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Relationship of horse temperament with breed, age, sex, and body characteristics: a questionnaire-based study

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Abstract

Background: Temperament is an important issue that must be taken into consideration when purchasing horses for leisure, racing, or even work in the fields. Those who work with horses have various opinions about the relationship between a horse's body characteristics and its temperament, but few scientific papers on this issue have been published. The objective of this study was to clarify the relationships of horse temperament with sex, breed, age, and body characteristics to help purchasers when selecting a horse with the desired temperament. A web-based survey consisting of a 32-item questionnaire was used to clarify the associations of sex, breed, age, and body characteristics with a horse's temperament. The owners of a total of 112 horses from different countries (Egypt, Jordan, Palestine, and Iraq) were recruited to fill in the questionnaire about their horses.

Results: The results showed statistically significant associations of sex and breed with temperament with 89.7% and 108.3%, respectively (p values < 0.001), while there was no significant association between age and temperament (chi-square p value 0.58). The results also clarified significant associations between body characteristics (color, head and body marks, leg marks, and whorls) and temperament (all chi-square p -values < 0.001).

Conclusion: Purchasers can predict a horse's temperament from its sex, breed, and body characteristics, including coat color, body and leg marks, and whorls

Keywords: Horse, Temperament, Questionnaire, Mark, Whorl

1 Background

Temperament makes an individual unique, and it reflects patterns of thought, behavior, and emotion [1]. It was defined by Helmbrecht Howard [2] as the novel personality of a horse, as measured by observable behavioral characteristics.

A good understanding of horses' temperament may help when selecting horses for a particular use [3]. Hennessy et al. [4] demonstrated that, when selecting horses, purchasers prioritize temperament rather than performance, competitiveness, and exercise. In addition, Patricia et al. [5] clarified that riders are willing to pay more for a horse that has been tested for its temperament.

Moreover, many horses for either leisure use or horseracing are sold despite an undesirable temperament [6]. Against this background, it would be beneficial to purchasers if the temperament of horses could be predicted from their body characteristics.

Increased scientific interest has been directed toward the subject of evaluating equine temperament. A questionnaire survey is one method that would be effective to assess this [7]. Although there is a growing literature on the temperament of horses, very little scientific work has focused on the association between a horse's temperament and its body characteristics.

The objective of this study is to clarify the relationships of a horse's temperament with its sex, breed, age, and body characteristics to help purchasers to select horses with the desired temperament.

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2 Methods

A web-based survey consisting of a 32-item questionnaire was applied. The owners of a total of 112 horses from different countries (Egypt, Jordan, Palestine, and Iraq) were recruited to fill in the questionnaire about their horses. Duplicated and carelessly completed questionnaires were excluded from the study. A copy of the questionnaire is available on request from the corresponding author.

2.1 Questionnaire design

The questionnaire consisted of three parts with a total of 32 questions. Part A collected general information about the horse's name, breed, age, and sex. Part B was about the characteristic features of the horse (color, marks on head, body, and legs, whorls). Part C contained questions about the horse's temperament. The questionnaire was released online in both Arabic and English. Cornell University Horse Temperament Survey (College of Agriculture and Life Sciences, Department of Animal Science) was used as a guide for Part C of the questionnaire.

2.2 Procedure

For the evaluation, an online version of the survey was created with Google Forms. Before starting the survey, the participants were informed about the purpose of the

study and that data would be treated anonymously and confidentially.

