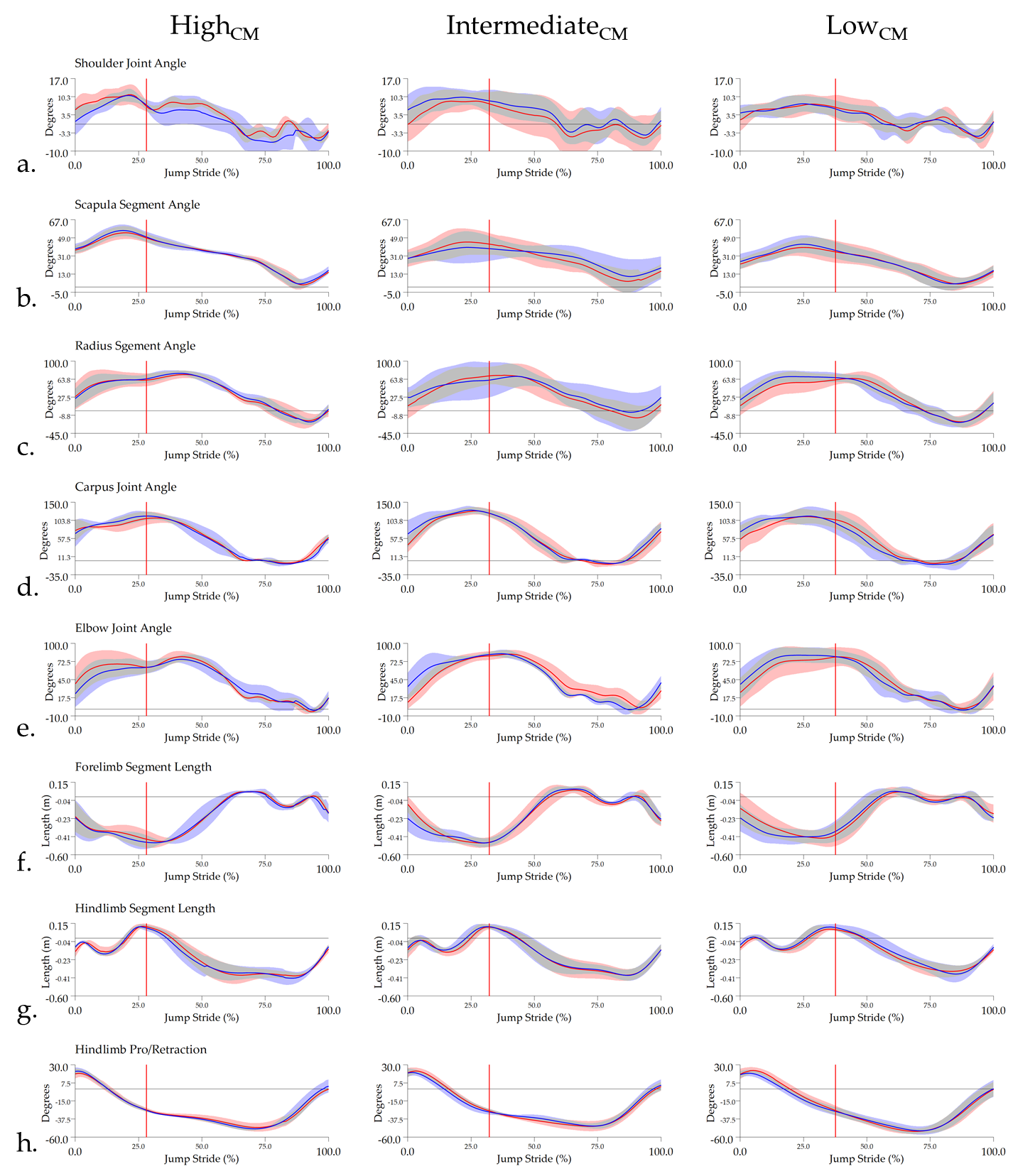
**Table S1:** Kinematic measurement techniques for equestrian-derived performance indicators. All variables are calculated within the jump stride unless otherwise stated. For outcome measures where an additional spatiotemporal measure is listed (% stride), the timing of each described outcome measure is calculated and normalised to jump stride duration.

