

Evaluating rider self-reports – challenges in monitoring equine adaptation to training and competition in eventing by self-reports

Insa Rump-Dierig¹, Charlotte Jensen², Anna Liedtke¹ and Heidrun Gehlen³

¹ Deutsches Olympiade Komitee für Reiterei, DOKR, Warendorf, Deutschland

² Institut für Veterinärepidemiologie und Biometrie, Fachbereich Veterinärmedizin, Freie Universität Berlin, Berlin, Deutschland

³ Pferdeklinik, Allgemeine Chirurgie und Radiologie, Freie Universität Berlin, Berlin, Deutschland

Summary: Self-report measurement of fatigue and wellbeing is frequently used in various sports to assess adaptability to training alterations. The aim of this study was to describe how German elite riders in the discipline of eventing assess their own fitness as well as that of their horses for the entirety of an eventing season. Short online questionnaires were used to allow eight riders to describe the training of their horses. Five criteria (general performance, ability to concentrate, general state of mind, general muscular condition and emotional wellbeing) were used to assess their horse's, as well as their own wellbeing. A 1–10 rating scale was used to score each criterion resulting in an average of 38 out of 50 (maximum wellbeing). The horse score and the rider's score were linearly correlated above a score of 30 points. The horse score also positively correlated with its success at competitions. Horses which are regularly turned out for grazing received a higher horse score. It can be concluded that self-report measurement of fatigue and wellbeing can be a useful tool for trainers and riders to better determine the horse's fatigue and recovery.

Keywords: self-report measurement, fatigue, training management, performance diagnostics

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Correspondence: Insa Rump-Dierig, Am Hang 6, 57462 Olpe, insa_rump@web.de

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Introduction

The key to optimal training lies in the best possible knowledge of the physical and mental state of the athlete, a principle also applicable to equestrian sports.

Daily fine-tuning of training in professional sport occurs based on the assessment of the state of fatigue. Psychological questionnaires or assessments can evaluate an athlete's mental fatigue, mood disorders, stress levels and general wellbeing. This can include measurements such as the Profile of Mood States (POMS) or specialised questionnaires to assess fatigue and recovery, with the aim being to maximise the training effect while avoiding prolonged recovery deficits [1,2]. Numerous fatigue markers are known in elite sports, which have been used for decades, with the caveat of great individual variability. The correspondingly wide reference ranges make it difficult to accurately assess the athlete's individual state of fatigue [3,4].

Evidence of documented training protocols for sport horses is scarce [5]. Only a few studies have begun to analyse training protocols and workloads [6]. Mental and physical stress are consistent and early markers for overload and overtraining [7].

In various sports, generalised stress has been described as sensitive to weekly training adaptations [8]. Self-report is one method of documenting this. A review by Saw et al. [9] points out that modern sport has adopted an increasingly scientific approach to sports preparation via athlete monitoring. Self-report measurements of athletes have the potential to provide valuable insights into training response. This is supported by Thorpe et al. [10] who found that perceived ratings of wellbeing are more sensitive than heart rate monitoring to intra-week variations in training load, experienced by elite football players during in-season training weeks. Optimal performance is achievable when athletes recover appropriately after training and competitions and obtain an optimal balance between a training response and an adequate recovery [11].

Eventing consists of three disciplines: dressage, show jumping and a cross-country. Beside the schooling of the three different individual disciplines, the training includes balance training, as well as endurance and units of strength training [12,13]. The assessment of the horses in training is based on the riders' own experiences. Daily training regime documentation is variable amongst riders. As a result, it is not possible to systematically use physical and mental condition of riders and horses to adapt their training across the board.

The correct assessment of the horse's fitness by its rider is fundamentally important in order to present the horse competition ready at an event and complete the cross-country course safely bearing in mind animal welfare [14]. Overtraining can not only manifest itself in the refusal to complete a task, but also in states of exhaustion that become visible during the ride. Various measurable parameters are used to define overtraining and states of exhaustion in a horse. Some indirect measurements include heart and respiratory rate, blood lactate levels etc. as well as changes in movement patterns [15–18]. However, behaviour and behavioural changes are also indicators of fatigue [19,20].