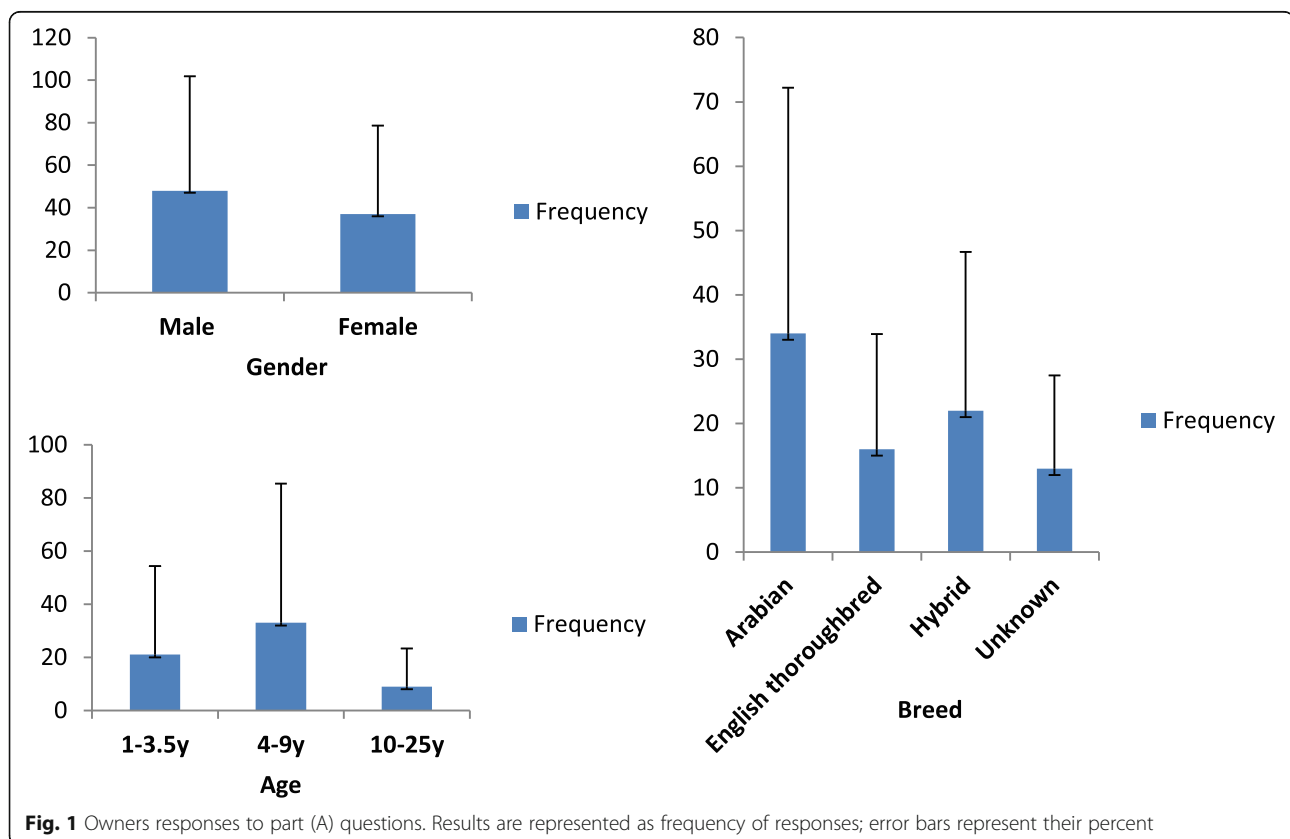
From January 2016, the questionnaire was available online at <https://docs.google.com/forms/d/1EW21I8frOf6-KH2RpWZCsNu5M3U7vlkAnAwQGoQTeOs/edit?c=0&w=1#>. Social media was used to recruit participants. Personal visits to some farms were also performed.

2.3 Statistical analysis

Data were compiled, entered into Microsoft Excel, and then analyzed using SPSS version 20. The reliability of the questionnaire was first assessed to determine its robustness for this study. Descriptive statistical analyses were performed to describe the information obtained from the questionnaire. Chi-squared test was used to analyze the categorical variables.

3 Results

Analysis of the data revealed that the questionnaire was reliable ($\alpha = 0.8291$). The owners who responded to the questionnaire items in the correct manner numbered 85 from a total of 112 respondents, after excluding the carelessly filled in and duplicated ones. Figure 1 shows the numbers and proportions of horses included in the study by sex: 53.9% were male and 41.6% were female.



The breeds of horses included in the study are also presented, revealing that the Arabian breed was predominant among the mentioned breeds (38.2%). Moreover, the majority of horses were between 4 and 9 years old (52.38%).

Figure 2 shows the respondents' answers to the questions in Part B about the horses' color, head and body marks, leg marks, and whorls. A variety of horse colors were reported, but chestnut was the most common (34.1%). Most of the studied horses had white marks on the head and body (61.8%) and legs (66.3%), and the majority had a single whorl (76.4%). Table 1 presents the owners' responses to the question about temperament, with the mean value on a temperament scale (from 1 to 9) being used for each horse. The horses were classified into two categories: higher (from 6 to 10 on the temperament scale) and lower (from 1 to 5 on the temperament scale).

We used the chi-square test for independence to determine whether there were significant associations between the temperament scale score and the horse's sex, age, breed, and body characteristics. The results in Table 2 show statistically significant associations of sex and breed with temperament scale score with 89.7% and 108.3% associations, respectively (both $p < 0.001$). The same table

reveals a non-significant association between age and temperament scale score (chi-square p value = 0.58).