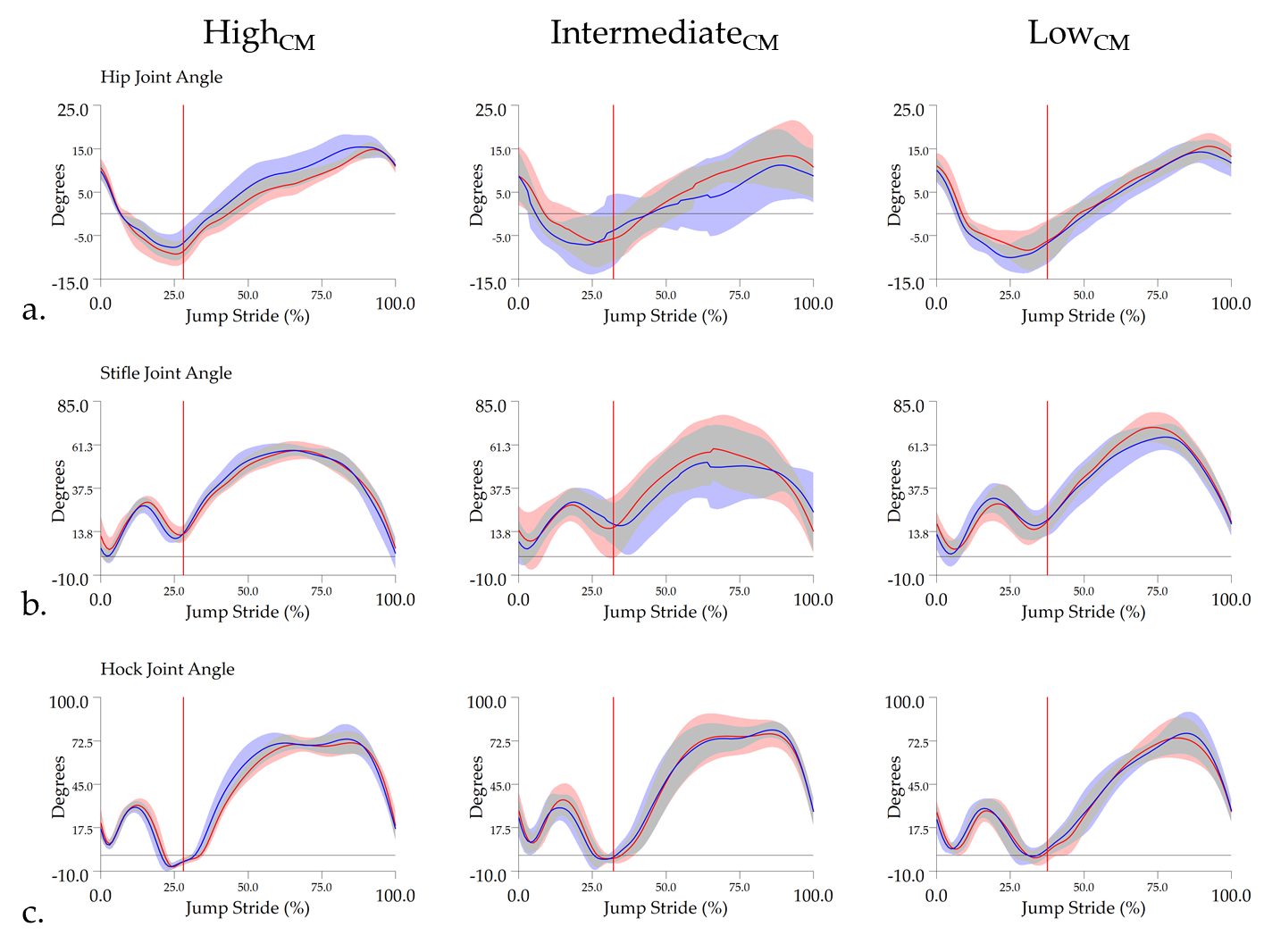
|  |  |  |  |
| --- | --- | --- | --- |
| Theme | Jump performance trait | Kinematic outcome measure | Kinematic Measurement Technique |
| Joint articulation | Ability to “use” and elevate the shoulder and to “back off” fence | Max shoulder flex (**°**) (% jump stride) | Maximum value from normalized shoulder joint-angle curve. |
| Max scapula angle (**°**)  (% jump stride) | Maximum value from scapula segment time-angle curve plotted within LCS (Y axis). |
| Ability to “tuck up”, elevate, and lift FL at take-off | Max FL shortening (m)  (% jump stride) | Minimum value from FL segment length-time signal, calculated by subtracting proximal (lateral epicondyle of humerus) from distal (fore DIPJ) vertical coordinates and normalizing to standing segment length. |
| Max carpus, elbow flex (**°**) (% jump stride) | Maximum value from normalized carpus and elbow joint-angle curves. |
| Max radius angle (**°**) (% jump stride) | Maximum value from radius segment time-angle curve plotted within LCS (Y axis). |
| Ability to “tuck up” the HL. | Max HL shortening (m)  (% jump stride) | As above for “Max FL shortening”, using proximal (tubera coxae) and distal (hind DIPJ) ends of the HL segment. |
| Ability to “open out behind”, “throw away the HL” | Max HL retraction (**°**) (% jump stride) | Minimum value from HL segment time-angle curve plotted within LCS (Y axis). |
| Impulsion | Power, strength, ability to push-off and pat/stamp the ground [take-off] | HL stance duration (s) | Time between HL hoof impact and lift-off events measured at jump and A1 strides. |
| Duty factor (% stride) | Temporal proportion of stride duration where HL is in contact with the ground (% stance) (Biewener, 1983). Measured at jump and A1 strides. |