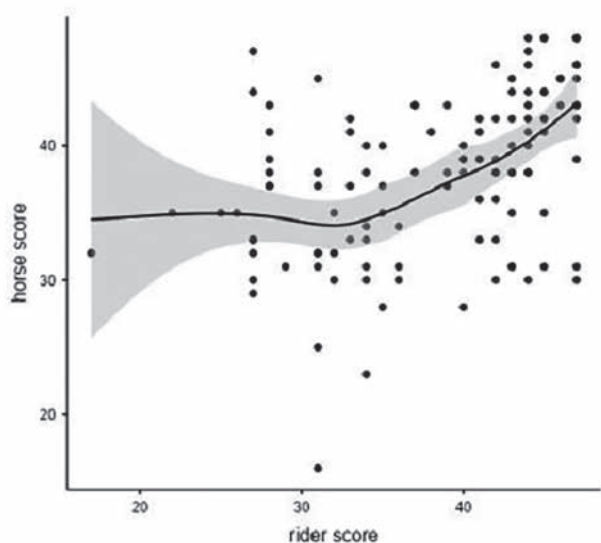


Fig. 1 Correlation of the rider and horse score showing the relationship between horse and rider welfare (standard error in gray). There is a significant correlation across all scores ($n = 120$). At a higher welfare score (above 30 points) it becomes obviously linear showing that, as the rider perceives themselves as fitter, the horse also appears to be fitter. | Die Korrelation der Reiter- und Pferdebewertung, die die Beziehung zwischen dem Wohlbefinden von Pferd und Reiter zeigt (Standardfehler in grau). Es besteht eine signifikante Korrelation über alle Punktzahlen hinweg. Bei einer höheren Wohlbefindensbewertung (über 30 Punkte) wird die Korrelation linear und zeigt, dass, wenn der Reiter sich selbst als fitter empfindet, auch das Pferd fitter zu sein scheint.

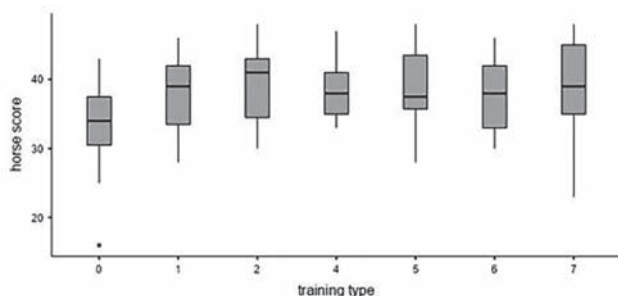


Fig. 2 Horse score correlating to the type of training, 0 = day off/transport only ($n = 10$), 1 = dressage ($n = 34$), 2 = jumping ($n = 14$), 4 = gallop training ($n = 7$), 5 = cross-country training ($n = 8$), 6 = exercise other than riding (lunge etc., $n = 29$), 7 = competition ($n = 17$). | Die Pferdebewertung in Abhängigkeit von der Art des Trainings, 0 = Ruhetag/nur Transport ($n = 10$), 1 = Dressur ($n = 34$), 2 = Springen ($n = 14$), 4 = Galopptraining ($n = 7$), 5 = Geländetraining ($n = 8$), 6 = andere Übungen als Reiten ($n = 29$), 7 = Wettkampf ($n = 17$).

The aim of this study was therefore to apply a tool for self-report measurement based on the Short Recovery and Stress Scale (SRSS) [21] amongst riders and to record their assessment of the mental and physical condition of themselves and their horses. The SRSS is used in various sports to assess the daily conditions of athletes within a few minutes [22,23]. In this study, associations between different factors, such as access to pasture, participation and success in competitions and the reported well-being of both, horse and rider, were identified. Moreover, the data recorded across the season was analysed to detect signs of fatigue. Finally, we analysed the association between self-assessment (rider) and the assessment of the horse's condition. It was investigated whether the answers to the questions increased or decreased depending on the workload, actual and perceived, how strong the maximum changes had been and which training units or competitions had a particular influence on the rider's perceived fitness of the horse.

Materials and methods

Participants and study design

The subjects of the present prospective longitudinal study were horse-rider combinations that were monitored as part of the "Performance Diagnostics" program of the German Olympic Equestrian Committee (DOKR). Prior informed written consent was obtained from all participating riders and owners of the study and agreement to participate was voluntarily and not financially compensated.

15 out of 22 sampled horses could be included in this study and were observed at seven international eventing competitions at CCI2* to CCI4* level held in Germany and Poland in 2022 (March to September). All horses were examined before participation and declared as fit to compete.

