60% of the OBs (70/324) had no previous career and did not know the previous career for 39 horses (12.04%).

Most of the horses were trained in-house by the manager of the EAS centre or the staff (TBs = 67.86%; 38/56; OBs = 74.76%; 237/317) and the others by external trainers or instructors either independently or in a retraining centre (TBs = 8.93%; 5/56; OBs = 7.26%; 23/317). Participants also noted that some horses had no specific training (TBs = 23.21%; 13/56; OBs = 17.98%; 57/317).

The statistical comparison for the current use and the living conditions between the two groups are presented in Table 3. When participants ticked the open-ended other box for the EAS activities, they mainly indicated: use as a herd mate, for lunge lessons and for trail rides. When participants ticked the open-ended other box for other types of work, they indicated: trail rides, carriage driving, training sessions for EAS practitioners, in retraining for rehoming and lunging. The comparison of the main categories of beneficiaries for each group of horse is shown in Table 4.

Participants were asked whether they had ever experienced any health issues with their horse and had to select among pre-selected responses (multiple selection) and reported that 32.14% of the TBs and 43.40% of the OBs had no health issues (when they ticked the 'no issues' box) with no significant difference between the two groups ($\chi^2 = 2.48$, df = 1; $P > 0.5$). The detailed results are presented in Figure 1(a). In the 'other' open-ended free-text box, 133 other health issues were encountered and reported by the participants (118 for OBs and 15 for TBs). Nine responses were excluded due to a lack of precision or resolved issues. These 124 responses (111 for OBs and 13 for TBs) were regrouped into categories and presented in decreasing order: osteoarthritis or arthritis (OBs = 20/111, TBs = 0/13), laminitis and/or founder (OBs = 15/111, TBs = 0/13), skin conditions (sarcoids, dermatitis, OBs = 15/111, TBs = 0/13), eye conditions (cataract, chronic dryness, blindness, OBs = 11/111, TBs = 1/13), pulmonary disease (Chronic Obstructive Pulmonary Disease, allergies, OBs = 8/111, TBs = 0/13), overweight (OBs = 7/111, TBs = 0/13), Cushing's syndrome (OBs = 7/111, TBs = 0/13), locomotor system conditions (kissing spines, vertebrae malformation, navicular syndrome, OBs = 7/111, TBs = 4/13), digestive

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Table 3. The current use and living conditions of thoroughbreds (TBs) and other horse breeds (OBs) used in EAS (Equine Assisted Services). Chi-squared value with the degree of freedom (df), and P-value are indicated. Significant P-values are indicated in bold. For dichotomous questions (Yes/No), the statistical comparison is shown for each item. For multiple choice with single selection questions, the statistical comparison shows the overall distribution

	TBs	OBs	χ^2(df)	*P*-value
CURRENT USE				
EAS activities (Yes/No for each item)				
Ground based	94.74% (54/57)	82.73% (273/330)	5.35(1)	**0.021**
Ground work	70.18% (40/57)	79.70% (263/330)	2.59(1)	0.11
Ridden	31.58% (18/57)	64.85% (214/330)	22.41(1)	**<0.001**
Driven	1.75% (1/57)	5.45% (18/330)	1.43(1)	0.23
EAS sessions on average the horse participate in				
< 7 sessions a week	97.62% (41/42)	80.71% (226/280)	7.37(1)	**0.007**
> 7 sessions a week	2.38% (1/42)	19.29% (54/280)		
Other type of work in parallel (Yes/no for each item)				
None	35.09% (20/57)	31.21% (103/330)	0.34(1)	0.56
Competition	14.04% (8/57)	8.18% (27/330)	2.02(1)	0.16
Riding lessons	5.26% (3/57)	15.15% (50/330)	4.02(1)	**0.045**
Leisure activities	29.82% (17/57)	31.82% (105/330)	0.08(1)	0.77
LIVING CONDITIONS				
Housing				
Individual housing	24.56% (14/57)	11.31% (37/327)	6.99(2)	**0.03**
Collective housing	71.93% (41/57)	84.41% (276/327)		
Both or depending on the season	3.51% (2/57)	4.28% (14/327)		
Average access to free exercise during summer				
A few hours a week	0.00% (0/51)	1.91% (6/314)	2.48(2)	0.29
Daily (1 to 12 h)	23.53% (12/51)	16.24% (51/314)		
Over 12 h/day	76.47% (39/51)	81.85% (257/314)		
Average access to free exercise during winter				
A few hours a week	1.96% (1/51)	6.13% (19/310)	2.89(2)	0.24
Daily (1 to 12 h)	29.41% (15/51)	20.97% (65/310)		
Over 12 h/day	68.63% (35/51)	72.90% (226/310)		
Forage (Yes/No)				
Unrestricted access	77.19% (44/51)	67.27% (222/308)	4.59(1)	**0.032**
Social contact				
A few hours a week	19.61% (10/51)	7.31% (22/301)	8.76(2)	**0.013**
Daily (1 to 12 h)	19.61% (10/51)	16.94% (51/301)		
Over 12 h/day	60.78% (31/51)	75.75% (228/301)		