| Z**CM** (m)  (% jump stride) | Maximum vertical coordinate of CM marker within the LCS (z-axis). Normalized to standing CM height. |
|  | (m/s)  (% jump stride) | Maximum vertical velocity of CM, calculated as first derivative of CM marker coordinates within the LCS (z-axis). |
|  | (m/s2)  (% jump stride) | Maximum vertical acceleration of CM during HL stance phase at take-off, calculated as second derivative of CM marker coordinates within the LCS (z-axis). |
| Forward | Stride velocity (m/s) | First derivative of croup (tubera sacrale) marker coordinates within the LCS (y-axis) averaged over A1 and jump strides. |
| Quick, snappy FL lift-off [take-off] | FL A1 stance duration (s) | Time between FL hoof impact and lift-off events measured at A1 stride. |
| Engaged | Ability to “take weight behind”, “sit” and “rock onto hocks” [take off] | Max hock, stifle, hip joint flex take-off (**°**) (% jump stride) | Maximum value from normalized hock, stifle and hip joint-angle curves during HL stance phase at take-off. |
| Max HL shortening take-off (% jump stride) | As above for “Max HL shortening”, using minimum value during HL stance phase at take-off. |
| Ability to bring the HL underneath body | Max HL protraction A1 stride (°) | Maximum value from HL segment time-angle curve plotted within LCS (Y axis) during A1 stride. |

**Table S2.** Pairwise comparisons for kinematic variables where a significant main effect was found between groups. Between group differences are presented for each variable as mean difference (MD), P-values and 95% confidence intervals (95% CI). Significant differences between groups are denoted by bold text.