Questionnaire

The content of the questionnaire was based on the Short Recovery and Stress Scale (SRSS) [21], which is validated in various countries and sports [22,23]. The authors modified the questionnaire to be appropriate for equestrian sport. It consisted of a description of the training the horse had undergone, as well as 5 questions assessing general performance, ability to concentrate, general state of mind, general condition of the muscles and the emotional wellbeing of the horse and the rider. To assess the questions, a 0–10 rating score was used, with 0 points representing the worst possible condition and 10 points the best possible condition of the respective topics covered. The questionnaires were completed after each training session. The electronic version was generated using a purpose specific website (www.limesurvey.org, Lime Survey Community Edition, Version 3.28.21+220726) and a link to the questionnaire was available to all participating riders.

A test version was initially dispersed to the riders in February 2022, in order to eliminate unclear wording or technical problems before the study commenced. The questionnaire

included five questions about training organisation, the impression of the horse’s fitness and the rider’s self-assessment (see appendix). The riders were instructed to answer the questionnaire for an entire week before, while and after every competition, starting with the first competition in March. The riders received the link to the questionnaire website with daily reminders to answer the questionnaire henceforth.

Data processing and analysis

The completed questionnaires were exported from Lime Survey to Excel (Microsoft Excel 2019, Microsoft Corporation, Redmond, Washington), incomplete data sets were removed. Statistical analyses were performed in Excel, Jamovi (The Jamovi Project [2022, version 2.3], available at <https://www.jamovi.org>) and SPSS (IBM SPSS Software, SPSS Statistics 29). The distribution of the quantitative data was checked visually using boxplots and histograms as well as a Kolmogorov-Smirnov test to determine normality. Descriptive statistics were performed to test the hypotheses. Cross tables, scatter plots and box plots were created to illustrate correlations between two or more variables. To facilitate comparison between the condition of the horses and riders, a score for the rider and the horse (maximum 50 points each) was calculated from the 5 questions on general performance, ability to concentrate, general state of mind, general muscular condition, and emotional well-being

(Figure 2). A score below 6 points from either rider or horse, was defined as “fatigued”. The relationship between the horse and rider score was calculated using Spearman rank correlation. The influence of certain factors on the horse score (outcome) were analysed statistically using a linear mixed model (LMM). The horse was included as random effect to account for the hierarchy in the data. Fixed effects were (a) the training type (0 = day off, 1 = dressage, 2 = show jumping, 3 = basic endurance, 4 = gallop training and 5 = cross-country training, 6 = “no riding days”, where horses performed non-ridden exercise or underwent transport and 7 = competition day), (b) the influence of pasture/paddock access (yes/no), (c) the season (months March to September as categories), and (d) competitions (days to or after the next event; quantitative). The residuals of the model (and the other models) were checked for normal distribution visually using the Kolmogorov-Smirnov-test. Furthermore, the relationship between the horse score and the placing of the horse in a competition (poor, average, good) was explored with a data subset. Here, the rider was included as random effect.

The placings of the horses were obtained from the FEI database and classified according to the age of the horse, the history of being placed at this level previously and the ranking and expertise of the co-competitors. This resulted in placings of individual competitions being categorized as poor, average and good performance according to the author’s considerations.

Table 1 Number of questionnaires by month (n = 120). | Anzahl der Fragebögen nach Monat (n = 120).

	rider ID	1	2	2	3	3	3	3	4	4	5	6	6	7	7	8	
	horse ID	388	529	530	454	514	473	521	427	470	525	517	387	492	398	531	total
month																	
3																	39
4																	7
5																	20
7																	17
8																	33
9																	4
total		2	24	35	3	14	3	14	2	2	5	5	5	2	2	2	120



Table 2 Descriptive statistics of the horse score (n = 120). | Deskriptive Statistik der Pferdebewertung (n = 120).

	Median	Minimum	Maximum
Does your horse feel powerful, full of energy and capable? Fühlt sich dein Pferd kraftvoll, energiegeladen, leistungsfähig an?	8	2	10
Does your horse seem focussed and attentive when you are working? Wirkt dein Pferd bei der Arbeit auf dich konzentriert, aufmerksam?	8	2	10
Do you think your horse is happy, balanced and in a good mood right now? Denkst du, dass dein Pferd gerade zufrieden, ausgeglichen, gut gelaunt ist?	9	3	10
Does your horse’s musculature feel overworked, fatigued, hardened? Hast du das Gefühl, die Muskulatur deines Pferdes könnte aktuell überanstrengt, ermüdet, verhärtet, übersäuert ein?	8	0	9
Do you have the feeling that your horse is emotionally stressed and easily irritable? Denkst du, dein Pferd ist momentan emotional gestresst, leicht reizbar?	8	1	9

Finally the evolution of the rider score across the period was verified using a linear mixed model including the rider as random effect. The illustrations were processed using Affinity Designer (Serif Inc., West Bridgford, Great Britain).