conditions (chronic diarrhoea, oesophagus choke, colics, OBs = 6/111, TBs = 1/13), metabolic diseases (Equine Metabolic Syndrome, insulin resistance, OBs = 5/111, TBs = 0/13), neurologic diseases (shivering, trigeminally mediated head-shaking, OBs = 0/111, TBs = 4/13) and other health issues (such as heart conditions, Lyme's disease, OBs = 8/111, TBs = 3/13).

Participants reported that 59.65% of the TBs and 71.91% of the OBs had no behavioural issues (when they ticked the 'no issues' box). TBs tend to present more behavioural issues than OBs (χ^2 = 3.48, df = 1; P = 0.062). The detailed results are presented in Figure 1(b). In the 'other' open-ended free-text box, thirty-three other behavioural issues were encountered by the participants (29 for OBs and four for TBs). These responses were regrouped into categories and presented in decreasing order: reactions towards humans (occasional biting or nipping, pulling/pushing leader, nervous towards new people, OBs = 9/29, TBs = 1/4), emotivity (panic attacks, hyper-vigilance, strong flight response, OBs = 6/29, TBs = 1/4), riding/saddling issues (bucking when ridden, girthy when saddling, OBs = 5/29, TBs = 1/4), abnormal behaviours (door or wall kicking, OBs = 4/29, TBs = 0/4), social

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Table 4. Main categories of Equine Assisted Services' beneficiaries cited by the participants for the thoroughbreds (TBs) and other breeds (OBs) in the open-ended question. Eighty-nine responses were gathered for the TBs and 476 for the OBs. The 12 most cited responses for each group are presented in this table and represent 100% of responses for the TBs and 78.36% of responses for the OBs. The three most cited responses (highest rank) for each group are indicated in bold

	Thoroughbreds		Other breed horses	
Category of beneficiaries	Rank	Proportion	Rank	Proportion
Personal development	**1/8**	20.22% (18/89)	**2/21**	11.13% (53/476)
Veterans (mental and physical care)	**2/8**	12.36% (11/89)	21/21	0.84% (4/476)
Any trauma	**3/8**	11.24% (10/89)	13/21	2.31% (11/476)
Post-traumatic stress	4/8	10.11% (9/89)	7/21	5.67% (27/476)
At risk or in need young people	4/8	10.11% (9/89)	6/21	5.88% (28/476)
Depression	5/8	7.87% (7/89)	5/21	6.30% (30/476)
Anxiety	6/8	5.62% (5/89)	8/21	4.83% (23/476)
Child and adults with specific needs	6/8	5.62% (5/89)	16/21	1.89% (9/476)
Mental health	7/8	4.49% (4/89)	11/21	3.57% (17/476)
Prisoners	7/8	4.49% (4/89)	/	Not cited
Autism	7/8	4.49% (4/89)	**1/21**	13.45% (64/476)
Trafficking	8/8	3.37% (3/89)	/	Not cited
Physical disabilities	/	Not provided	**3/21**	8.61% (41/476)
Mental disabilities	/	Not provided	4/21	7.35% (35/476)
Addiction	/	Not provided	9/21	3.78% (18/476)
Professional development	/	Not provided	10/21	4.62% (22/476)
Sensory processing disorders	/	Not provided	12/21	3.15% (15/476)

behaviours (aggressiveness towards horses, separation anxiety, OBs = 3/29, TBs = 1/4) and sexual behaviours (stallion-like behaviours, OBs = 2/29, TBs = 0/4).