Table 3 shows that there were significant associations of body characteristics (color, head and body marks, leg marks, and whorls) with temperament scale score (chi-square p values < 0.001).

4 Discussion

In this study, the temperament of horses was assessed using the owners' responses to Part C of the questionnaire and classified as higher and lower temperament. We also investigated the effects of age, sex, breed, and body characteristics on horses' temperament.

The training of mares can be very different from that of stallions or even geldings as mares are by nature more sensitive [8]. This may be related to the relationship between sex and temperament, which parallels with the results obtained in this study. The results also coincide with the work of Fenner et al. [9], who demonstrated variation in horses' temperament according to their sex, and also with an online survey that revealed that more respondents defined geldings as calm, reliable, trainable, and predictable; and mares as safe, bossy, trainable, willing, and as having a good attitude; while some respondents labeled stallions as being difficult, while a large

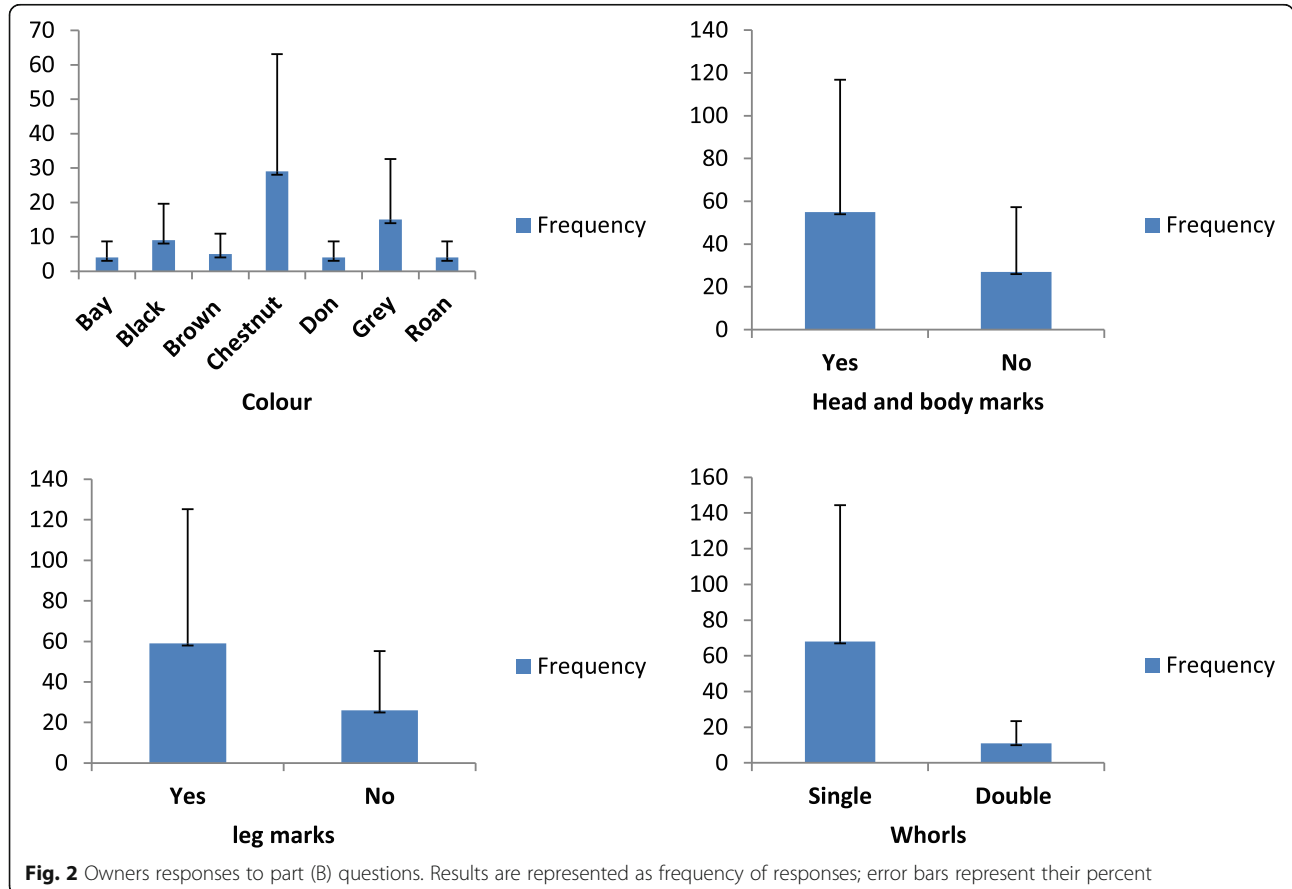


Fig. 2 Owners responses to part (B) questions. Results are represented as frequency of responses; error bars represent their percent