Results

A total of 15 horses, eight geldings and seven mares aged 7 to 15 years were observed in 2022 at seven international eventing competitions ranging from CCI2* to CCI4* level held in Germany and Poland. The horses were seven Hanoverians, two Oldenburg show jumpers, two Irish sport horses, one Holsteiner, one Rhinelander, one Polish sport horse and one Selle Français. The horses were ridden by eight riders (five females, three males, aged between 21 and 39 years), all belonging to the perspective or national eventing squads of Germany. Four of the horses were ridden by one rider, a further four riders rode two horses each and the remaining three riders rode one horse each. The average penalty score in the cross-country phase was 9.0 penalty points, while the rate of incompleteness was 6%. In total, there were 120 answered questionnaires. Most of them were answered in month 3 and 4, while there were no questionnaires answered in month 6 (Table 1).

The welfare assessment of horse and rider

The horse score was calculated summing the scores of the five questions on the horse's condition (Table 2). The data was normally distributed and the average score was 38 out of a maximum of 50 points. The question on the condition of the horse's musculature was the lowest with an average of 6.6 out of 10 points. The question about the horse's ability to concentrate was rated highest with an average of 8.1 out of 10 points. All questions were mainly answered positively with points ranging between 5 and 10 being awarded and only 9.3% of all questions about the horse were awarded points below 4. Zero points were only given once for the question about the condition of the horse's musculature, while 10 points were only awarded on three occasions, once for the question regarding the horse's satisfaction and balance, about its ability to concentrate and about its strength and energy respectively.

Analogue to the questions on the condition of the horse, the riders also had to estimate their own condition (Table 3). The sum of the scores of these questions resulted in the rider score and in contrast this was not normally distributed. The riders rated themselves with a mean value of 38.1 points (also out of a maximum of 50 points). The question about their own

fatigue was rated the lowest on average with 6.1 points and the question about their own motivation was rated the highest with an average of 9.3 points. All answers to this question were above 5 points. A total of 13.8% of all questions were answered with less than 5 points, with 32.5% of the questions about the rider's fatigue scoring less than 5 points.

The scatter plot of horse and rider score (Figure 1) shows that at a rider score above 30 points, a linear relationship starts to develop, showing a positive correlation between welfare scores of horse and rider. Below this point, there is no clear correlation due to the low number of data points. Overall, there was a medium correlation between the two scores.

Effect of the type of training and the horse's welfare (horse score)

Figure 2 shows the horse score correlating to the type of training. The type of the training had a significant influence on the horse score (Table 4; LMM: $p = 0.022$): on "days off" the horse received a significant lower score. In the final model, the ran-

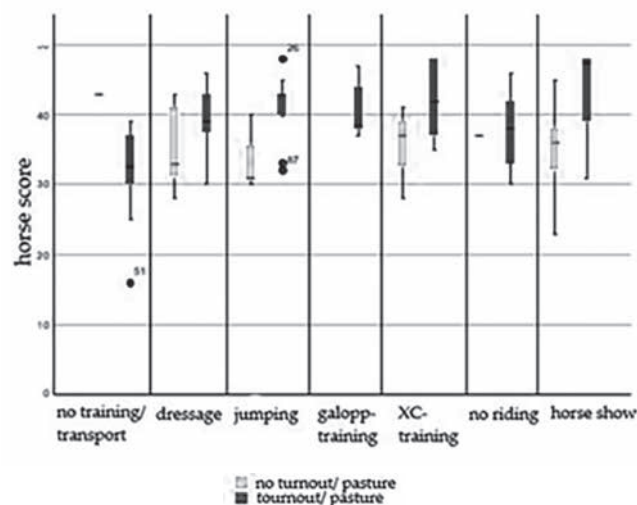


Fig. 3 Comparison of pasture/paddock and no pasture/paddock on the horse score split by type of training shows the significant impact that turnout had on the perceived welfare of the horse represented by a higher score (n day off/transport = 10, n dressage = 34, n jumping = 14, n gallop training = 7, n cross-country training = 8, n lunge or similar = 29, n competition = 17). | Der Vergleich der Pferdebewertung mit Zugang zu Weide/Paddock und keinem Zugang zu Weide/Paddock, aufgeteilt nach der Art des Trainings, zeigt die signifikante Auswirkung, die Weidezugang auf das wahrgenommene Wohlbefinden des Pferdes hatte (n Ruhetag/Transport = 10, n Dressur = 34, n Springen = 14, n Galopptraining = 7, n Geländetraining = 8, n Longe oder ähnliches = 29, n Wettbewerb = 17).