Views of the use of Thoroughbreds

When asked in a yes/no question, 56% of participants (70/125) agreed that TBs possess something specific that makes them especially interesting for EAS. Participants were then asked to state the three best features, assets, characteristics of TBs in a fill-in-the-blank question. This question was answered by 70 participants (47 participants with three responses, six participants with two responses and 14 with one response) for a total of 167 responses. Twenty-one responses were excluded due to a lack of precision or through misreading the question. Accordingly, the 146 selected responses regarding the best TB characteristics were: sensitivity (21.23%; 31/146), body/movement characteristics (17.12%; 25/146), responsiveness/flight response (12.33%; 18/146), intelligence (11.64%; 17/146), past experience (well-handled and used to a lot of activities around them, 10.27%; 15/146), friendliness and sociability towards humans (8.90%; 13/146), curiosity (5.48%; 8/146), perceptiveness (5.48%; 8/146), past trauma/bad experiences (4.11%; 6/146), trainability/willingness to learn (3.42%; 5/146). Some participants developed their responses and stated that "*many beneficiaries are inspired by the horse's past story*", sometimes with traumatic past experiences, and that horses can "*heal while helping others* [humans] *to heal*".

Among the participants, 30.40% (38/125) were already working with TBs in their EAS programmes and declared having from one to 23 TBs in their horse team (median = 2, average = 3.87). For those not already working with TBs (69.60%; 87/125), 74.41% would consider working with TBs in their EAS programmes in the future (64/86).

Over three-quarters of our participants (85.04%; 108/127) were already aware that TBs could be used in EAS programmes and 89.52% (111/124) considered TBs suitable for EAS programmes. A hundred participants also left a comment in a free text box, whether they responded positively or negatively to the previous question about suitability. Among these participants, 32% were of the opinion that suitability did not depend on the breed but on the individual (32/100), 18% acknowledged the suitability of TBs in EAS programmes with no reservations (18/100), 14% thought that TBs could be used in EAS programmes as long as they went through a thorough handling and retraining process (14/100), 12% underlined that TBs can be incorporated in certain EAS programmes but not others (12/100), 9% stated that any horse could be incorporated into EAS programmes (9/100), 6% were unsure whether TBs are suitable or not, 6% declared that their behavioural and physical characteristics make them not suitable for EAS programmes (6/100), and 3% declared that had no opinion (3/100).

Discussion

The EAS practitioners surveyed in this study consisted mainly women from 15 countries and who represent a wide range of services provided and different types of beneficiaries. The survey provided the first detailed information on over 400 individual horses involved in EAS activities: their living conditions, health and behavioural status, and the beneficiaries' type of horses involved in EAS programmes.

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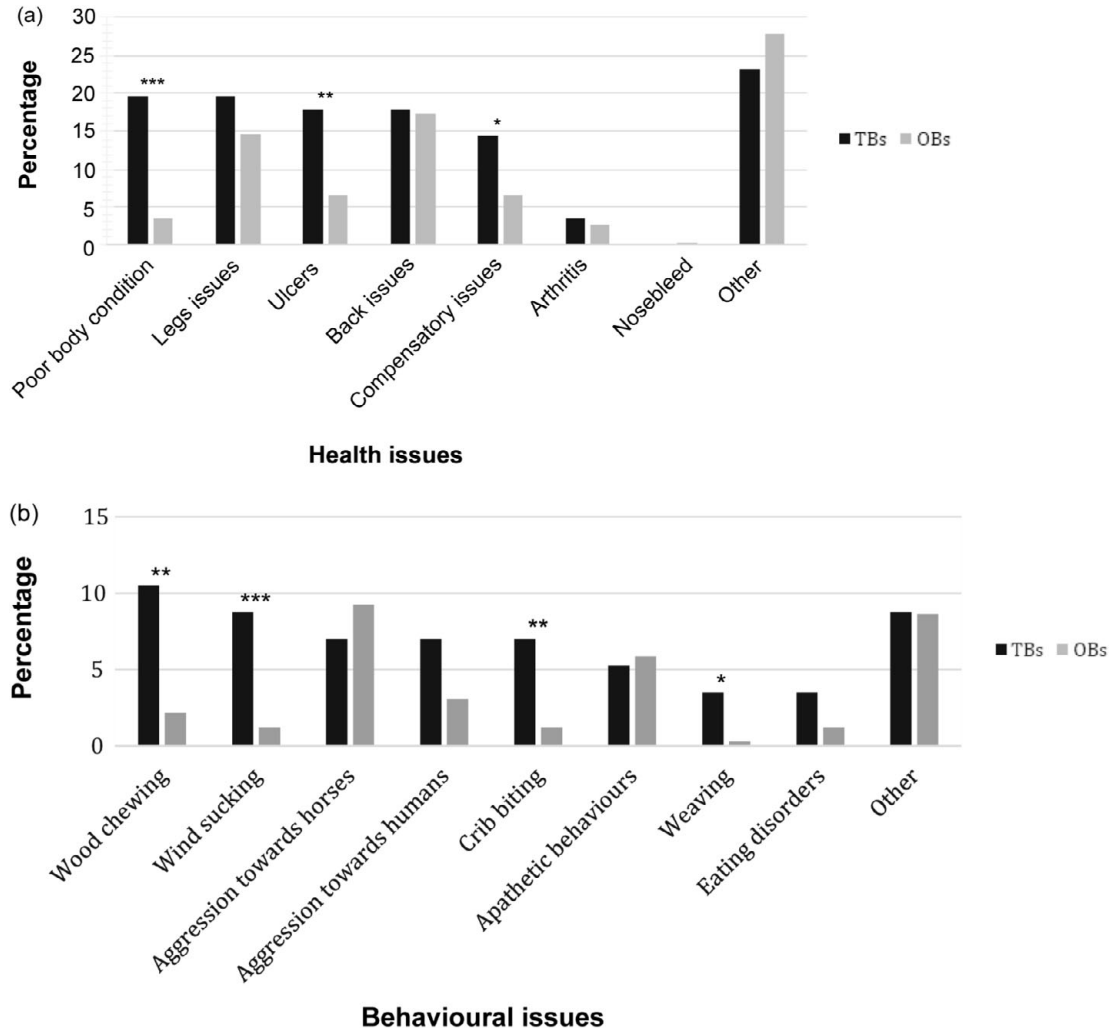

