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Exploring Equestrian Psychology: How Owner Attachment Style and Personality Traits Relate to Training Choices and Relationship Parameters

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ABSTRACT

Through an online survey, this study examined the associations between horse owner attachment styles (Pet Attachment Questionnaire adjusted to horses) and personality traits (Short Five Questionnaire) with the frequency of their interactions with horses, including frequency of riding, groundwork training, and quality time with their horses, as well as headgear choices. Additionally, we investigated the associations with relationship length, number of horses owned, and whether owners are professional equestrians. We found that higher avoidant attachment was associated with less frequent interaction with horses (riding, groundwork, and quality time), while higher anxious attachment correlated with more frequent quality time. Personality traits such as conscientiousness and extraversion were positively correlated with riding frequency, while higher openness was associated with more frequent groundwork training. Owners with higher avoidant attachment were more likely to use bit-based headgear. Equestrian professionals exhibited higher avoidant attachment. Owners with one horse displayed higher anxious attachment. Longer relationships with horses were associated with lower avoidant attachment. Additionally, owners of mares exhibited higher avoidant attachment compared with those of geldings or stallions. These findings highlight the importance of understanding psychological factors in equestrian practices, offering insights into more personalized, welfare-oriented approaches to horse care and training. A better understanding of horse-owner psychology can guide the development of tailored training programs and improve human–horse interactions and relationships. Designing tools to provide equestrians with awareness of their psychological profiles could lead to better horse management and welfare.

KEYWORDS

Horse head tack; horse owner psychology; horse rider; horse welfare; human–animal interaction

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Human–animal relationships have been central to human life for millennia, with animals providing food, clothing, contributing to research, and more recently serving as companions. This interdependence affects both human (Wells, 2009, 2019; Wunderlich et al., 2021) and animal (Acharya et al., 2022; Mota-Rojas et al., 2020; Rault et al., 2020) welfare. Despite growing recognition of their importance, research on human psychology in these relationships remains limited (Amiot & Bastian, 2015). Studies have, however, identified psychological factors that shape interactions and care for animals, with attachment styles and personality traits emerging as key determinants of variations in human attitudes (Albrecht et al., 2017; Guthrie et al., 2018; Herzog & Mathews, 1997) and pet care (Coy & Green, 2018; Green et al., 2018).

An individual's attachment style can influence the dynamics of the human–animal relationship, including the amount of time spent together or the care they provide (Coy & Green, 2018; Green et al., 2018). This attachment style reflects emotional responses and behavioral patterns developed through early interactions with caregivers (e.g., parents), which continue to shape how individuals form relationships throughout adulthood (Bartholomew & Horowitz, 1991). The two-dimensional model of adult attachment reflects internal models of self and others (Bartholomew & Horowitz, 1991). When an individual's sense of attachment security and internal model of themselves and/or others are compromised, they tend to develop an insecure attachment orientation, which can be conceptualized as two orthogonal dimensions of insecure attachment: *anxious* and *avoidant* attachment orientations (Mikulincer & Shaver, 2010). Anxiety involves “hyperactivating” strategies – worry about others' availability, fear of abandonment, and longing for closeness (negative self-model). Avoidance involves “deactivating” strategies – emphasizing independence and emotional distance due to fear of dependence (negative model of others). Secure attachment is low on both dimensions, combining desire for closeness with trust and independence (Mikulincer & Shaver, 2010).

Attachment theory posits that attachment forms when four key conditions are met: proximity maintenance, safe haven, secure base, and separation anxiety (Zeifman & Hazan, 1997). These conditions are also met in relationships between humans and their pets, particularly companion animals like dogs and cats, who have been shown to provide a sense of security, safe haven, and source of emotional support to their owners (Kurdek, 2008; Zilcha-Mano et al., 2012). Owners can suffer from anxiety when separated from their pets (Dowsett et al., 2020) and can strongly grieve their loss (Lavorgna & Hutton, 2019), mirroring the dynamics of human attachment.

There is also growing evidence of distinct attachment styles of humans to their pets, reflecting the dimensions of pet attachment-related anxiety and avoidance (Zilcha-Mano et al., 2011). People with avoidant attachment styles tend to form weaker bonds with their pets, while those with anxious attachment styles feel stronger emotional connections but also experience more insecurity regarding the relationship (Reevy & Delgado, 2015; Ståhl et al., 2023). Attachment styles have also been linked to the care of pets. Shore et al. (2006) found that people with stronger attachments to their pets were more likely to keep them indoors and provide higher levels of care, particularly for house dogs compared with yard dogs. Similarly, people with attachment anxiety show heightened caregiving toward their pets, while avoidant individuals show less,

both driven by fears of negative judgment from their pets (Coy & Green, 2018). These findings suggest that attachment may significantly affect the treatment of animals in domestic environments.

Human personality traits also play a key role in human–animal relationships. Human personality refers to relatively persistent patterns of thoughts, feelings, and behaviors that characterize an individual. The Five Factor Model (Big Five) is the most widely supported framework for assessing these traits, encompassing dimensions of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Graziano & Tobin, 2016; Jackson & Roberts, 2015; Sutin, 2015; Tackett & Lahey, 2016; Wilt & Revelle, 2016, see Table 1 for details). Payne et al. (2015) reported that high neuroticism in dog owners is associated with poorer dog performance in tasks, excessive signaling during training, and delayed response to commands. Research by Giacomini et al. (2023) shows that antagonism is associated with lower empathy toward both humans and animals, resulting in more negative attitudes toward animals, while narcissistic neuroticism is linked to higher empathy and positive attitudes specifically toward animals. Compassion for animals has also been linked to agreeableness and openness to experience; specifically, the compassionate facet of agreeableness serves as a significant predictor of animal-directed empathy (Hopwood et al., 2023).

Most studies on human–animal psychology focus on pets residing closely with owners, providing a limited understanding of attitudes and behaviors toward domesticated animals living outside the home. The horse is a compelling subject, given its cultural significance and historical transition from working animal to athlete and leisure companion,

Table 1. Description of the five personality factors from the Big Five model based on the definition from Widiger, 2015.

Openness	Describes the tendency to be imaginative, curious, and open to new experiences and ideas. Individuals high in openness are characterized by their intellectual curiosity, esthetic sensitivity, and preference for novelty and variety. They are more likely to engage in creative pursuits, appreciate art, and explore abstract concepts. In contrast, those low in openness are more conventional, prefer routine, and may be less receptive to unconventional ideas. (Sutin, 2015)
Conscientiousness	Refers to a person's degree of organization, persistence, and motivation in goal-directed behavior. Individuals high in conscientiousness are disciplined, reliable, and systematic. They are often seen as responsible, hardworking, and good at planning. People low in conscientiousness may be more spontaneous and less concerned with structure, often displaying more disorganized or careless tendencies. (Jackson & Roberts, 2015)
Extraversion	Reflects an individual's tendency toward sociability, assertiveness, enthusiasm, and activity. Individuals high in Extraversion tend to seek out social interactions, enjoy excitement and stimulation, and feel energized by engaging with others. They are typically outgoing, talkative, and enthusiastic, and they often display positive emotions like joy and optimism. (Wilt & Revelle, 2016)
Agreeableness	Reflects an individual's tendency to be compassionate, cooperative, and concerned with social harmony. People high in agreeableness are empathetic, warm, and considerate, often prioritizing the needs of others over personal desires. They tend to avoid conflict and seek harmonious relationships. Those low in agreeableness may be more competitive, self-focused, and skeptical of others' intentions. (Graziano & Tobin, 2016)
Neuroticism	Refers to the tendency to experience negative emotions such as anxiety, fear, sadness, and anger. Individuals high in neuroticism are more emotionally reactive and vulnerable to stress, often experiencing mood swings and feelings of insecurity. They may have difficulty managing stress and may struggle with emotional regulation. Low neuroticism is associated with emotional stability, resilience, and a generally calm temperament. (Tackett & Lahey, 2016)

shaping human perceptions and interactions with them (Freeman, 2019; Hausberger et al., 2008). In Western cultures, horses occupy a unique role, straddling the line between livestock and companion animals (Endenburg, 1999), and the motivation for getting a horse deriving from wanting to have emotional interactions with the animal and caring for it as well as using the horse for riding, work, and competitions (Bornemann, 2025). The four features of attachment have been identified in human attachments to horses (Törmälehto & Korkiamäki, 2020) and are reflected in human interpretations of horse behavior (Merkies et al., 2024), suggesting that attachment theory can be applied in the study of human–horse relationships. Surprisingly the literature regarding the emotional bond of humans with horses and the horse owners' psychology is very limited.