Table 3 Descriptive statistics of the riders score (n = 120). | Deskriptive Statistik der Reiterbewertung (n = 120).

	Median	Minimum	Maximum
Do you have the feeling that your muscles feel tired/over-acidified? Hast du das Gefühl, deine Muskeln fühlen sich müde/übersäuert an?	7	1	9
Do you feel tired today? Fühlst du dich heute müde?	7	0	9
Do you feel stressed today? Fühlst du dich heute gestresst?	8	2	9
Are you currently enjoying your training? Macht dir das Training aktuell Spaß?	10	5	10
Do you feel motivated? Fühlst du dich motiviert?	10	5	10

dom effect of the horse explained 24% of the variance in the data.

Figure 3 shows the score of all horses grouped by type of training and compared to access to pasture/turnout (green) or no access to pasture/turnout (blue). It was observed that the horses' scores were 3.5 points lower if the horse had no access to pasture/turnout (Table 4). Access to pasture/turnout resulted in a significant increase in the rider's assessment of the horse's wellbeing

Evolution of the horse and rider scores over the eventing season

It was observed that the riders rated their horses similarly across the eventing season (Figure 4a, average 37–41 points), as no significant differences were found ($p=0.11$, Table 4).

In contrast, the rider's average self-assessment (Figure 4b) was significantly higher between April (40 points) and July

Table 4 Influencing factors on the horse score ($n=116$); results of a multifactorial linear mixed model including the horse as a random effect. | *Einflüsse auf den Pferde Score ($n=116$); gemischtes, mehrfaktorielles lineares Modell mit dem Pferd als zufälligem Effekt.*

parameter	estimate	p-value	95% confidence interval	
			lower limit	upper limit
constant term	44.6	<0.001	36.2	53.0
type of training				
day off	-7.9	<0.001	-12.2	-3.5
dressage	-2.0	0.261	-5.4	1.5
show jumping	-0.8	0.717	-5.0	3.5
gallop training	4.4	0.163	-1.8	10.6
cross-country	2.1	0.347	-2.4	6.6
non-riding (e.g. lunge)	-4.0	0.041	-7.8	-0.2
competition	reference	.	.	.
access to pasture				
no pasture	-3.5	0.022	-6.4	-0.5
pasture	reference	.	.	.
days before or after a competition (quantitativ)				
month	0.3	0.310	-0.2	0.7
month				
March	-6.4	0.106	-14.2	1.4
April	-2.0	0.674	-11.2	7.2
May	-3.2	0.415	-10.8	4.5
July	-2.0	0.625	-10.2	6.1
August	-3.6	0.338	-10.9	3.8
September	reference	.	.	.

(43 points) when compared to the beginning of the season (March, 35 points) and the end of the season (August, 37 points and September, 36 points). In the LMM, the rider explained 60% of the variance in the data. Still, in the months April, May and July scores were higher compared to March (Table 4). At the end of the season (months August and September), no significant differences were found compared to the beginning of the season.

Evolution of horse scores immediately prior and post the cross-country phase.

The horse score was analysed for variations in the week before and after a competition (Figure 5a and b). The lowest average score (33 points) was assessed on the day after the competition. From the third day after the competition onwards, the horses were judged to be "fit above average" (40–44 points on day 5). However, there was no significant influence of the day prior or post an event on the horse score (Table 4).

Correlation between the horse's welfare (horse score), competition success and its influencing factors

The assessment of the competition success was classified as poor, average and good (Figure 6). The boxplots show that

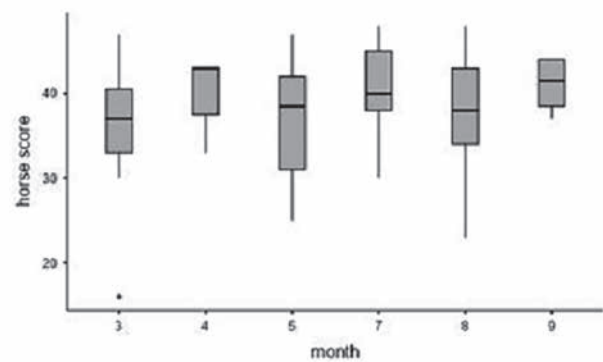


Fig. 4a Over the course of the year no significant differences were observed in the horses' scores. | *Im Laufe des Jahres wurden keine signifikanten Unterschiede in der Bewertung des Wohlbefindens der Pferde festgestellt.*