Table 1 Owners responses to part (C) questions (temperament scale questions)

Questions	Mean	Scale frequency Percent									General orientation
		Totally agree	Agree	May agree	To some extent	Somewhat	May disagree	Disagree	Strongly disagree	Totally disagree	
The horse looks to become nervous or agitated by new items, noises	3.39	39 46.4	8 9.5	7 8.3	4 4.8	4 4.8	5 6.0	4 4.8	2 2.4	11 13.1	May agree
The horse concentrate on target and unaffected by the environment	2.52	45 54.2	14 16.9	7 8.4	4 4.8	2 2.4	2 2.4	1 1.2	2 2.4	6 7.2	Agree
The horse looks to be at ease if left solo away from the herd.	2.88	40 50.6	6 7.6	12 15.2	6 7.6	3 3.8	1 1.3	1 1.3	2 2.5	8 10.1	Agree
The horse could be trained easily.	2.65	43 51.2	14 16.7	6 7.1	5 6.0	4 4.8	3 3.6	2 2.4	1 1.2	6 7.1	Agree
The horse looks to get energized easily or reacts too quickly to new stimuli	3.48	30 36.1	16 19.3	8 9.6	6 7.2	4 4.8	2 2.4	2 2.4	2 2.4	13 15.7	May agree
The horse looks to be never aggressive or frightful of individual	1.98	61 71.8	11 12.9	0 0.0	2 2.4	2 2.4	2 2.4	3 3.5	1 1.2	3 3.5	Totally agree
The horse looks to be concentrated in novel objects and approaches them	3.24	36 43.4	10 12.0	11 13.3	4 4.8	5 6.0	3 3.6	2 2.4	1 1.2	11 13.3	May agree
The horse looks to remember what it was trained	1.91	54 64.3	14 16.7	7 8.3	2 2.4	1 1.2	3 3.6	0 0.0	0 0.0	3 3.6	Totally agree
The horse looks to get fearful to an unusual extent	3.89	27 32.1	10 11.9	8 9.5	6 7.1	10 11.9	4 4.8	4 4.8	5 6.0	10 11.9	May agree
The horse looks to be cooperative with a caretaker when handled	2.37	49 59.0	13 15.7	6 7.2	2 2.4	2 2.4	1 1.2	4 4.8	2 2.4	4 4.8	Agree
The horse looks to be unstable from day to day.	4.52	23 27.1	5 5.9	9 10.6	9 10.6	10 11.8	3 3.5	6 7.1	1 1.2	19 22.4	To some extent
The horse looks to be tenacious once it resists a command.	4.08	28 32.9	9 10.6	13 15.3	5 5.9	3 3.5	3 3.5	2 2.4	3 3.5	19 22.4	To some extent
The horse looks to be easygoing in general.	3.22	40 47.6	10 11.9	6 7.1	4 4.8	5 6.0	3 3.6	4 4.8	2 2.4	10 11.9	May agree
The horse looks to be attentive about vicinities.	2.29	47 56.0	15 17.9	7 8.3	3 3.6	2 2.4	4 4.8	1 1.2	3 3.6	2 2.4	Agree
The horse looks to be patient	2.9	34 40.5	15 17.9	7 8.3	10 11.9	9 10.7	1 1.2	2 2.4	0 0.0	6 7.1	Agree
The horse looks to socialize with other horses in a friendly way	3.9	28 35.0	8 10.0	7 8.8	5 6.3	9 11.3	5 6.3	3 3.8	3 3.8	12 15.0	May agree
The horse looks to be dominant in fighting with other horses.	3.7	26 33.8	6 7.8	10 13.0	6 7.8	11 14.3	3 3.9	6 7.8	2 2.6	7 9.1	May agree
The horse looks to get surprised in an easy manner.	3.75	30 37.5	5 6.3	9 11.3	11 13.8	5 6.3	3 3.8	1 1.3	5 6.3	11 13.8	May agree
The horse looks to be lacks bravery in new environments.	4.47	20 23.5	8 9.4	12 14.1	9 10.6	9 10.6	2 2.4	3 3.5	4 4.7	18 21.2	To some extent
The horse can be load easily into a trailer.	3.4	38 45.2	9 10.7	8 9.5	1 1.2	7 8.3	4 4.8	3 3.6	2 2.4	12 14.3	May agree