DeAraugo et al. (2014) investigated the relationship between horse trainers' attachment styles and their training methods. Their findings indicate that trainers using the behavioral training approach (grounded in learning theory, emphasizing positive and negative reinforcement) had significantly higher attachment-avoidance scores compared with those in the eclectic (combines elements from multiple training approaches) or con-specific (techniques based on natural equine interactions, using body language and pressure-release principles) training groups. Importantly, the study noted that these attachment differences were unique to human–horse relationships and were not affected by the trainers' own attachment styles or relationship statuses. However, the attachment measure adapted for the study was only assessed for internal consistency and was lacking comprehensive validation.

Another study by McGowan et al. (2012) examined the relationship between horse owners' personalities and their perspectives on, and experiences with, euthanasia decisions for their horses. They found that female owners who struggled more with the decision to euthanize scored higher on neuroticism. Additionally, these owners were more likely to let their decision be driven by their strong attachment to their animal rather than its overall quality of life. To our knowledge, these are the only two studies conducted on this topic. They highlight that attachment styles may also apply to horse owners and that human personality traits may significantly influence important decisions regarding horse care.

In this study, we utilized an extensive online survey that included an adapted version of the Pet Attachment Questionnaire (PAQ) (Zilcha-Mano et al., 2011), which was tailored for horse owners (Ståhl et al., 2026), along with the Short Five Questionnaire (Konstabel et al., 2012), which was used to assess the participants' personalities (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism; see Table 1 for definitions). Our aim was to explore how horse owners' attachment styles and personality traits are associated with their behaviors toward their horses. Specifically, we focused on their activity patterns, such as riding, groundwork (training from the ground without riding), and quality time (time spent with their horses without any specific demands) frequency. Additionally, we examined the type of headgear used, as bridles with bits are known to be associated with mouth pain and injuries in horses (Anttila et al., 2022; Cook, 2003; Mellor, 2020; Tuomola et al., 2021b, 2021a); this knowledge led some horse riders to use bitless options when riding. Additionally, we investigated whether the duration of the relationship between the owner and their horse was associated with lower levels of avoidant and anxious attachment styles. To ensure a thorough analysis, we controlled for intrinsic horse

factors, such as age and sex, as well as owner-specific factors, including whether they owned one or multiple horses and whether they worked in a horse-related profession or owned horses as hobbyists (e.g., for leisure riding, non-professional sport eventing, or as companions).

Methods

Ethics Statement

The informed consent form and the research protocol were approved by The Ethics Committee for Human Sciences at the University of Turku, Humanities and Social Sciences Division (approval number 36/2023). Participant data were collected anonymously. To ensure compliance with the EU General Data Protection Regulation (GDPR 2016/679), all sensitive information (e.g., personality and attachment style survey responses) has been securely stored to protect participant privacy. Data access is restricted to authorized researchers, and no data that could provide identifiable information, despite the anonymity of the survey, has been shared in publications or presentations.

Instruments

The Pet Attachment Questionnaire (PAQ; Zilcha-Mano et al., 2011) was adapted for horse owners, with the original 26 items being reviewed and modified by O. L. to reflect human–horse attachment. Specifically, the word “pet” was replaced with “horse” (see online Table S1). The Finnish version of the 26-item questionnaire was translated into English by A. V. and into French by O. L., and the final version was validated by A. S. (online Table S1; Ståhl et al., 2026). For each respondent, scores for avoidant and anxious attachment styles were calculated (detailed in the analysis section).

We used the Short Five Questionnaire (Konstabel et al., 2012) to assess normal-range personality traits. This 64-item instrument generates scores for each of the Big Five personality traits: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The final part of the survey collected data on the respondents’ activity patterns with their horses, including riding frequency, groundwork frequency, and quality time frequency. We also gathered information about the type of headgear used (bitless, bit only, or a combination of both), along with details about the horse, such as sex, age, and breed. Additional variables included the length of the owner–horse relationship, the number of horses owned, whether the owner’s professional activity involved close contact with horses (equestrian professional), their years of experience with horses (equestrian experience), and sociodemographic information (gender, age, country of residence). Full details and definitions are provided in Tables 2 and 3.

Participants

The survey was conducted from June 2023 to February 2024 and 2,239 horse owners participated. They were recruited with a multi-modal recruitment and snowball sampling method through a variety of channels, which included targeted social media groups

Table 2. Details, definitions, and samples sizes of the different variables of interest.

Variables of interest		Sample size	Additional details	Definitions
Riding frequency	Non broken or retired	216	Non ridden horses younger than 5 years old were considered not broken yet. Non ridden horses from 18 years old were considered retired.	How often the horse owner rides/drives their horse.
	Never	138	Horse probably not ridden either by choice or for other unknown reasons.	
	Rarely	305		
	1–2/month	208	Once or twice a month.	
	1–2/ week	814	Once or twice a week.	
Groundwork frequency	4–7/ week	558	4–7 times a week.	How often the horse owner trains their horse from the ground (not on the horse).
	Never	106		
	Rarely	324		
	1–2/month	424	Once or twice a month.	
	1–2/ week	1,084	Once or twice a week.	
Quality time frequency	4–7/ week	301	4–7 times a week.	How often does the respondent spend time with their horse without asking anything from them (e.g., just being with the horse in the stall, the paddock or the pasture; giving them scratches or treats; or just doing nothing at all).
	Never/rarely	105		
	1–2/month	164	Once or twice a month.	
	1–2/week	731	Once or twice a week.	
	4–7/week	1,239	4–7 times a week.	
Headgear	Not ridden	316	Horses not ridden or trained with specific headgear.	The type of headgear used during riding or training. Respondents could choose multiple options and were classified based on whether they selected only bitless headgear, only headgear with bits, or a combination of both.
	Bitless only	71	Owner only uses bitless options when training/riding the horse (e.g., neck rope, rope or classic halter, bitless bridles ...).	
	Bitless and bit	677	Owner uses both bitless and bit head tack when training/riding the horse.	
	Bit only	1,175	Owner only uses head tack with bit when training/riding the horse.	
Relationship length	0–1 year	200		The duration, in years, the respondent knew their horse.
	2–5 years	729		
	6–10 years	669		
	> 10 years	641		

(Continued)

Table 2. Continued.

Variables of interest		Sample size	Additional details	Definitions
Horses owned	One	1,076		Does the respondent own only the horse for which they answered the survey or do they own several horses.
	Multiple	1,163		
Equestrian profession	Job	438	The main profession of the respondent involves working in close relationship with horses (e.g., riding, training, taking care of, equine therapy ...).	Does the respondent have a profession that involves a close relationship with horses? Or is it just a hobby or for leisure?
	Hobby	1,801	The respondent owns horses only for leisure and hobby purposes.	
Horse sex	Mare	961	Female Sterilized male Non sterilized male	Male horses are categorized according to their sterilization status. Female horses are usually not sterilized.
	Gelding	1,210		
	Stallion	68		
Horse age	Continuous	2,239	min = 0.5; max = 35; Mean = 13; SD = 6	Age of the horse in years.