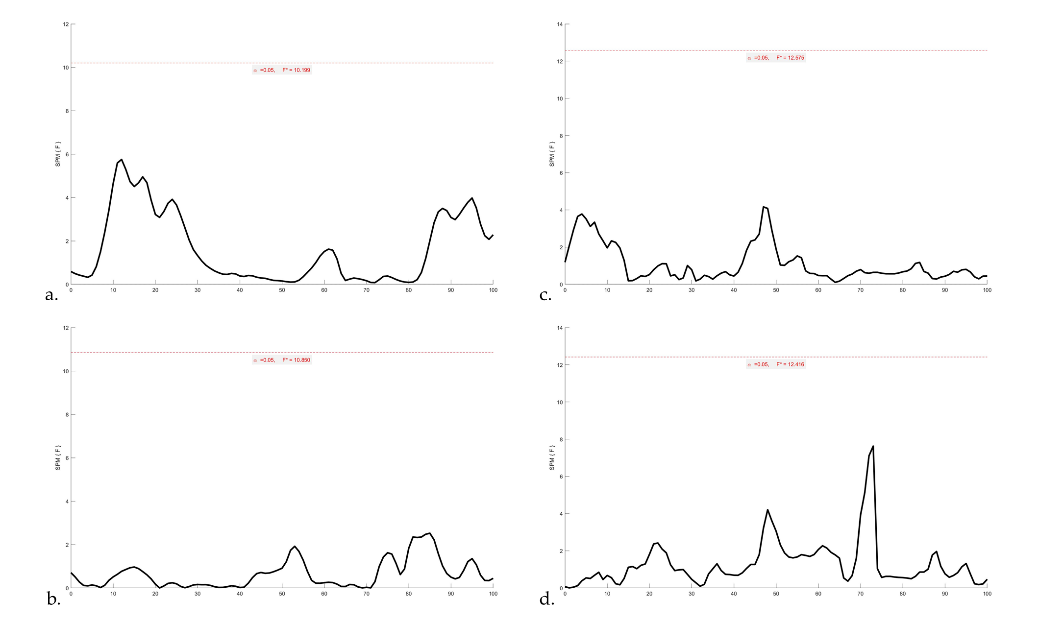
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Theme | Kinematic Variable | Limb |  | HighCM – Int.CM | HighCM – LowCM | IntCM. – LowCM |
| Joint articulation | Max scapula angle time (% jump stride) | TrF | MD | -4.1 | -4.6 | -0.5 |
| P value | 0.06 | **0.04** | 1.00 |
| 95% CI | -8.3, 0.2 | -9.0, -0.1 | -4.5, 3.5 |
| Max radius angle (**°**) | LdF | MD | -6.9 | 3.4 | 10.4 |
| P value | 0.27 | 1.00 | **0.05** |
| 95% CI | -17.2, 3.4 | -7.7, 14.6 | 0.1, 20.7 |
| Max HL shortening time  (% jump stride) | LdH | MD | -11.9 | -15.2 | -3.3 |
| P value | 0.07 | **0.03** | 1.00 |
| 95% CI | -24.7, 0.9 | -28.8, -1.5 | -15.2, 8.7 |
| Max HL retraction (°) | TrH | MD | -4.2 | 2.3 | 6.4 |
| P value | 0.08 | 0.68 | **0.00** |
| 95% CI | -8.8, 0.4 | -2.6, 7.2 | 2.1, 10.7 |
| LdH | MD | -2.8 | 6.0 | 8.8 |
| P value | 1.00 | 0.21 | **0.02** |
| 95% CI | -10.4, 4.8 | -2.2, 14.2 | 1.2, 16.4 |
| Impulsion | HL A1 stance duration (s) | LdH | MD | -0.03 | -0.06 | -0.03 |
| P value | 0.46 | **0.04** | 0.53 |
| 95% CI | -0.09, 0.02 | -0.11, -0.00 | -0.08, 0.03 |
| Duty factor (% jump stride) | TrH | MD | -3.8 | -9.0 | -5.2 |
| P value | 0.56 | **0.02** | 0.19 |
| 95% CI | -11.4, 3.8 | -16.9, -1.2 | -12.3, 1.9 |
| LdH | MD | -2.8 | -8.2 | -5.4 |
| P value | 0.77 | **0.02** | 0.09 |
| 95% CI | -9.2, 3.7 | -15.1, -1.3 | -11.4, 0.6 |
| ZCM (m) | TrH | MD | 0.10 | 0.20 | 0.10 |
| P value | **0.01** | **0.00** | **0.01** |
| 95% CI | 0.03, 0.18 | 0.12, 0.29 | 0.03, 0.17 |
| LdH | MD | 0.10 | 0.21 | 0.10 |
| P value | **0.00** | **0.00** | **0.00** |
| 95% CI | 0.04, 0.17 | 0.13, 0.28 | 0.03, 0.17 |
| time (% jump stride) | TrH | MD | -3.1 | -6.0 | -2.9 |
| P value | 0.38 | **0.03** | 0.40 |
| 95% CI | -8.5, 2.2 | -11.6, -0.5 | -7.9, 2.1 |
| (m/s) | TrH | MD | 0.38 | 0.76 | 0.37 |
| P value | 0.12 | **0.00** | 0.10 |
| 95% CI | -0.08, 0.85 | 0.26, 1.26 | -0.06, 0.81 |
| LdH | MD | 0.33 | 0.77 | 0.44 |
| P value | 0.14 | **0.00** | **0.03** |
| 95% CI | -0.08, 0.74 | 0.32, 1.21 | 0.03, 0.85 |