Figure 1. Showing (a) health issues (n_{TBs} = 56, n_{OBs} = 318) and (b) behavioural issues (n_{TBs} = 57, n_{OBs} = 324) indicated by the survey participants (n = 129) for their Equine Assisted Services (EAS) horses (multiple selection questions). Significant results indicated as: * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. TBs: Thoroughbred horses in EAS; OBs: Other breed horses in EAS.

Selection criteria and personality

Our participants deemed demonstrating a good personality to be the most important selection criteria. Personality is a complex concept, and certain specific selection criteria cited by participants could also be construed as being components of personality. Some chosen criteria, such as reactivity to humans ('demonstrating a special bond to humans', 'demonstrating an ability to mirror human behaviour') or emotivity ('not demonstrating a high sensitivity/reactivity', 'demonstrating a passive attitude/stillness') were in line with previous horse personality traits definitions (Lansade & Bouissou 2008; Lansade *et al.* 2008a,b). In a previous survey, personality was also considered important by the practitioners when selecting a horse, but no further information was provided on the specific personality traits (Rankins *et al.* 2021).

Participants were also questioned on the specific characteristics that make TBs especially useful for EAS. Again, certain personality components were cited such as emotivity ('responsiveness/flight response'). The flight response is defined as a fear response where the horse withdraws from a perceived danger by bolting or shying. Each individual can adapt the intensity of the withdrawal to the specific situation (Waring 2003; Starling *et al.* 2016). This fear response could lead to injuries for humans and is often considered undesirable for equestrian purposes for riders or handlers (Starling *et al.* 2016; Romness *et al.* 2020). Surprisingly, this flee response display by EAS horses seemed to be considered useful by some practitioners, the suggestion being that it encouraged beneficiaries to be more attuned to the response of the horse in response to their actions. However, the intensity of the horse flight response expected by the practitioners might be specifically adapted to EAS purposes to avoid human injuries and therefore, would need to be clarified.

As for the reactivity to humans, several participants also used the expression 'friendliness and sociability towards humans' and the word 'sensitivity' to describe the best TB assets. Indeed, 'sensitivity' might not be linked to the sensory sensitivity but rather to the horse's perception and response to conspecifics (Wathan *et al.* 2016) or to human emotional cues (Baba *et al.* 2019) or their ability to become attuned to the rider/human's psychological state (Merkies *et al.* 2014). These responses emphasise that reactivity to humans, and friendliness and appropriate responses in particular might be a key characteristic for TBs in EAS.

Curiosity, defined as exploratory behaviours towards novel stimuli (Christensen *et al.* 2021), was also cited as an important selection criterion for general EAS horses and emphasised as being

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an important characteristic for TBs used in EAS by certain participants. Christensen *et al.* (2021) found curiosity to be positively linked to higher performance by horses in learning tasks. This trait might be of particular use in EAS horses that need to develop cognitive abilities for adaptation to different categories of beneficiaries' reactions in EAS programmes. Also, 'intelligence' was considered by participants as being one of the best TB characteristics for EAS purposes and could be defined as them being fast-learning horses. Further clarification of the meanings of terms used by participants and correspondence with scientific terms would enable greater accuracy in interpreting these attributes. Finally, as has been stated in several studies, personality can also be influenced by external factors such as age, environment or past experience and would need to be considered for further studies and experimental design (Rankins & Wickens 2020).