Table 3. Details, definitions, and sample sizes of the random factors.

Random factors	Sample size	Additional details	Definition	Region of residence of the respondent.
Respondent location	North America	200	Canada and USA.	Region of residence of the respondent.
	Central Europe	1,003	France, Belgium, Switzerland, Germany, Austria, Monaco, Spain, Italy, Luxembourg, Netherlands, Ireland and Great Britain.	
Human age	Ireland and UK	182	Norway, Sweden, Denmark, Finland.	Categories of human age in years. Respondents under 18 years old were not allowed to answer the survey.
	Fenno-Scandinavia	772	Australia, New Zealand, Pacific Ocean islands, and South Africa	
	Oceania and SA	82		
	18–24	138		
	25–34	499		
Human sex	35–44	568		Human biological sex.
	45–54	517		
	55–64	380		
	65 and over	137		
	Female	2,119		
Equestrian experience	Other	120	Men, intersex, and respondent who did not wish to answer.	Respondent's experience with horses in years.
	1–5 years	90		
	6–10 years	124		
	11–15 years	248		
	16 years and over	1,777		

focused on equine topics, both online and print equine press, specialized forums, and direct outreach to horse stables (randomly picked from Google Maps, after applying the search terms “livery stables,” “horse stables,” “ranch”) in countries where English, Finnish, or French is spoken. While recruitment was targeted in these regions, the survey was accessible to respondents from anywhere in the world. The modal age group of participants was 35–44 years. Of the respondents, 2,119 were women (94.6%), 120 were classified as “other” including men, and some respondents identified as intersex or preferred not to disclose their gender (5.4%). The participants represented 21 different countries, with the majority coming from France (40.5%), Finland (33.96%), the UK (6.8%), and Canada (5.7%). However, for analysis purposes, countries were grouped into broader geographical regions to avoid categories with fewer than 50 respondents. Most respondents had over 16 years of experience with horses (79.5%). For participants who owned multiple horses (47.7%), we asked them to provide information only about the horse they felt closest to or knew best. For a detailed demographic breakdown, see [Tables 2](#) and [3](#).

Statistical Analysis

Statistical analyses were performed using the statistical software R (version 3.6.3; R Core Team, [2026](#)), and figures were created using the *ggplot2* package (Wickham, [2016](#)).

Attachment Style and Personality Trait Scores Calculation

We calculated the attachment anxiety and avoidance scores for each participant (see Ståhl et al., [2026](#) for detailed methodology); these were calculated as sum scores for both attachment styles. Similarly, we calculated personality trait sum scores for each participant, following the instructions for the Short Five (Konstabel et al., [2012](#)) using the revised agreeableness dimension and its score (K. Konstabel, personal communication, 26 November, 2024). The following are descriptive statistics for attachment styles and personality traits. They characterize scale distributions and variability in the study population:

Avoidant attachment: range 4–50, mean = 11.90, *SD* = 6.91; **Anxious attachment:** range 4–66, mean = 27.91, *SD* = 11.18; **Conscientiousness:** range –24–36, mean = 14.25, *SD* = 9.23; **Extraversion:** range –33–34, mean = 2.68, *SD* = 10.52; **Neuroticism:** range –35–32, mean = –6.79, *SD* = 11.91; **Openness:** range –20–35, mean = 13.07, *SD* = 9.64; **Agreeableness:** range –26.5–35, mean: 13.54, *SD* = 8.12. These values provide an overview of the scale distributions and highlight the heterogeneity in attachment styles and personality traits among participants.

Modeling Strategy and Collinearity Assessment

We modeled attachment style and personality trait scores as response variables rather than predictors as this approach allowed for more direct interpretation of estimated effects on the response scale. This strategy enabled the use of generalized linear mixed-effects models (GLMMs), providing model-based estimates of group differences and associations while accounting for random effects. While modeling attachment styles and personality traits as predictors is theoretically possible, our approach preserves

the underlying relationships among variables while facilitating the reporting of effect sizes as estimated differences or changes in predicted response values.

We assessed the potential collinearity between the independent variables and random factors using Spearman's rank correlation and χ^2 tests. As the relationship lengths cannot be higher than the horse's age, a strong correlation was logically found between relationship length and horse age (Spearman's $\rho = 0.72$). To address this, relationship length, initially a continuous variable, was categorized into four groups ("0–1 year," "2–5 years," "6–10 years," and "more than 10 years"; see Table 1), which reduced the correlation to 0.65. A correlation below 0.7 is commonly accepted and allows both variables to be included in the same models without causing convergence issues (Dormann et al., 2013).

Attachment Style Models

To evaluate the associations between avoidant/anxious attachment style scores and independent variables, including activity patterns, headgear usage, relationship duration, ownership of multiple horses, equestrian profession, and horse characteristics (Table 1), we employed generalized linear mixed models (GLMMs) using the glmmTMB package (Brooks et al., 2017). Since both attachment style scores were strictly positive, we applied a gamma distribution with a log link and assessed model dispersion, deviation, and overall fit of the data with the DHARMa package (Hartig, 2022). Human-related variables (equestrian experience, age group, sex, and location) were included as random effects (Table 2) to account for potential sociodemographic clustering and non-independence of observations. Estimated effects therefore represent population-level associations conditional on these random effects.

Personality Traits Models

Associations between Big Five personality trait scores and independent variables – including activity patterns, headgear usage, ownership of multiple horses, and equestrian profession (Table 1) – were assessed using generalized linear mixed-effects models fitted with the glmmTMB package. A Gaussian error distribution was applied, and model diagnostics were evaluated using the DHARMa package. Human-related factors (age group, sex, and location) were included as random effects (Table 2). As personality trait scores were not horse-specific, horse-related variables (age and sex), relationship length, and equestrian experience were excluded from these analyses.

Model Selection and Post Hoc Analyses

Model selection was based on Akaike's Information Criterion corrected for small sample sizes (AICc) using the MuMIn package (Bartoň, 2024). Candidate models were compared based on AICc values, and the most parsimonious models were retained. The final selected models, including fixed effects and random-effects structures, are presented in Tables 3 and 4.

Post hoc pairwise comparisons were conducted using estimated marginal means (EMMs) via the "emmeans" package (Lenth, 2021) to explore specific differences between factor levels. These contrasts provide model-based estimates of group differences on the original

Table 4. Presentation of the selected independent variables and random effects for each model.

Response variable	Independent variables							Random factors					
	Riding freq.	Ground-work freq.	Quality time freq.	Head tack	Horses owned	Profession hobby	Relationship length	Horse sex	Horse age	Equestrian experience	Location	Age	Sex
Attachment styles													
Avoidance	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Anxiousness	✓		✓	✓	✓	✓		✓			✓	✓	✓
Personality factors													
Openness		✓		✓		✓					✓	✓	✓
Conscientiousness	✓	✓		✓	✓						✓	✓	✓
Extraversion	✓				✓	✓					✓	✓	✓
Agreeableness		✓		✓	✓						✓	✓	✓
Neuroticism	✓			✓	✓	✓					✓	✓	✓

response scale, along with associated standard errors, test statistics, and 95% confidence intervals. Pairwise comparisons were adjusted for multiple testing using Tukey's honestly significant difference (HSD) method. Statistical significance was assessed at $\alpha = 0.05$; however, interpretation emphasizes the magnitude and uncertainty of estimated effects rather than reliance on p -values alone, particularly given the large sample size.