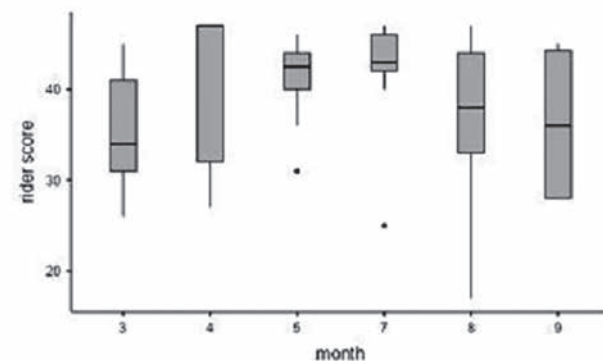


Fig. 4b Significantly higher rider scores were observed in April, May and July compared with earlier and later on in the season. | *In den Monaten April, Mai und Juli wurden signifikant höhere Reiterbewertungen beobachtet als zu Beginn und am Ende der Saison.*

the quality of the placement increases with the horse's score on the day of the competition. The horse score correlates significantly with the assessment of its success (LMM, $p = 0.045$, $n = 15$). Here, the rider accounted for 48% of the variance of the horse score.

Discussion

A form of self-report measurement, a questionnaire based on the Short Recovery and Stress Scale, was adapted to be used by riders competing in the sport of eventing to assess the well-being themselves and of their horses. While the

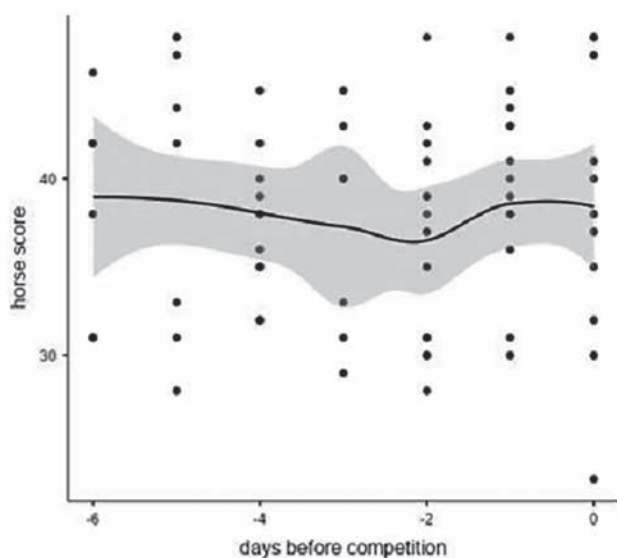


Fig. 5a Development of the horse score before the competition (the gray area describes the standard error). | Die Entwicklung der Pferdebewertung innerhalb der Tage vor dem Turnier (der graue Bereich beschreibt den Standardfehler).

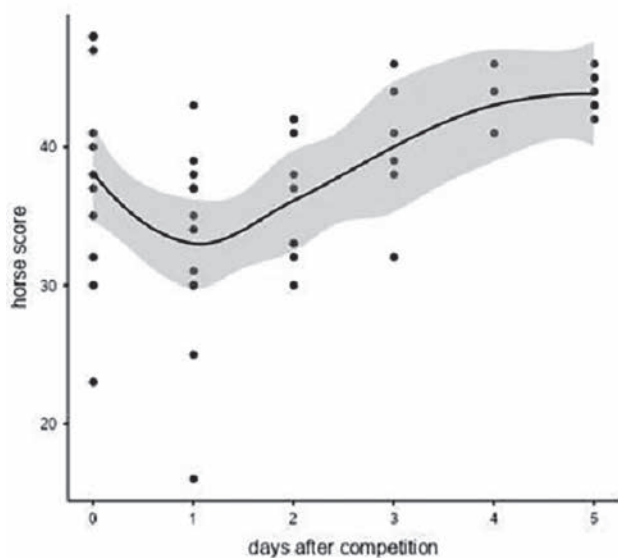


Fig. 5b Development of the horse score after the competition. | Die Entwicklung der Pferdebewertung nach dem Turnier.

horses' score did not fluctuate significantly, the riders assessed their own well-being better in the middle compared to worse at the beginning and towards the end of the competition season. However, data collection proved to be difficult, particularly regarding the regularity of responses to the questionnaires. It was not possible to obtain 14 questionnaires from a single rider on the 7 consecutive days before including and after a competition. Care was taken to ensure that the questionnaire was easy to use with a response time recorded being generally less than 3 minutes. Nevertheless, the riders did not answer the questionnaires every day without several active reminders.