There were similar selection characteristics also mentioned, with no ranking, by practitioners in an earlier survey that never specified the breed of horse. These included 'friendliness', 'responsive to cues', 'brain', 'calmness', 'quietness' or 'quiet demeanour' (Rankins *et al.* 2021). However, the main EAS activities in the reported centres were adaptative or therapeutic riding, where quiet horses might be necessary for their categories of beneficiaries. In our TBs sample, the horses were used with varied beneficiaries' categories mainly for mental healthcare, such as personal development, post-traumatic stress, or trauma, and only a third of them participated in ridden EAS programmes.

In the horse-centred question, some TBs and OBs were interestingly reported to have shown aggressiveness towards horses and/or humans. Aggressive behaviour could have several causes, such as fear-induced aggression, hormonal disorders or unsuitable conditions (Olczak & Klocek 2014) but could also be linked to a personality trait: the reactivity to humans (Lansade & Bouissou 2008). Interestingly, participants described aggressiveness toward humans as the main reason why a horse would be deemed unsuitable for EAS programmes. A result which begs the question whether horses reported here had been initially selected by practitioners with this behavioural issue or whether it had emerged over a period of time. Certain working and living and conditions could also trigger this behaviour.

Horse training and human safety

Once acquired, over ninety percent of the practitioners reported keeping their horses for a selection trial/assessment period. However, the time-frame of this trial/assessment period often appeared to overlap with the designated EAS training period. Indeed, over eighty percent declared a training process was in place regarding beneficiaries' safety and welfare. In the horse industry, horse-related human injuries are often reported when handling or riding a horse and these revolve around three components: the horse, the human and the environment (Carmichael *et al.* 2014; Chapman & Thompson 2016). The most frequent injuries involve handlers or bystanders being kicked or, in the case of riders, being thrown from their horse (Hawson *et al.* 2010; Carmichael *et al.* 2014). In EAS, multiple bystanders (volunteers, practitioners, assistants, other beneficiaries or even family members) can be involved with horses for different purposes: helping with grooming, handling/leading the horse or side-walking to secure the rider. Also, beneficiaries and volunteer handlers can be unfamiliar with horses (Rankins *et al.* 2021; Ferlazzo *et al.* 2023) which increases the risk of injury for all parties involved. This context underlines the importance of a successful training programme for EAS horses. Rankins *et al.* (2021) reported that a majority of the practitioners they surveyed encountered challenges with their horse training programme and half of them identified the need for better training programmes or better trained horses.

Our results illustrated great variation in the training practices of EAS horses, including basic training methods (e.g. handling, ground education, ridden work), specific EAS training methods (e.g. introduction to new stimulations, simulation of session, crowd training) and familiarisation with the new environment (e.g. acclimatisation to the facilities, herd introduction). This reveals the lack of a specific and reliable assessment process for training suitability for horses in EAS. Processes appear more to be specifically adapted to each centre's EAS programme in order to enable the horse becomes familiar with the facilities, the staff and the type of exercises undertaken with the beneficiaries. A basic ground skill assessment for EAS horses was recently successfully tested as a valid predictor of equine stress level and horse behaviour (Andersen *et al.* 2023). However, the protocol was only tested on a small sample of horses and the intra- and inter-rater reliabilities were moderate. A European project also recently released the collaborative research results regarding an evaluation system of equids taking part in EAS that still has to be tested (EvaSE 2023). It is unknown whether practitioners would respond positively to a standardised protocol or prefer to adapt the assessment process to specific horse and EAS programmes, as is likely the case now. A reliable assessment/training process would still be worth exploring in order to monitor horse adaptation to EAS programmes and to enhance beneficiaries' safety. Such an assessment process would also need to undergo testing in different contexts in order to cater for the extensive range of EAS horses (e.g. sport horses, ponies, draft horses, former racehorses) and EAS activities (e.g. ridden, non-ridden).