Effect sizes for all mixed-effects models were quantified using standardized regression coefficients β and 95% confidence intervals (CIs), calculated via the "effectsize" package (Ben-Shachar et al., 2020). These coefficients represent the expected change in the outcome in standard deviation (SD) units per one SD change in the predictor, allowing for a direct comparison of effect magnitudes across disparate variables. To provide further practical context, effect sizes were also expressed as percentage differences derived from estimated marginal means. For attachment style outcomes (modelled with a Gamma distribution and log-link), percentages were calculated from pairwise ratios as $(\text{ratio}-1) \times 100$. This approach reflects the multiplicative nature of the model, where a negative value indicates a percentage decrease and a positive value a percentage increase. For personality traits, pairwise contrast estimates were reported as raw score differences and as a percentage of the observed scale range: $(\text{estimate}/\text{observed range}) \times 100$.

Results

For clarity, only a subset of the strongest or most relevant findings is described in the main text. Full statistical results for all standardized coefficients (β) and model-estimated marginal means (EMMs), including confidence intervals (CI), effect estimates, Z or t statistics, and adjusted p -values, are provided in the online supplemental materials (Table S2; Tables S2.1 to S2.7, and Table S3). The practical significance of these effect sizes was interpreted using empirical benchmarks for small, medium, and large effects in social psychology (Lovakov & Agadullina, 2021). Specific post hoc pairwise comparisons mentioned in the text are expressed as percentage differences in raw scores between groups to aid interpretation.

Activity Patterns

Quality Time Frequency

Quality time frequency had the strongest association with avoidant attachment. Standardized coefficients indicated a large negative effect ($\beta = -0.36$, 95% CI $[-0.43, -0.28]$), suggesting that individuals spending more time with their horses exhibited substantially lower avoidance. Post hoc analyses confirmed this: horse owners spending quality time with their horse 4–7 times per week scored approximately 60% lower in avoidant attachment compared with those never or rarely doing it (ratio = 1.60, $Z = 8.93$, $p < 0.0001$) (Figure 1: A). Quality time also positively predicted anxiety, with a small effect ($\beta = 0.10$, 95% CI $[0.05, 0.15]$), consistent with post hoc analyses: anxious attachment was significantly negatively associated with quality time frequency (Figure 1: B): respondent never or rarely spending quality time with their horse scored significantly lower in anxious attachment than the other categories – approximately 12% lower than those doing it 1–2 times per month (ratio = 0.88, $Z = -2.68$, $p = 0.037$) and approximately 14% lower

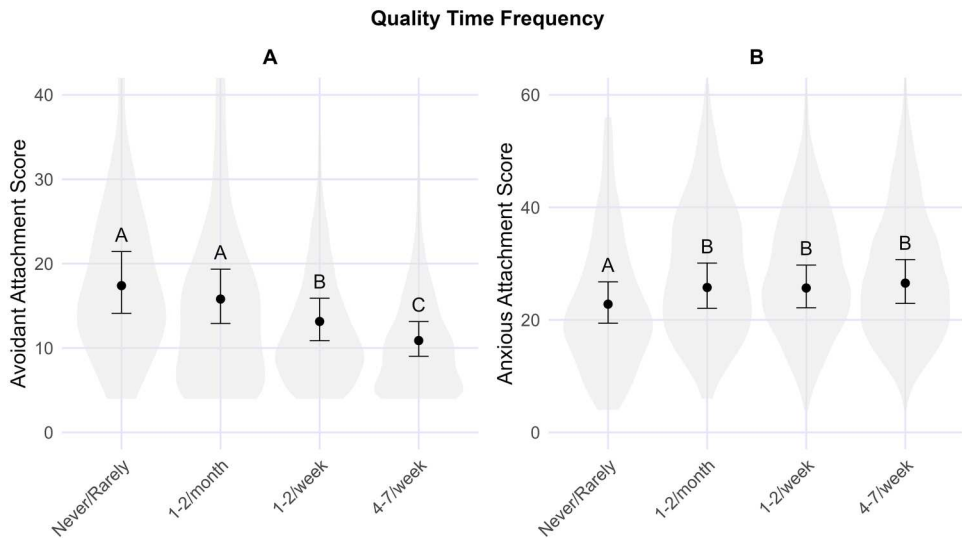


Figure 1. Association of quality time frequency with (A) Avoidant attachment score, (B) Anxious attachment score. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function *emmeans* from the “*emmeans*” package in R. The violin plots represent the distribution of the raw data.

than those spending quality time 4–7 times per week with their horse (ratio = 0.86, $Z = -4.04$, $p < 0.0001$). No significant associations with personality traits were observed.

Riding Frequency

Riding frequency negatively predicted avoidant attachment (small to medium effect: linear $\beta = -0.18$, 95% CI $[-0.29, -0.07]$; quadratic $\beta = -0.10$, 95% CI $[-0.17, -0.03]$), indicating diminishing returns at higher frequencies. Horse owners riding most frequently (4–7 times per week) showed significantly lower avoidant attachment scores compared with less frequent riders. Specifically, compared with owners riding 1–2 times per week, avoidant attachment scores were approximately 14% lower (ratio = 1.14, $Z = 4.68$, $p < 0.0001$). Compared with owners who never rode their horse, avoidant attachment scores were approximately 28% lower (ratio = 1.28, $Z = 3.75$, $p = 0.002$) (Figure 2: A). Anxiety showed a small nonlinear effect (linear $\beta = 0.07$, 95% CI $[0.03, 0.12]$; cubic $\beta = -0.07$, 95% CI $[-0.12, -0.03]$), reflecting subtle fluctuations across engagement levels but with no significant associations.

For personality traits, see Figure 2 (B, C, D). For conscientiousness, a medium, positive linear effect was observed ($\beta = 0.37$, 95% CI $[0.17, 0.57]$), indicating higher conscientiousness among individuals who rode more frequently. This association was accompanied by a small negative cubic component ($\beta = -0.14$, 95% CI $[-0.26, -0.02]$), suggesting some nonlinearity at higher frequencies. Owners riding at least 1–2 times per week scored approximately 7% higher than those never riding (estimate = -3.73 , $t = -3.36$, $p = 0.010$). For extraversion, there was a medium positive effect ($\beta = 0.34$, 95% CI $[0.23, 0.46]$), suggesting that individuals riding more frequently their horse tended to score higher on extraversion. Owners who never