| time (% jump stride) | TrH | MD | -3.1 | -6.7 | -3.7 |
| P value | 0.29 | **0.01** | 0.12 |
| 95% CI | -7.8, 1.7 | -11.7, -1.8 | -8.1, 0.8 |
| A1 stride vel (m/s) | TrH | MD | 0.35 | 1.00 | 0.65 |
| P value | 0.87 | **0.04** | 0.19 |
| 95% CI | -0.55, 1.25 | 0.05, 1.96 | -0.25, 1.56 |
| Jump stride vel (m/s) | TrH | MD | 0.35 | 1.01 | 0.65 |
| P value | 1.00 | 0.05 | 0.21 |
| 95% CI | -0.62, 1.33 | -0.01, 2.02 | -0.26, 1.57 |
| FL A1 stance duration (s) | TrF | MD | -0.01 | -0.05 | -0.03 |
| P value | 0.92 | **0.01** | **0.04** |
| 95% CI | -0.05, 0.02 | -0.08, -0.01 | -0.06, 0.00 |
| LdF | MD | -0.02 | -0.04 | -0.03 |
| P value | 0.63 | **0.02** | 0.13 |
| 95% CI | -0.05, 0.02 | -0.08, -0.01 | -0.06, 0.01 |
| Engaged | Max hock flex take-off time (% jump stride) | TrH | MD | -2.3 | -4.2 | -2.0 |
| P value | 0.39 | **0.04** | 0.48 |
| 95% CI | -6.2, 1.6 | -8.3, -0.2 | -5.6, 1.7 |
| Max stifle flex take-off time (% jump stride) | TrH | MD | -2.9 | -5.2 | -2.3 |
| P value | 0.20 | **0.01** | 0.35 |
| 95% CI | -6.9, 1.1 | -9.4, -1.0 | -6.1, 1.5 |
| LdH | MD | -3.0 | -4.5 | -1.5 |
| P value | 0.15 | **0.03** | 0.74 |
| 95% CI | -6.7, 0.8 | -8.5, -0.5 | -5.0, 1.9 |
| Max HL shortening take-off time (% jump stride) | TrH | MD | -3.0 | -5.0 | -2.0 |
| P value | 0.12 | **0.01** | 0.38 |
| 95% CI | -6.6, 0.6 | -8.7, -1.3 | -5.4, 1.4 |



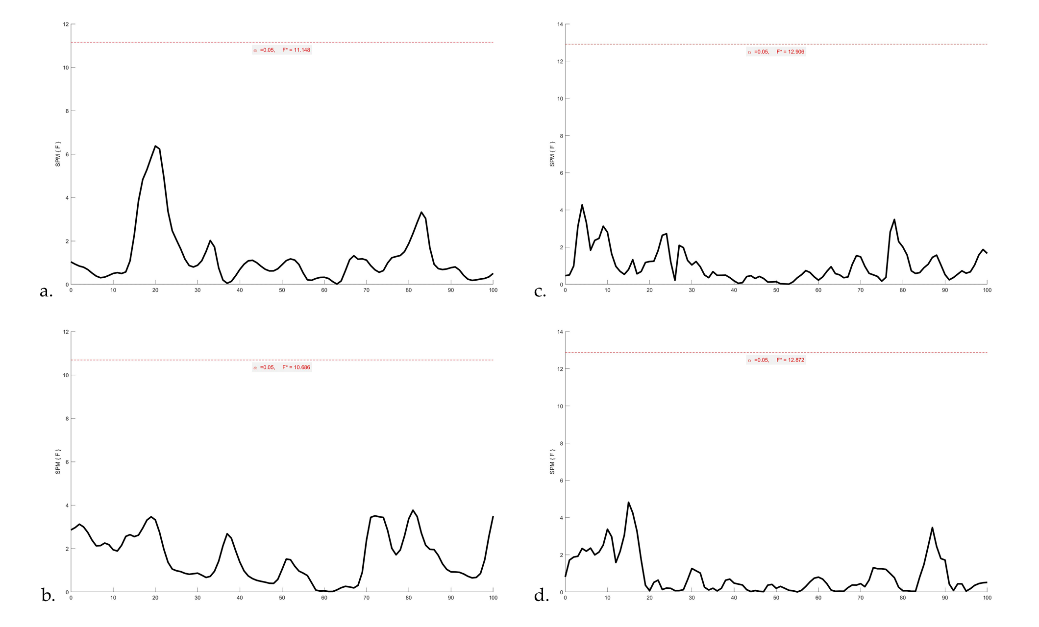
**Figure S1**: Mean and standard deviation time angle curves (˚) for kinematic variables within the joint articulation theme. a) shoulder joint b) scapula segment c) radius segment d) carpus joint e) elbow joint and h) HL segment pro/retraction angles. Mean and standard deviation data for f) FL and g) HL segment lengths (m). Data are presented in separate columns for HighCM, IntermediateCM, and LowCM groups and are normalised to jump stride duration. Red vertical lines represent the average HL lift-off event within each group. Mean data are presented for LdH (red line) and TrH (blue line), with shaded areas representing the standard deviation for each limb.