The horse and rider scores showed an increasing linear correlation, this is especially true for higher scores of perceived wellbeing. We suggest this is due to a rider who is capable of maximising their own performance is also more able to train their horse optimally, thereby improving the horse's perceived wellbeing. This hypothesis is supported by the work of Pursley, who investigated the influence of the rider's mood on their horse [24]. In the lower range of scores, the horse score was observed to be independent of the rider score. A rider who therefore feels less fit is still able to perceive the horse as fit. In this instance, the results contradicted those of Pursley, but this study was done with riders who competed professionally in eventing only. Fundamentally a better basic fitness was therefore to be expected and this was consistent with the fact that a value below 5 (median option) was given in only 9.3% of all questions answered. We suspect that with amateur riders, the assessment of the horse's fitness could be lower, resulting in an increased correlation between the rider and horse score.

It is a limiting factor to the questionnaire that the rider has to answer the questions about their horse, the athlete, horse in this instance, cannot answer the questions on its own. In the LMMs, the rider accounted for up to 60% of the variability in the data. Therefore, the rider cannot be ignored as an influencing factor and comparisons between riders should be made with caution. The adjustment for the rider – as we did – is therefore necessary. An additional limiting factor is, particularly on "days off" or transport days, that the rider has reduced contact with their horse affecting that day's score. Other influencing factors studied, include the condition of the horse on the previous day and access to pasture

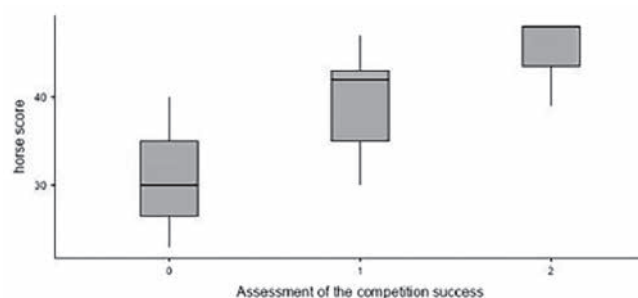


Fig. 6 The horse score correlated to the classification of the competition success (0 = poor, 1 = average, 2 = good). | Die Pferdebewertung korreliert mit der Einstufung des Turniererfolgs (0 = schlecht, 1 = durchschnittlich, 2 = gut).

or paddocks. It was expected that turnout (self-determined movement) would have a positive effect on the horse's behaviour and fitness, as has already been observed by another publication [25]. The types of ridden training, on the other hand, showed no influence on the horse score. A reason for this could be the fact, that horses and riders favour different disciplines to each other, and the assessment was therefore evenly distributed across all types of training. Regardless of the type of training, the horse was rated more positively overall if it was given access to pasture or paddocks on the same days. Access to turnout fulfils the horse's natural need to move freely and thus provides both, active and passive rest as decided by the horse. It also aids in maintaining the horse's basic fitness compared to pure stabling and reduces stress for the horse, which has a positive effect on recovery times [25].

The significant improvement in the overall impression of the horse's fitness compared to the day before the competition and from the second day after the competition has also been confirmed in other sports [10,26]. The overall low score on the day after the competition is likely caused by acute fatigue, this is also observed in many other sports [27,28]. Intensive sports sessions deplete a horse's physiological carbohydrate stores. Highly influenced by a given feeding regime, it takes horses usually 48–72 hours to fully recover their carbohydrate stores after an intensive training session [29]. Similarly, our data shows an average of 50 hours to regain an average score of 38 points after a competition. A limiting factor to the overall low horse score on the day after a competition is again the fact that the riders had a limited contact to their horses due to the fact that it was a day off or a day of transport.

The assessment of a horse's competition success within a season cannot be solely determined by the placing of any individual competition. Therefore, the authors also used the age and experience of the horse as well as the difficulty of the competition to classify the quality of a placement. For instance, placements of younger horses were ranked higher by the authors than placings of more experienced horses on the same level of difficulty. The horses' successes showed a significant positive correlation with perceived horse wellbeing (higher horse scores). It was also observed that the riders' assessment of their horses' fitness corresponded with their successes. However, the riders' perception of their horses' wellbeing could have been influenced by their knowledge of their own placing of the competition in question. Nevertheless, the correlation of the horses' success with their perceived horse scores demonstrates the validity of the questionnaire. In future it will be advisable to compare the results of this questionnaire with physiological parameters of fatigued horses.