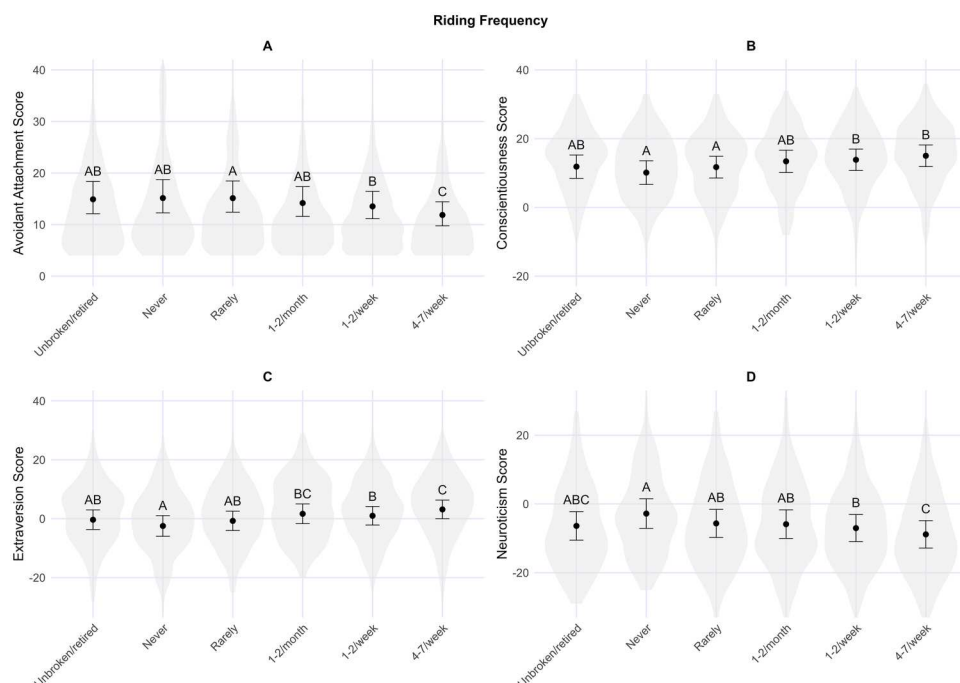


Figure 2. Association of riding frequency with (A) avoidant attachment score, (B) conscientiousness score, (C) extraversion score and (D) neuroticism score. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function `emmeans` from the “`emmeans`” package in R. The violin plots represent the distribution of the raw data.

rode them scored approximately 11% lower than those riding 1–2 times per month (estimate = -4.12 , $t = -3.64$, $p = 0.004$). For neuroticism, there was a medium negative effect ($\beta = -0.25$, 95% CI [-0.36 , -0.14]), suggesting that individuals who rode more frequently tended to score lower on neuroticism. The quadratic term was also negative ($\beta = -0.18$, 95% CI [-0.30 , -0.07]), indicating a slight nonlinear decrease at higher riding frequencies. Owners never riding scored approximately 9% higher than those riding 1–2 times per week (estimate = 4.22 , $t = 4.09$, $p = 0.001$).

Groundwork Frequency

Similarly, groundwork frequency exhibited a modest negative linear association with avoidance ($\beta = -0.10$, 95% CI [-0.18 , -0.02]), while quadratic and higher-order terms were small and statistically indistinguishable from zero. Together, these results suggest that increased engagement in both riding and groundwork is associated with lower avoidance, though the magnitude of these effects is notably smaller than that observed for quality time. Respondents practicing groundwork 4–7 times per week showed approximately 12% lower avoidant attachment compared with those practicing 1–2 times per month (ratio = 1.12, $Z = 2.95$, $p = 0.027$). Differences involving respondents who never practiced groundwork were small ($< 10\%$) and not statistically significant (Figure 3: A). Groundwork frequency exhibited small but consistent positive associations

with anxiety at both the linear ($\beta = 0.07$, 95% CI [0.01, 0.12]) and cubic levels ($\beta = 0.04$, 95% CI [0.01, 0.08]), suggesting subtle nonlinear increases in anxiety across engagement levels, but this was not revealed as significant variations in the post hoc analyses.

With personality traits (Figure 3: B, C), standardized coefficients indicated that groundwork frequency was associated with openness. The linear term showed a substantial positive effect ($\beta = 0.40$, 95% CI [0.25, 0.55]), suggesting that individuals who engaged more frequently in groundwork activities exhibited higher openness. Respondents never practicing groundwork scored approximately 9% lower than those practicing at least 4–7 times per week (estimate = -4.84 , $t = -4.36$, $p < 0.0001$). Standardized coefficients indicated that groundwork frequency was a meaningful positive predictor of agreeableness, with the linear term showing a moderate effect ($\beta = 0.24$, 95% CI [0.09, 0.39]). Respondents never practicing groundwork scored approximately 6% lower than those practicing 4–7 times per week (estimate = -2.93 , $t = -3.06$, $p = 0.019$).

Headgear

The use of a bit in the headgear demonstrated a small, positive linear association with avoidance ($\beta = 0.14$, 95% CI [0.03, 0.25]). Participants using only bit-based headgear scored approximately 21% higher in avoidant attachment compared with those using bitless options only (ratio = 0.79, $Z = -3.67$, $p = 0.001$). Compared with participants using a combination of bit and bitless headgear, exclusively bit-based users scored approximately 7% higher in avoidant attachment (ratio = 0.93, $Z = -2.85$, $p = 0.023$). Participants using only bitless headgear tended to score approximately 15% lower in avoidant attachment than those using both types, although this difference narrowly missed the significance threshold (ratio = 0.85, $Z = -2.53$, $p = 0.055$) (Figure 4: A).

For openness, there was a small positive effect only for the cubic term ($\beta = 0.13$, 95% CI [0.04, 0.22]): participants using both bitless and bit headgear scored significantly higher in openness than those using only bit-based headgear, corresponding to an approximate 4% difference of the scale range (estimate = 2.21, $t = 4.61$, $p < 0.0001$) (Figure 4: B).

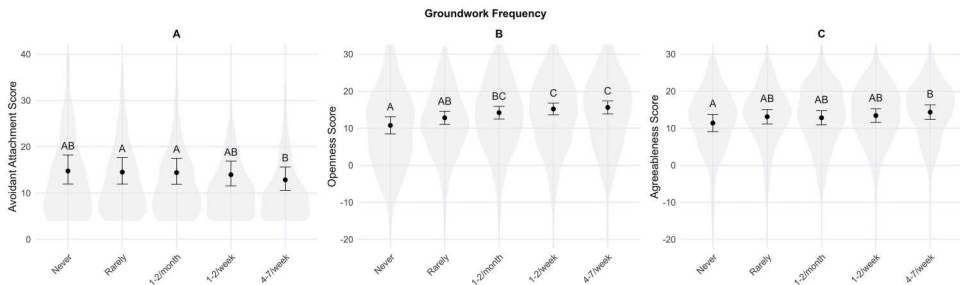


Figure 3. Association of groundwork frequency with (A) avoidant attachment score, (B) openness score, (C) agreeableness score. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function `emmeans` from the “`emmeans`” package in R. The violin plots represent the distribution of the raw data.

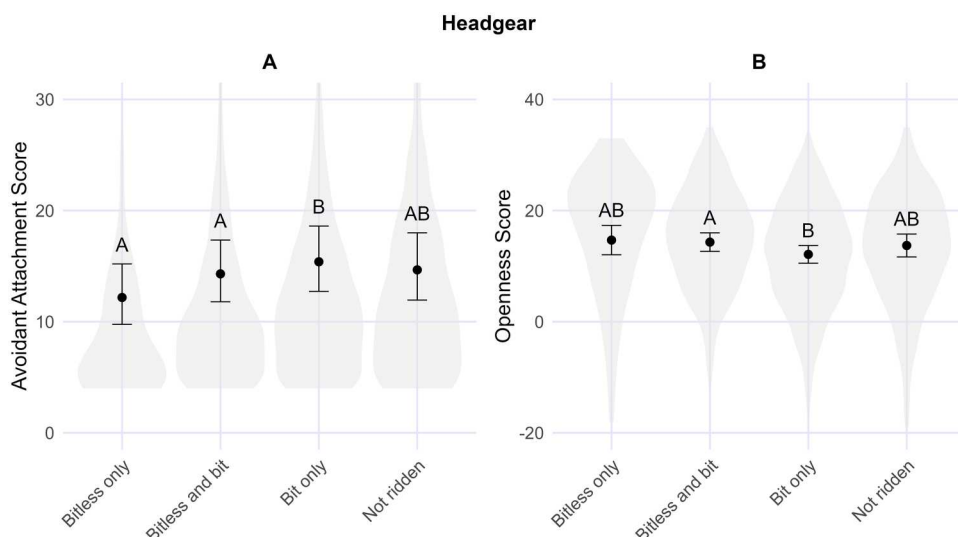


Figure 4. Association of headgear with (A) avoidant attachment score and (B) openness score. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function `emmeans` from the “`emmeans`” package in R. The violin plots represent the distribution of the raw data.