Welfare concerns and implications for horses

The data gathered from a range of elements in our survey show that EAS practitioners were reportedly aware not only of their horses' welfare but, in particular, their living and working conditions, the quality of their interactions with humans and their overall health. Within our survey, EAS practitioners were asked to list the three most important factors in ensuring the positive welfare of EAS horses. In our questionnaire we offered no definition of horse welfare or its valence (positive or negative). The intention being to receive completely spontaneous responses that would hopefully reveal EAS practitioners' most pressing concerns regarding horse welfare.

Accordingly, the most important factors ensuring positive welfare for our participants represented virtually half the responses and focused on the horses' physiological and behavioural basic needs, including the importance of social contact, free movement and constant access to forage. This result is confirmed by the most common horses' living conditions as reported in the horse-centred question: collective housing and daily social contacts, unrestricted forage distribution and daily free exercise.

The second most important factor in helping to ensure positive welfare, according to our participants, concerned the horses' working conditions (24%) with workload appearing to be the greatest concern. Practitioners also reported that 80% of their horses participate in less than seven EAS sessions a week of unknown duration. Previous surveys have shown that EAS horses most commonly participated in EAS sessions for 2 to 3 h per day, 3 to 5 days a week for a total of 6 to 15 h per week (Rankins & Wickens

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2020; Watson *et al.* 2020). Watson *et al.* (2020) reported a median session length for EAS participants of 45 min, with horses spending 80% of the ridden time at walk. It would appear therefore that horses described here have a lighter workload than those described previously. There could be many reasons for this. These include a welfare-oriented choice, a lack of client base or the specific EAS programmes represented in this survey and further investigation is needed. Secondly, a number of participants emphasised an innovative working method whereby the horse is afforded the choice of engaging/disengaging during a session. Indeed, Rudd *et al.* (2024) suggested that restraint during EAS activities, such as being tied up while being groomed, could negatively impact the horse's experience and, thus, repeated occurrences could impact horses' affective state and quality of life (Reimert *et al.* 2023). Willingness to engage with handlers and beneficiaries was also singled out by certain participants as being an important indicator of good welfare to check as part of the daily routine. However, the perception of each interaction will depend on the nature of the affiliative contact: frequency, variety, duration, and form (Mellor *et al.* 2020). In the EAS context where a variety of people are interacting with horses, affording the animal the ability to choose whether or not to initiate the interaction could be an important step towards EAS horses' welfare.

The third most important factor in ensuring positive welfare, according to our participants, involved human engagement. Firstly, it was noted by several participants that staff involved with EAS horses need to know the horse's behaviours and physical abilities in order to gauge the horse's reaction and adapt the EAS session accordingly. Participants also stressed the importance of checking the horse's general attitude before and during EAS sessions. However, a number of studies have highlighted an inability of horse owner and caretakers to recognise and understand certain horse behaviours (Bell *et al.* 2019; Dyson *et al.* 2022). Therefore, many authors recommend improving the education of horse owners and caretakers in order to improve horse welfare (Bell *et al.* 2019; Hötzel *et al.* 2019; Hemsworth *et al.* 2021; Dyson *et al.* 2022). Secondly, some participants emphasised the importance of constructive horse training in helping to ensure positive welfare. Indeed, equine science and, in particular, the appropriate use of the learning theory, could enhance horse welfare and minimise the risk of injuries for humans (Starling *et al.* 2016).

Health monitoring was designated as the fourth most important factor in ensuring positive welfare, based around regular health check-ups and appropriate medical care. Many respondents reiterated this in response to the question on routine checks on a daily basis that help ensure positive welfare, with horse soundness aggregating about 40% of the responses. Monitoring of health is indeed an important dimension when evaluating horse welfare as the listing of health issues is incorporated into several welfare assessments (Viksten *et al.* 2016; Dalla Costa *et al.* 2017; Harvey *et al.* 2022).

Comparison between Thoroughbreds and other breeds horses

The survey results showed a predominance of geldings in EAS programmes which is consistent with previous studies (Watson *et al.* 2020; Rankins *et al.* 2021). The greater proportion of gelding in the TBs' group could be explained by a high proportion of mares becoming brood mares after racing. According to the Racing Australia Annual Report (2022), 26% of the TBs that retired in 2021 went for breeding, and the common ratio stallion/mare is 1/32 (Institut Français du Cheval et de l'Equitation 2022). Fewer mares ending up in EAS programmes could be the primary reason but other factors, such as personality, need to be explored. For instance, in Aune *et al.* (2020)'s survey, owners reported that mares moved away when being caught. This avoidance behaviour could be interpreted by EAS practitioners as an unwillingness to interact with beneficiaries or unfriendliness towards humans, and be a reason therefore for not selecting mares in EAS programmes.