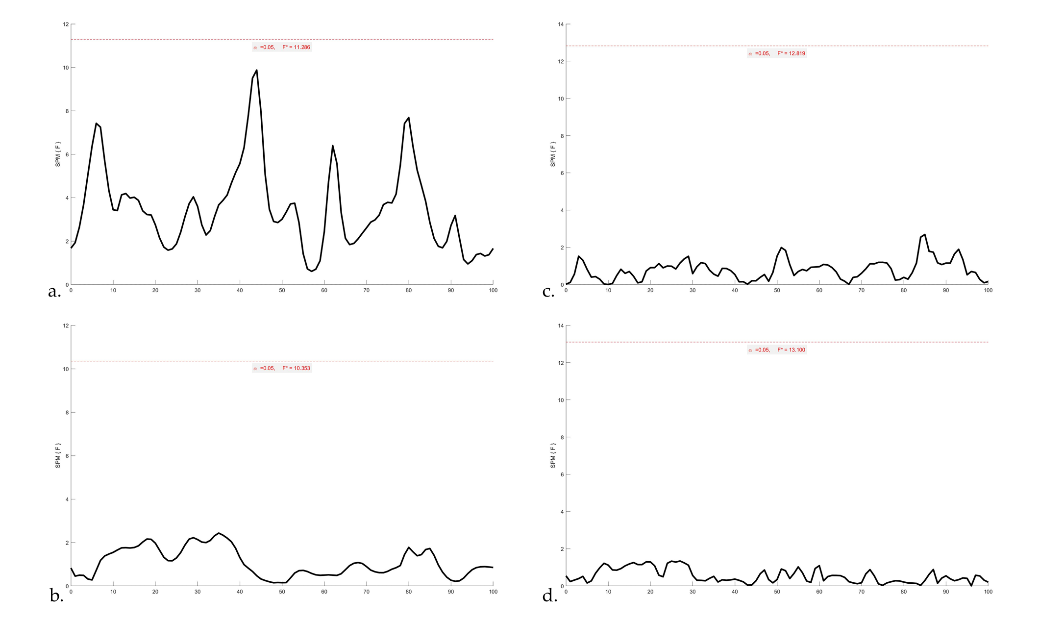
**Figure S2**: Mean and standard deviation time angle curves (˚) for kinematic variables within the engagement theme. a) hip b) stifle c) hock joints. Data are presented in separate columns for HighCM, IntermediateCM, and LowCM groups and are normalised to jump stride duration. Red vertical lines represent the average HL lift-off event within each group. Mean data are presented for LdH (red line) and TrH (blue line), with shaded areas representing the standard deviation for each limb.



**Figure S3:** SPM results for gluteal sEMG waveforms from a) LdH A1 stride b) TrH A1 stride c) LdH jump stride d) TrH jump stride.



**Figure S4:** SPM results for biceps femoris sEMG waveforms from a) LdH A1 stride b) TrH A1 stride c) LdH jump stride d) TrH jump stride.



**Figure S5:** SPM results for triceps sEMG waveforms from a) LdH A1 stride b) TrH A1 stride c) LdH jump stride d) TrH jump stride.