Equestrian Profession and Number of Horses Owned

Having an equestrian profession showed a small positive association with avoidance ($\beta = 0.08$, 95% CI [0.02, 0.13]). Participants with an equestrian profession scored approximately 7% higher in avoidant attachment than hobbyists (ratio = 0.93, $Z = -2.69$, $p = 0.007$). Working in an equestrian profession predicted lower anxiety ($\beta = -0.09$, 95% CI [-0.13, -0.05]), with 10% lower in anxious attachment (ratio = 1.10, $Z = 4.61$, $p < 0.0001$). In terms of personality traits, the effects were small. Having an equestrian profession was also related to openness ($\beta = 0.19$, 95% CI [0.08, 0.29]): professionals scored approximately 3% higher in openness (estimate = -1.80; $t = -3.56$, $p < 0.0001$). Having an equestrian profession was related to extraversion ($\beta = 0.14$, 95% CI [0.03, 0.25]), with 2% higher in extraversion (estimate = -1.47; $t = -2.59$, $p = 0.010$) compared with hobbyists. (Figure 5: A, B, C, D).

Owning only one horse had a small effect and was associated with lower avoidance ($\beta = -0.10$, 95% CI [-0.14, -0.05]). Participants owning multiple horses scored approximately 10% higher in avoidant attachment than those owning a single horse (ratio = 1.10, $Z = 4.20$, $p < 0.0001$). Owning a single horse was associated with slightly higher anxiety ($\beta = 0.06$, 95% CI [0.03, 0.10]). Participants owning multiple horses scored approximately 6% lower in anxious attachment (ratio = 0.94, $Z = -3.80$, $p < 0.0001$).

Personality traits had small effects. Owning a single horse was associated with higher neuroticism ($\beta = 0.19$, 95% CI [0.11, 0.27]), with participants scoring 3% lower in neuroticism compared with those with multiple horses (estimate = -2.25; $t = -4.54$, $p < 0.0001$). Finally, owning a single horse was associated with lower extraversion ($\beta = -0.11$, 95% CI [-0.20, -0.03]), with owners of multiple horses scoring approximately 2% higher in extraversion (estimate = 1.17; $t = 2.57$, $p = 0.010$) (Figure 5: E, F, G, H).

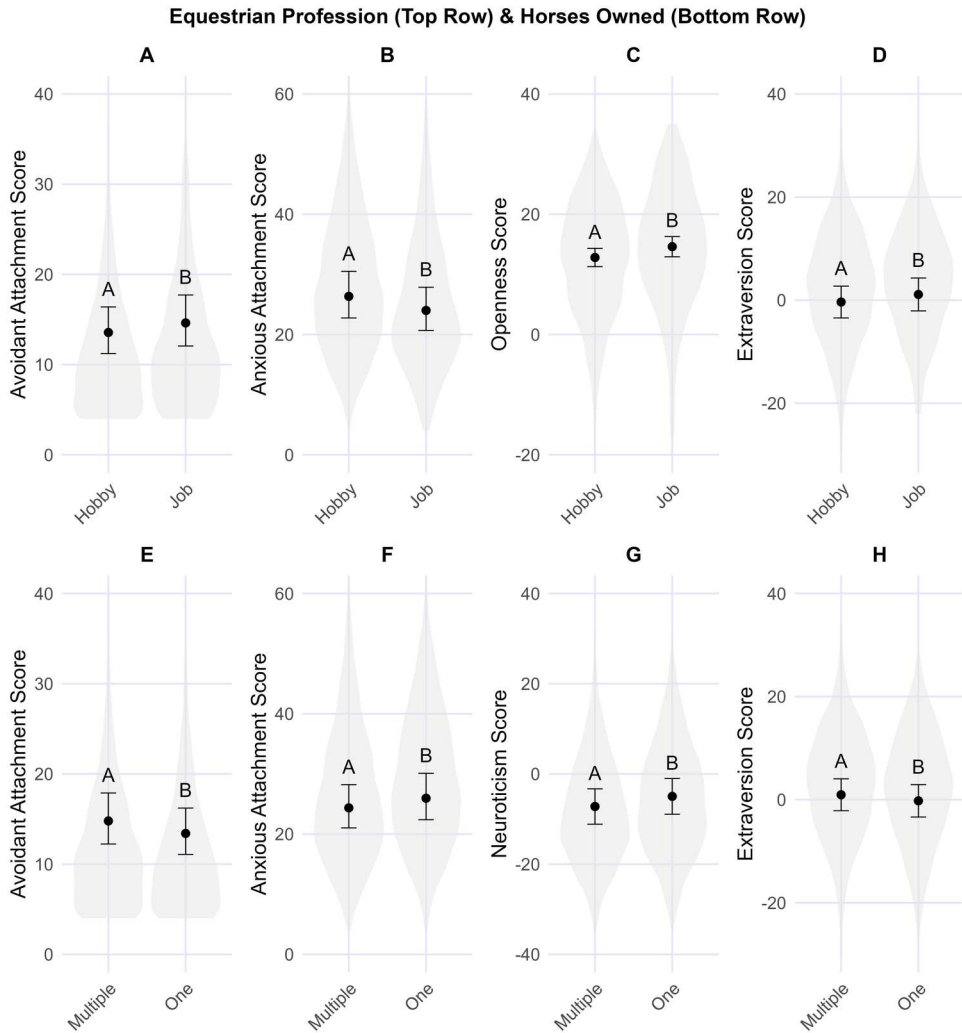


Figure 5. Association of the equestrian profession with (A) avoidant attachment score, (B) anxious attachment score, (C) openness score, and (D) Extraversion score. Association of the number of horses owned with (E) avoidant attachment score, (F) anxious attachment score, (G) neuroticism score and (D) extraversion score. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function `emmeans` from the “`emmeans`” package in R. The violin plots represent the distribution of the raw data.

Relationship Length and Horse Age

Relationship length had a modest negative linear effect ($\beta = -0.11$, 95% CI $[-0.17, -0.05]$), while quadratic and cubic terms were negligible, suggesting that longer relationships are associated with slightly reduced avoidance, without evidence of strong nonlinearity. Respondents who had known their horses for 6–10 years scored approximately 12% lower in avoidant attachment than those who had known their horses for 0–1 year (ratio = 1.12, $Z =$

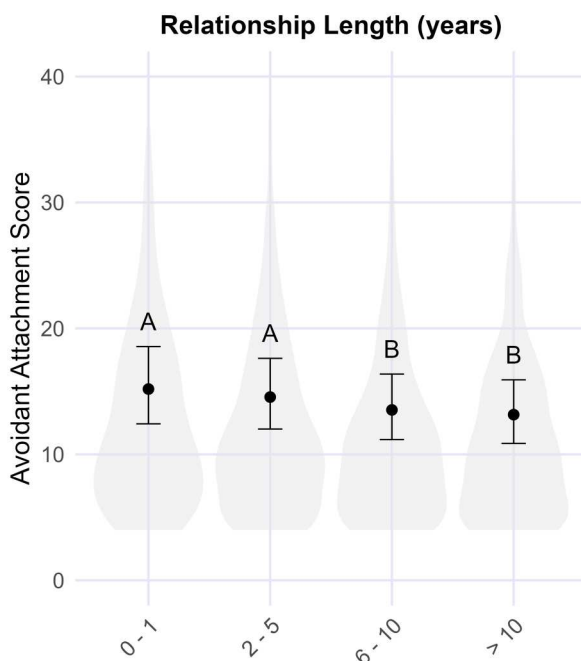


Figure 6. Association of avoidant attachment style score with the relationship duration between the respondents and their horse. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function *emmeans* from the “*emmeans*” package in R. The violin plots represent the distribution of the raw data.