Other breed horses were a median age of 17 years old which is consistent with most of the previous studies and surveys stating the most common age to be between 16 and 20 years of age (for a review, see Rankins *et al.* 2023). The median age of TB horses was younger (14 years old) but, surprisingly, TBs and OBs were acquired at a similar median age of 9 years. This may be because TBs retraining for EAS purposes is a fairly recent development, meaning that horses have not had time to age, or that TBs may have been retired early from EAS purposes due to health or behavioural issues and/or been redirected to other activities, such as leisure or sport activities. TBs were acquired mainly through donation and a greater percentage of them came from rescue programmes as compared to OBs. In previous studies, donation and purchase were the main sources of EAS horses but no breeds were indicated, and data were not gathered at an individual level (Watson *et al.* 2020; Rankins *et al.* 2021). Yet, donation of TBs after their racing career for leisure, sport or education purposes, is well established in the racing industry and so it is perhaps unsurprising that the same applies regarding a second career in EAS (Bowman *et al.* 2010; Heleski *et al.* 2020; Skyner *et al.* 2024). Surveyed TBs are used slightly more frequently for ground-based activities compared to OBs but a third of them are routinely ridden for EAS purposes, likely following a careful selection and training process. TBs were previously reported to be used for ridden work in therapeutic riding sessions (Svoboda *et al.* 2011; Janura *et al.* 2015). In those two publications, the experimenters used horses with at least eight years' experience in ridden EAS activities and stipulated that these horses had previously undergone training to lessen their reaction to potentially disturbing objects and difficult situations as well as enabling greater toleration of people.

TB and OB horses in our study were found to differ in living conditions with TBs' less likely to be subjected to restricted forage. This may be to prevent low body condition and gastric ulceration, in contrast to OBs where forage restriction may have been aimed at preventing obesity, especially amongst ponies (Rendle *et al.* 2018). A greater proportion of TBs lacked social contact: a quarter of them were housed individually and a fifth were not afforded daily access to physical social interactions with other horses. These housing conditions reflect TBs' customary living conditions during their racing career where stabling was reported for all horses observed, even if a few may have had some turn-out or physical social contact through windows (McGreevy *et al.* 1995; Tadich *et al.* 2013; Annan *et al.* 2023). Even in the event of the horse's racing career ending, some practitioners may still have persisted with this daily routine for a number of reasons: yard routine organisation, yard building, fear of injury or fear of general health issues. In this present survey, a substantially higher proportion of various stereotypic and abnormal behaviours (cribbing, windsucking, weaving and wood chewing) were reported in TBs. These behaviours are well described in horses and vary between studies as occurring in 10 to 48% of horses encompassing a large range of breeds and activities (for a review, see Sarrafchi & Blokhuis 2013). Some authors have suggested that TBs could present genetic

https://doi.org/10.1017/awf.2024.51 Published online by Cambridge University Press

predispositions for certain stereotypic behaviours, such as cribbing where a higher prevalence, 13.6%, was reported, and are likely to have developed during the horse's early life and/or previous career. Management practices can enhance the prevalence of stereotypic behaviours (for a review, see Sarrafchi & Blokhuis 2013; Seabra *et al.* 2021; Stallones *et al.* 2023). Therefore, the highest reported number of TBs presenting stereotypic or abnormal behaviours in the present study is not necessarily a reflection of the current state of welfare in horses. The best option in seeking to reduce the occurrence of such behaviours would be to adapt management practices such as increasing feeding time with forage, increasing social contact with congeners or facilitate turn-out at pasture (Sarrafchi & Blokhuis 2013). As for health issues reported, TBs showed a higher proportion of poor body condition, gastric ulcers and ongoing compensatory issues due to past injury during previous careers than OBs. These more prevalent behavioural and health issues could be linked to their breeding, living and/or training conditions in their previous racing career (Mactaggart *et al.* 2021), as well as their previous second career and/or current living conditions (Sarrafchi & Blokhuis 2013; Seabra *et al.* 2021; Stallones *et al.* 2023). Therefore, the costs of maintaining a TB within an EAS programme may be greater than a horse from another breed.