**Table S3**. Pairwise comparisons for sEMG activity timing variables where a significant main effect was found between groups. Between group differences are presented for each variable as mean difference (MD), P-values and 95% confidence intervals (95% CI). Significant differences between groups are denoted by bold text.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Muscle | Stride | sEMG Variable (% stride) | Limb |  | HighCM – Int.CM | HighCM – LowCM | IntCM. – LowCM |
| Gluteal | A1 | A1 activity offset | TrH | MD | -22.4 | -26.4 | -4.0 |
| P value | **0.03** | **0.04** | 1.00 |
| 95% CI | -42.8, -2.1 | -51.3 -1.5 | -28.9, 20.9 |
| Jump | Activity duration | TrH | MD | -15.1 | -30.5 | -15.4 |
| P value | 0.41 | **0.03** | 0.39 |
| 95% CI | -42.2, 12.0 | -57.6, -3.4 | -42.5, 11.7 |
| LdH | MD | -15.3 | -39.3 | -24.0 |
|  | P value | 0.42 | **0.01** | 0.09 |
|  | 95% CI | -42.6, 12.0 | -68.1, -10.5 | -51.4, 3.3 |
| Landing activity onset | TrH | MD | 8.8 | 14.6 | 5.8 |
| P value | 0.20 | **0.02** | 0.50 |
| 95% CI | -3.7, 21.3 | 2.1, 27.1 | -5.7, 17.4 |
| LdH | MD | 1.6 | 11.8 | 10.2 |
|  | P value | 1.0 | **0.05** | 0.05 |
|  | 95% CI | -9.7, 12.9 | 0.0, 23.6 | -0.1, 20.6 |
| Biiceps femoris | A1 | A1 activity offset | TrH | MD | -17.9 | -0.6 | 17.3 |
| P value | **0.04** | 1.00 | 0.10 |
| 95% CI | -34.5, -1.4 | -20.9, 19.7 | -3.0, 37.6 |

**Table S4**: Correlations between kinematic variables were significant between group differences were observed and the discriminative performance indicator, ZCM. Pearson correlation coefficients (rho) are presented for each comparison.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Theme** | **Kinematic outcome measure** |  | **ZCM (m)** | |
| **Limb** | TrH/TrF | LdH/LdF |
| Joint articulation | Max scapula angle time (% jump stride) | TrF | **-.72\*\*** | **-.68\*\*** |
| LdF | -0.40 | -0.43 |
| Max radius angle (°) | TrF | -0.18 | -0.22 |
| LdF | -0.02 | -0.03 |
| Max HL retraction (°) | TrH | 0.46 | 0.42 |
| LdH | 0.48 | .**53**\* |
| Max HL shortening time (% jump stride) | TrH | -0.31 | -0.34 |
| LdH | -0.40 | -.**52**\* |
| Impulsion | (m/s) | TrH | **.92\*\*** | **.90\*\*** |
| LdH | **.88\*\*** | **.93\*\*** |
| time (% jump stride) | TrH | **-.63\*** | **-.57\*** |
| LdH | -0.36 | -0.30 |
| time (% jump stride) | TrH | **-.77\*\*** | **-.75\*\*** |
| LdH | -0.50 | -0.38 |
| HL A1 stance duration (s) | TrH | **-.62\*** | **-.65\*** |
| LdH | **-.61\*** | **-.67\*\*** |
| A1 stride vel (m/s) | TrH | **-.61\*** | **-.65\*** |
| LdH | -0.47 | -.64\*\* |
| Duty factor (% jump stride) | TrH | **-.65\*\*** | **-.67\*\*** |
| LdH | **-.59\*** | **-.66\*\*** |
| FL A1 stance duration (s) | TrF | **-.62\*** | **-.67\*\*** |
| LdF | **-.58\*** | **-.67\*\*** |
| Engagement | Max hock flex take-off time (% jump stride) | TrH | **-.79\*\*** | **-.68\*\*** |
| LdH | **-.55\*** | **-.54\*** |
| Max stifle flex take-off time (% jump stride) | TrH | **-.83\*\*** | **-.79\*\*** |
| LdH | **-.61\*** | **-.64\*\*** |
| Max HL shortening take-off time (% jump stride) | TrH | **-.78\*\*** | **-.75\*\*** |
| LdH | **-.62\*** | **-.58\*** |