2.77, $p = 0.029$), Respondents with relationships longer than 10 years scored approximately 15% lower in avoidant attachment than those with relationships of 0–1 year (ratio = 1.15, $Z = 3.37$, $p = 0.004$) (Figure 6). Horse age was never selected in the models and is therefore considered as not being significantly associated with any of the response variables. There were no significant associations with anxiety or personality traits.

Sex of Horse

Compared with geldings, owners of mares exhibited slightly higher avoidance toward their horse ($\beta = 0.05$, 95% CI [0.01, 0.10]). Owners of mares scored approximately 5% higher in avoidant attachment than owners of geldings (ratio = 0.95, $Z = -2.47$, $p = 0.036$), and approximately 17% higher than owners of stallions (ratio = 1.17, $Z = 2.50$, $p = 0.033$) (Figure 7). There were no significant associations with anxiety or personality traits.

Discussion

Attachment Styles, Personality, and Equestrian Activity

Our study reveals that the frequencies of equestrian activities (riding, groundwork, and quality time) are associated with both attachment styles and personality traits, with effect magnitudes ranging from small to moderate, depending on the activity type and

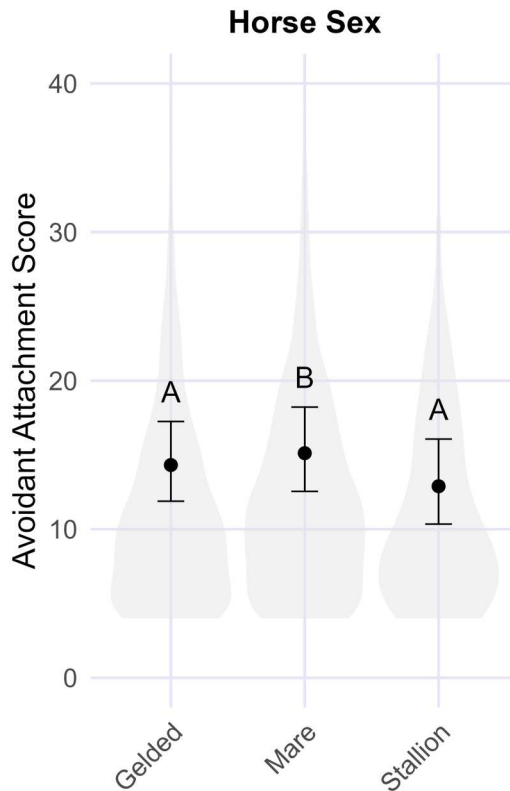


Figure 7. Association of avoidant attachment style score with the sex of the horse owned by the respondent. Different letters indicate significant differences between the groups. The means and their associated 95% confidence intervals (error bars) were extracted from the corresponding model using the function *emmeans* from the “*emmeans*” package in R. The violin plots represent the distribution of the raw data.

psychological dimension considered. These findings align with prior research suggesting that human psychology, including attachment styles and personality traits, drive how people interact and care for nonhuman animals (Beetz et al., 2012; Coy & Green, 2018; Kurdek, 2008; Zilcha-Mano et al., 2011).

Higher engagement in equestrian activities was consistently associated with a lower avoidant attachment style. For example, frequent quality time was associated with a substantial reduction of avoidant attachment of up to 60% compared with minimal interaction, while frequent riders exhibited approximately 14–28% lower avoidant attachment compared with less frequent or non-riders. These effect sizes, although model-derived, suggest that frequent, sustained interaction with horses may be meaningfully linked to reduced emotional distancing tendencies. Similar patterns have been observed in human–pet relationships, where individuals with lower attachment avoidance tend to engage in more emotionally meaningful interactions and provide greater caregiving and attentiveness. In contrast, those with high attachment avoidance may experience less concern about negative evaluations from their pets, which can result in

negligent care. Previous studies show that such evaluation concerns mediate the relationship between attachment avoidance and caregiving behaviors in dog owners and cat owners (Coy & Green, 2018; Zilcha-Mano et al., 2011).

Anxious attachment showed a different pattern, primarily associated with quality time frequency. Individuals spending quality time with their horse at least monthly exhibited approximately 12–14% lower anxious attachment compared with those rarely or never engaging in such interactions. Although these effect sizes are modest, they are consistent with findings in house pets, indicating higher levels of attachment anxiety are associated with dog owners and cat owners providing a greater number of daily treats and more daily interaction (Coy et al., 2021). Research also suggests that anxiously attached individuals may seek out animal companionship to regulate their emotional states, potentially using these interactions as a coping mechanism for attachment-related insecurities (Julius et al., 2012; Kurdek, 2008; Zilcha-Mano et al., 2012). Equestrian activities could serve as an emotional outlet, where riding provides not only physical engagement but also psychological comfort, a finding consistent with reports of equestrianism's positive effects on mental wellbeing (Malchrowicz-Moško et al., 2020).

Personality traits were also associated with activity frequency, although all effects were small when expressed relative to the full trait scale ranges (typically 2–11% of the scale range). More frequent riding was associated with slightly higher conscientiousness (7%) and extraversion (11%) and slightly lower neuroticism (9%). These magnitudes suggest subtle but systematic personality differences rather than large psychological distinctions between groups. This is consistent with the association between conscientiousness, higher levels of organization and discipline, and greater activity in structured hobbies (Roberts et al., 2009). Similarly, extraverted individuals are more likely to seek social and outdoor activities, which may explain their higher engagement in riding (McCrae & Costa, 1997). However, neuroticism was inversely associated with riding frequency, suggesting that emotionally unstable or anxious individuals might avoid frequent riding. Horse riding is often regarded as a dangerous sport, frequently associated with injuries and accidents (Camargo et al., 2018; Chapman & Thompson, 2016; Franzén et al., 2023). Given that neuroticism correlated with riding frequency but not with groundwork or quality time spent with horses, this result aligns with studies indicating that neurotic individuals tend to avoid activities that may heighten stress or discomfort, particularly those requiring focus and physical coordination (Patrick, 2019).

For groundwork, higher openness was associated with more frequent practice, with differences reaching approximately 9% of the openness scale range, supporting the idea that individuals high in openness may be more inclined to explore varied or non-traditional activities and engage in creative or diverse approaches to problem-solving (DeYoung et al., 2014). Overall, although personality-related effects were modest, their consistency across activities suggests meaningful psychological patterning in equestrian engagement.

Headgear

This study examined links between horse owners' attachment styles, personality traits, and headgear choice (bit, bitless, or both). Headgear choice was primarily associated

with avoidant attachment (small-to-moderate effects): bit-only users showed approximately 21% higher avoidant attachment than bitless-only users, and approximately 7% higher than those using both. This suggests headgear choice is meaningfully, though not strongly, related to emotional distancing. Higher avoidant attachment may involve reduced sensitivity to potential horse discomfort when using a bit (Anttila et al., 2022; Mellor, 2020; Tuomola et al., 2021b, 2021a).

Coy and Green (2018) found highly avoidant individuals reported lower caregiving/attentiveness toward pets, and Zilcha-Mano et al. (2011) reported that owners with higher anxious and avoidant attachment tend to mistrust their pets. If bits are perceived as offering greater control, bit-only use among more avoidant owners may also reflect lower trust in horse behavior. Notably, Luke et al. (2023) found bitless riding was not associated with poorer control or safety and was linked to better reported welfare, fewer extreme negative behaviors, and greater rider satisfaction/partnership.