Views on Thoroughbreds in equine assisted services programmes

A third of the survey participants reported currently working with TBs in their EAS programmes. When directly asked, three-quarters of the participants not currently working with TBs would consider doing so in the future in their EAS programmes. According to over 50% of the participants, TBs even present specific assets that may make them especially useful for EAS programmes. Moreover, almost 90% considered TBs suitable for EAS programmes even if a number expressed reservations about the activities practised or the need for a thorough retraining process. The remaining participants were either unsure of TBs suitability or adamant that their behavioural and physical characteristics rendered them wholly unsuited to EAS programmes. Overall, this openness to working with TBs suggests that more TBs could be incorporated into EAS programmes in the future.

Study limitations

Caution should be applied in the interpretation of these results. The first limitation concerns the dissemination process that mainly used social media through a self-selecting sample. Even though our participants covered a considerable variety of EAS practices throughout 15 countries, our sample is not representative of all EAS activities and beneficiaries. Moreover, dissemination included racing industry social networks. Therefore, participants already alerted and sympathetic towards TB horses might have been more inclined to respond to the survey. The second limitation pertains to the number of TBs reported here. Indeed, even if the results were based on 57 TBs currently used in EAS, they only represented 17.27% of our selected sample. The third limitation to this study concerns horse personality trait definitions which possibly differ from practitioners. In order to define the selection criteria for EAS horses, future studies need to clarify the definitions of expected behaviours and personality traits, especially the reactivity to humans (friendliness, sensitivity) and the emotivity (flight response, curiosity).

Animal welfare implications

While there is a growing body of studies highlighting the benefits of Equine Assisted Services for people, a notable gap remains in considering the EAS experience from the horses' perspective and how best to effectively select, train and maintain the most suitable horses. Our results showed that some precise behavioural criteria are sought when selecting an EAS horse, including horse personality traits. In terms of animal welfare, a selection process could therefore be designed and implemented to choose the most suitable horse for each EAS centre, according to EAS activities practised (groundwork, ground based, ridden, driven) and beneficiaries. The training of EAS horses seems very specific to each EAS centre. However, training steps, adaptable to each EAS activity could be proposed to EAS practitioners to help minimise human injuries and improve horse adaptation to EAS. Overall, most of the EAS horses' living conditions align with basic behavioural and physiological needs (positive social contact, free movement, and constant access to forage) and some EAS practitioners deploy innovative working methods (free choice) aligned with horse welfare. This is a new direction of study that can also be applied to other equestrian activities.

Conclusion

The findings of this study highlight the importance of personality as a selection criterion for horses in Equine Assisted Services programmes. Indeed, the participants identified various personality traits, such as reactivity to humans and emotivity, as key components of an EAS horse's personality. These traits were in accordance with previous definitions of horse personality traits. The study also revealed concerns regarding horse training and the consequences for human safety during EAS sessions. It appears essential to have a reliable assessment process to monitor the horse's adaptation to EAS programmes and ensure the safety of beneficiaries and practitioners. Participants emphasise the importance of ensuring that EAS horses' living conditions are in line with horses' physiological and behavioural needs, that appropriate working conditions are provided, that horse training methods are appropriated, and that horse health is monitored. These findings highlight the need for ongoing education and training of EAS practitioners and staff to improve horse welfare. When compared with other breed horses, TBs were found to have different living conditions, a higher prevalence of stereotypic and abnormal behaviours, and more health issues, such as poor body condition or gastric ulcers. These differences may be attributed to breed-specific factors, as well as past and current management practices. Finally, the results of the present survey show that TBs are already used in various EAS programmes and that they have the potential to be incorporated into EAS programmes, with many participants expressing openness to work with TBs in the future. However, careful consideration of their behavioral and physical characteristics, as well as appropriate retraining processes, are necessary to help ensure their suitability and success in EAS programmes.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/awf.2024.51.

Acknowledgements. The authors are very grateful to the questionnaire participants for their time and support to this project. We also wish to thank the equine, EAS and racing organisations that disseminated the survey: Arenas for

Change, Horses For Mental Health, American Hippotherapy Association, Au-Delà des Pistes, EAGALA, Full Field Agency, HEIR UK, HETI, Horses and Human Research Foundation, Institut Français du Cheval et de l'Equitation, International Forum for the Aftercare of Racehorses, National Equine Welfare Council, Path International, Syndicat Interprofessionnel des Praticiens de la Médiation Equine, One Equine, Racing Together, Racing to Relate, Retraining of Racehorses and Treo Eile. Finally, we are thankful to Dr Helen Sharp for the article in the *Irish Field* newspaper and Reuters Science for the video reportage. The study was kindly funded by the John Pearce foundation as part of a PhD project.

Competing interest. None.

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https://doi.org/10.1017/awf.2024.51 Published online by Cambridge University Press