EFFECT OF EQUINE ACTIVITIES ON THE PHYSICAL AND MENTAL PERFORMANCE OF THE RIDER

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Abstract

Equestrian riding requires continuous physical and cognitive adaptation to the horse's movement. Variations in horse gait may affect cardiovascular demand, metabolic effort, stress, and concentration. Previous research identified the need for additional validation, more experimental trials, and further evaluation of cognitive performance. This study expands that work by comparing rider physiologic and mental responses during different equine gaits and experience levels of two cases o riders. Results tend to show that physiological demands rise with intensity of the equine activity, diagonal horses requires more physical but less mental demands than lateral horses and that the greater the rider's experience, the less physical and mental effort they exert. An increase in subjects and horses is needed for further studies.

Introduction

Equestrian riding requires continuous physical and cognitive adaptation to the horse's movement. Variations in gait may affect cardiovascular demand, metabolic effort, stress, and concentration. Previous research [1] identified the need for additional validation, more experimental trials, and further evaluation of cognitive performance. This study expands that work by comparing rider responses during different equine gaits and experience levels based on two cases of study.

Objectives

- Measure physiological responses during equestrian activity.
- Compare rider responses during walk, trot, and gallop.
- Evaluate differences between lateral and diagonal gait patterns.
- Assess concentration and mental response during riding activity.
- Relate physiological demand to rider experience and cognitive performance.

Methodology

Two riders with different levels of equestrian experience (Rider 1 – 12 years vs. Rider 2 – 8 years) and similar body features participated in the study as case subjects. Each rider practiced walking, trotting, and galloping with two Criollo horses: Fogonera - lateral gait, and Candelero - diagonal gait. Physiological (O2 consumption [VO2], heart rate [HR]) and cognitive/mental related (HR variability [HRV], Band Width of HRV spectrum [BW] and Respiratory Coherence [RC]) measurements were collected during each condition and compared according to rider experience, horse type gait, and gait intensity.

1. Rider and horse preparation
2. Walking, Trot, and Gallop for 6 minutes each
3. Sensor Placement
4. Data Analysis

Results

Diagonal - Candelero

	Walk			Trot			Gallop		
	VO2	HR	HRV	VO2	HR	HRV	VO2	HR	HRV
Rider 1	6.86	97.94	82.36	15.10	119.12	37.60	15.73	141.25	45.88
Rider 2	6.90	104.12	82.75	16.71	143.29	27.82	23.52	169.74	29.06
Avg	6.88	101.03	82.55	15.90	131.20	32.71	19.62	155.49	37.47
Diff	0.04	6.18	0.39	1.61	24.17	-9.78	7.78	28.49	-16.82

Lateral - Fogonera

	Walk			Trot			Gallop		
	VO2	HR	HRV	VO2	HR	HRV	VO2	HR	HRV
Rider 1	10.90	102.77	64.81	12.33	117.75	54.86	18.22	129.98	49.74
Rider 2	10.90	102.74	57.31	15.68	145.20	44.58	18.78	159.31	48.22
Avg	10.90	102.75	61.06	14.01	131.48	49.72	18.50	144.64	48.98
Diff	0.00	-0.03	-7.51	3.35	27.45	-10.28	0.56	29.33	-1.53
Difference	-4.02	-1.73	21.50	1.90	-0.28	-17.01	1.13	10.85	-11.51

Figure 1. Comparison between lateral and diagonal horses measured parameters(Franco,2026)



Figure 2. EmWave HRV sensor application (Franco,2026)



Figure 3. Fogonera, lateral horse for experimentation (Franco,2026)



Figure 4. Candelero, diagonal horse for experimentation (Franco,2026)



Figure 5. Experimental Area for data compilation (Franco,2026)

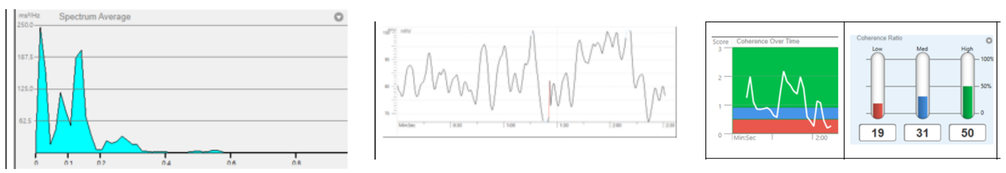


Figure 6. Mental Performance through HRV & Respiratory coherence data from lateral horse walking: HRV Spectrum (left) HRV over time (center), Respiratory Coherence (Right) (Franco,2026)

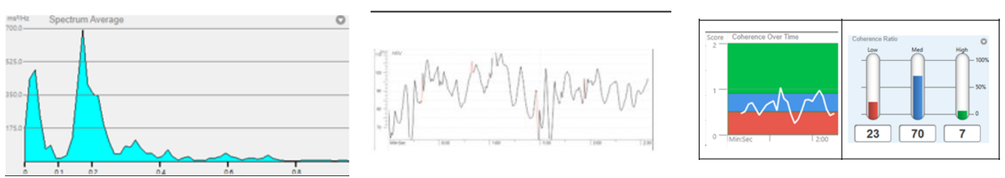


Figure 7. Mental Performance through HRV & Respiratory coherence data from lateral horse trotting: HRV Spectrum (left) HRV over time (center), Respiratory Coherence (Right) (Franco,2026)

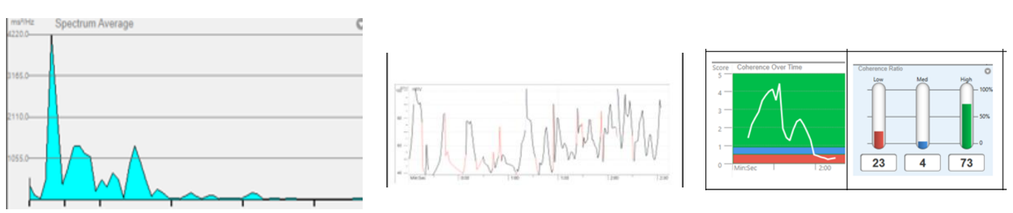


Figure 8. Mental Performance through HRV & Respiratory coherence data from lateral horse galloping: HRV Spectrum (left) HRV over time (center), Respiratory Coherence (Right) (Franco,2026)

Analysis

Physiological demand increased as riders progressed from walking to trotting and galloping. HR and VO2 showed an overall increase with gait intensity, demonstrating greater cardiovascular and metabolic demand during faster gaits. In trot and gallop, the diagonal horse requested slightly more physical effort than lateral one. Differences in HRV parameters and RC were also observed between gait conditions and horse gait patterns. The diagonal gait produced greater physical demand but was associated with higher concentration, whereas the lateral gait was associated with lower fatigue and less concentration. Less physiological demand and more mental focus was observed in the experienced rider.

Conclusion & Recommendations

The results tend to indicate that horse gait, riding intensity and rider experience may influence both physiological and cognitive rider performance for this two cases. Walking required less physiological effort than trotting and galloping. Although diagonal gait produced greater physical fatigue, it was associated with improved concentration. Lateral gait produced lower physical demand but greater mental stress and focus less. Rider experience and perceived control may therefore contribute to differences in both physical and mental performance during equestrian activity. A greater sample of riders and horses is recommended for future studies.

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