Personality associations were statistically significant but very small: those using both bit and bitless headgear scored approximately 4% higher in openness than bit-only users. While unlikely to have a strong influence, this fits the theory that openness relates to novelty-seeking and receptiveness to unconventional ideas (Soto & John, 2017); bitless headgear – often framed as a more progressive, horse-friendly approach – may therefore appeal to more open individuals. Overall, the findings suggest psychological dispositions may subtly shape equipment preferences, with potential implications for horse comfort and welfare.

Equestrian Profession and Number of Horses Owned

Profession and number of horses owned were both associated with attachment styles and personality traits, though again with small effect sizes. Equestrian professionals exhibited approximately 7% higher avoidant attachment and 10% lower anxious attachment compared with hobbyists. These magnitudes suggest modest but systematic differences. Anxious attachment is typically linked to fear of abandonment and contrasts with avoidant attachment, which is characterized by a tendency to rely less on others (Reevy & Delgado, 2015, 2020; Ståhl et al., 2023). Individuals with lower anxious attachment and higher avoidant scores may be drawn to equestrian careers because these roles allow them to connect with multiple horses while maintaining emotional distance. This dynamic can be beneficial when managing separation, as seen in professions like horse breeding, where breeders must sell the foals they produce, and horse training, where trainers build relationships with horses they do not own. Professionals also scored 2–3% lower in openness and extraversion, indicating slight personality differences rather than pronounced psychological profiles.

Similarly, owning multiple horses was associated with approximately 10% higher avoidant attachment and 6% lower anxious attachment, alongside small personality differences (2% higher extraversion and 3% lower neuroticism) compared with owning a single horse. Our results align with the Resource Dilution Theory, which posits that caregivers have limited resources – such as time and emotional energy. When caregivers have more dependents, these resources are spread thinner, potentially lowering the quality of attention and support each dependent receives (Downey, 2001). This theory has only

been applied to familial contexts but could be extended to human–animal relationships. Owners of multiple horses may have to divide the finite emotional resources among the horses they care for, which may lead to higher avoidant attachment as a coping strategy to maintain emotional distance, avoid becoming overwhelmed, and ensure efficiency in caregiving.

These findings suggest that occupational context and the number of horses owned may shape, or select for, subtle differences in emotional regulation and the way owners interact with their horses.

Relationship Length and Horse Age

Relationship length was consistently associated with lower avoidant attachment, with effect sizes ranging from 8 to 15%, depending on comparison groups. Owners who had known their horse for more than 10 years exhibited approximately 15% lower avoidant attachment compared with those in relationships of 0–1 year, indicating a gradual but meaningful reduction in emotional distancing over time. These findings support the notion that prolonged, stable relationships foster emotional security, consistent with prior work in both human–animal (Bagley & Gonsman, 2005; Marinelli et al., 2007) and human–human attachment research (Umemura et al., 2018; Zhang & Labouvie-Vief, 2004). Prolonged, consistent relationships between humans and animals may reduce the insecurity that arises from unfamiliarity or lack of a predictable history of positive outcomes, fostering a more positive interaction. Liehrmann et al. (2022) also reported that horses are more likely to cross a novel surface when they have a long-lasting relationship with their caretaker (> 4–6 years), indicating that behavioral confidence and reduced reactivity increase with a long-term relationship. As the length of the relationship was closely tied to the horse's age, it was reasonable to assume that the horse age could influence the owner's attachment style. However, horse age was not selected in the statistical models, which suggests that the emotional bond between the owner and the horse is more dependent on the duration and quality of their interaction, rather than simply the horse's age. This reinforces the importance of sustained interaction and familiarity in shaping attachment dynamics.

Horse Sex

Horse sex was slightly associated with avoidant attachment: owners of mares showed approximately 5–17% higher avoidant attachment than owners of geldings or stallions. Although modest, this may reflect gendered perceptions of temperament rather than objective behavioral differences. Given that 94.6% of the respondents were women, this aligns with Fenner et al. (2019), who reported that female riders often view geldings as calmer, more trainable, reliable, and predictable and therefore more suitable for show jumping, dressage, and trail riding than mares. Similarly, Duberstein and Gilkeson (2010) found mares were rated as more aggressive, tense, excitable, and prone to panic, whereas geldings were rated as calmer and more trainable. Such perceptions could contribute to higher avoidant attachment among mare owners – either because managing a “more challenging” horse promotes emotional distance/frustration or because more avoidant

individuals may be drawn to such temperaments. However, empirical studies report minimal to no behavioral sex differences in human–horse interaction contexts (Aune et al., 2020; Liehrmann et al., 2022, 2023), suggesting the association may be driven more by human expectations than by horse behavior.

Limitations

Demographic factors (e.g., ethnicity, social class, gender, family status) can reflect distinct group experiences and shape people's understanding of, and relationships with, animals (Blouin, 2012). Although the survey was distributed globally, limiting it to English, French, and Finnish likely biased participation toward Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies – a well-known issue in psychological research (Krys et al., 2025; Newson et al., 2021). Because we could not translate the survey into additional languages, future studies should prioritize a broader language range to improve global representativeness. We also acknowledge that voluntary participation in a lengthy online survey may introduce sample bias, potentially toward certain personality types. Nonetheless, the means and standard deviations of personality trait scores indicate substantial heterogeneity and are comparable to those reported by Konstabel et al. (2012) and Minkov et al. (2019) in non-equestrian WEIRD populations.

Our sample also showed a marked gender imbalance (94.6% female), consistent with similar horse and companion-animal surveys, where women typically participate more (Fenner et al., 2019; Luke et al., 2023; Ståhl et al., 2023). Because this study is cross-sectional, we cannot determine directionality or causality between owners' habits and their personality traits or attachment styles. Associations may be observed, but single time-point data cannot establish whether traits/attachment shape behaviors or vice versa; longitudinal designs are needed to clarify causal links and temporal dynamics.

Finally, horses have been selectively bred for centuries, resulting in over 400 breeds, and breed differences can affect behavior and temperament (Guest & Mattfeld, 2019; Lloyd et al., 2008; Sackman & Houpt, 2019). As horse personality may influence the human–horse relationship (Rankins & Wickens, 2020), attachment style could plausibly vary by breed. However, the high number of crossbreeds, frequent uncertainty about breed, and an uneven breed distribution prevented us from including breed in the analyses. While the sample's breed diversity likely minimized breed effects, future studies should examine this factor more directly.

Conclusion

This study shows that human psychological characteristics are systematically, though mostly modestly, associated with equestrian practices. Taken together, these findings emphasize the relevance of psychological perspectives in equine research and welfare, while also underscoring the importance of interpreting effect sizes cautiously. Even small, systematic effects may have practical significance when accumulated across time, individuals, and management contexts. By quantifying the magnitude of these associations, this study provides a clearer and more balanced understanding of how attachment styles

and personality traits shape equestrian practices and offers a foundation for more individualized and welfare-oriented approaches to horse–human relationships.

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Author Contribution Statement

Conceptualization: A.S., O.L., M.S., A.V.; Data curation: O.L., A.V., A.S., M.S.; Formal Analysis: O.L., A.S., A.V.; Funding acquisition: O.L.; Investigation: O.L., A.V.; Methodology: A.V., O.L.; Project administration: O.L., M.S.; Supervision: O.L.; Writing – original draft: O.L.; Writing – review & editing: A.S., O.L., M.S.

Data Availability Statement

Due to the sensitive nature of the anonymized personality test results, the raw data used to calculate attachment style and personality scores is available from the corresponding author upon request. The derived scores, other variables used, and the R script are freely available in an online repository (Liehrmann, 2026).

Disclosure Statement

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