Results are represented as mean, frequency, and the percent of respondent

Table 2 Association between temperament scale and horse’s gender, breed, and age

Temperament scale	Gender				Total	χ^2
	Male	Female				
Higher scale	43	35			78	89.7
Lower scale	5	2			7	0.000
	Breed					
	Arabian	English thoroughbred	Hybrid	Unknown		
Higher scale	33	14	18	13	78	108.3
Lower scale	1	2	4	0	7	0.000
	Age					
	1–3.5 years	4–9 years	10–25 years			
Higher scale	19	31	8		58	18.06
Lower scale	2	2	1		5	0.58

Results are represented as a frequency
 χ^2 is represented as Pearson’s chi-square value and significance

proportion of them labeled stallions as being bossy, trainable, and having a good attitude.

A horse’s breed was found to have a direct association with its temperament. This is in accordance with the work of Hausberger and Muller [10], Hausberger et al. [11], and Lloyd et al. [12], who showed that breed can affect a horse’s reactions toward humans. It is therefore predicted that horse breeds differ in their personalities.

Regarding the relationship between age and temperament, the obtained results are to some extent consistent with the work of Jezierski et al. [13], who showed that 2-year-old horses were less manageable than younger ones.

A horse’s coat color has long been considered to reflect its temperament [14]. The results in this study suggest that silver horses are more cautious in novel situations, rather than more reactive in fearful situations. They also revealed the relatively common opinion that different coat colors are related to personality traits such as calmness, boldness, or nervousness. Furthermore, Lauren et al. [15] reported that black mares were more independent than bay mares. This to some extent agrees with our results that suggested a relationship between a horse’s coat color and its temperament. Lauren et al. [15] explained the relationship between coat color and temperament as being associated with the shared signaling pathways utilized by neurons and melanocytes,

Table 3 Association between temperament scale and horse’s body characteristics

Temperament scale	Color							Total	χ^2
	Bay	Black	Brown	Chestnut	Don	Gray	Roan		
Higher scale	4	7	5	28	2	15	4	65	15.47
Lower scale		2		1	1			4	0.000
	Head and body marks								
	Yes				No				
Higher scale	50				26			76	63.16
Lower scale	5				2			7	0.000
	Leg marks								
	Yes				No				
Higher scale	52				26			78	93.59
Lower scale	7				0			7	0.000
	Whorls								
	Yes				No				
Higher scale	10				62			72	33.47
Lower scale	1				6			7	0.000

Results are represented as a frequency
 χ^2 is represented as Pearson’s chi-square value and significance

resulting in pleiotropic traits of coat color and behavior in many mammalian species.

Hair whorls in horses (rosettes) are considered a constant form of identification for horses, since a whorl does not change in direction or location during a horse's lifetime. Whorls can thus be considered the equine tantamount of fingerprints in humans [16].

The higher frequency of high-scale temperament in horses with double whorls than in those with single ones is in agreement with the work of Linda and Sybil [16], who reported that horses with two whorls, either side by side or one above the other, tend to be more reactive than average. They also tend to become disturbed for no apparent reason, and at unexpected moments. The findings also agree with a previous study [17] that noted that horses with double whorls on the face tend to be overly reactive or highly strung to novel stimuli. The relationship between temperament and this body characteristic has also been explained by research showing that skin and brain tissue come from the same layer of cells (ectoderm) during embryonic development. As embryonic cells migrate to form the fetus, skin and brain cells are closely intertwined, particularly at the scalp, explaining how this hair formation could be related to personality. It was also added that, although hair whorls cannot completely predict a horse's temperament or performance, they might be worth taking into consideration when purchasing horses.

5 Conclusions

Temperament is an important issue that should be taken into consideration when purchasing horses for leisure, racing, or even work in the fields. This questionnaire-based study proved that purchasers can predict a horse's temperament from its sex, breed, and body characteristics, including coat color, body and leg marks, and whorls.

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Authors' contributions

N.A. was a major contributor in preparing the research work and writing the manuscript. H.E. contributes in the methods of the study and reviewing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

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Competing interests

The authors declare that they have no competing interests

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