Conclusion

The importance of the methodology to determine training sessions depends largely on the rider's compliance and is therefore not applicable for every rider. To assess a horse's welfare, a complete survey of the individual reference values over a longer period is required. Deviations from the individual av-

erage self-report measurement can indicate a lack of recovery or a developing pathology. Analysis of the daily training regime and the resulting signs of fatigue can help to create an optimised training plan in preparation for major sporting events. If conspicuously low values of wellbeing are observed for a certain type of training, which can aid in the uncovering of the horses' or riders' weakness, the training can be adapted accordingly. The correlation between competition success and horse score shows that riders assess their horses well and are therefore able to prepare their horses appropriately for the competition. However, it must be observed that only riders who belonged to the German squad in their respective age groups were taken into consideration for this study. In all cases, the riders surveyed in this study, are trainers or otherwise professionally active in the equestrian sports industry. A correct assessment of the wellbeing of their horses is crucial for their professional success. A good rider's feeling about the wellbeing of their horse is a good indication of a good placing at a show.

This study provides a basis for exploring the characteristics of a horse's exhaustion. Since fatigue is a multifactorial event, it can therefore not be determined on the assessment of a single measured parameter. However, self-report questionnaires can close part of the gap without requiring additional equipment and can be transposed down the ranks to even reach amateur sports.

Author Contributions

Conceptualization, K.C.J., A.L. and H.G.; methodology, A.L., K.C.J. and H.G.; software, K.C.J.; validation, K.C.J., A.L. and H.G.; formal analysis, K.C.J. and I.R.-D.; investigation, I.R.-D.; resources, K.C.J., A.L. and H.G.; data curation, K.C.J. and I.R.-D.; writing – original draft preparation, I.R.-D.; writing – review and editing, K.C.J., A.L. and H.G.; visualization, K.C.J. and I.R.-D.; supervision, H.G.; project administration, H.G.; funding acquisition, H.G. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was registered with the regulatory state office of Berlin (1–02.04.40.2022.VG006) but was not classified as an animal experiment.

Informed Consent Statement

Riders and owners received written information about the studied conditions and agreed in writing to the voluntary and unremunerated participation of their horses.

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

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Conflicts of Interest

The authors declare no conflict of interest.

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Questionnaire – Horse performance diagnostics

Study "Investigation of cardiac and skeletal muscle fatigue after exercise in eventing horses and its influence on performance", or "fatigue monitoring" for short.

Dear rider, thank you for taking part in our study.

As part of the study, we also want to record your subjective experiences. Of course, everything will be handled anonymously and nothing will be published with your name or that of your horse; we only need the name of your horse for internal allocation.

Have fun!

This survey contains 8 questions.

Horse name and date*

What was the main training today? *

! Please select the answers that apply: Please select all applicable answers.

Dressage

Gallop training

Jumping

Cross-country jumps

Basic endurance

Other

How long was the training in total (from mount to dismount)? *

How did you organise your warm-up phase? *

! Comment when an answer is selected. Please select the applicable points and write a comment.

Walk
in Minutes

Trot
in Minutes

Canter
in Minutes

Other

Have you moved your horse in any other way today? *

! Please select the answers that apply: Please select all applicable answers.

Pasture/Paddock

Free jumping

Horse walker/Treadmill

Lunge

Aqua Trainer

(loose) riding

Free Running

Other

Have you adapted your training due to unforeseen events? *

! Please select the answers that apply: Please select all applicable answers.

- No, training was not adapted
- Rider's illness
- Horse's illness
- Other
- Lost horseshoe
- Vaccination/dentist/farrier appointment

Horse (1 = does not apply at all, 10 = absolutely applies) *

! Please select the appropriate answer for each item:

	1	2	3	4	5	6	7	8	9	10
Does your horse feel powerful, full of energy and capable?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does your horse seem focussed and attentive when you are working?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you think that your horse is happy, balanced and in a good mood?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have the feeling that your horse's muscles are currently overworked, tired, hardened or over-acidified?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you think your horse is currently emotionally stressed/ easily irritated?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1 = does not apply at all, 10 = absolutely applies

Rider (1 = does not apply at all, 10 = absolutely applies) *

! Please select the appropriate answer for each item:

	1	2	3	4	5	6	7	8	9	10
Do you have the feeling that your muscles feel tired/over-acidified?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling tired today?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you feeling stressed today?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you currently enjoying your training?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you feel motivated?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1 = does not apply at all, 10 = absolutely applies

Thank you for your participation! Your doctoral students Insa, Charlotte, Katharina and Johanna