

WITHIN-SESSION RELIABILITY OF ISOMETRIC MID-THIGH PULL INTERLIMB ASYMMETRIES IN MALE COLLEGIATE ATHLETES



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INTRODUCTION

- The Isometric Mid-Thigh Pull (IMTP) is a commonly used assessment measuring maximal force production capability and interlimb asymmetries.
- While the reliability of left and right limb force measures during the IMTP has been examined, there has yet to be an examination of the reliability of asymmetry measures computed from this assessment.
- Additionally, it is unknown if quantifying these asymmetries as a percentage or as an absolute difference will result in differing reliability.

PURPOSE

- To examine the within-session reliability of IMTP asymmetries
- To examine the differences in reliability when asymmetries are quantified as a percentage or an absolute difference

METHODS

- A total of 77 Division I male collegiate athletes competing in basketball (n = 9), track (n = 13), and football (n = 55) volunteered for this study.
- These athletes performed two trials of the bilateral IMTP while standing on twin force platforms, sampling at 1000 Hz (See Figure 1).
- Unfiltered force data was then utilized to calculate the interlimb asymmetries of peak force as either a percentage, utilizing the symmetry index equation [(higher value-lower value)/total x 100], or as an absolute difference (higher value-lower value).
- Two-way random effects Intraclass Correlation Coefficients with absolute agreement and 95% CI along with coefficient of variations and their respective 95% CI were determined to examine the reliability of the interlimb asymmetries between all athletes, as well as for each sport sub-group.
- Lastly, Kappa coefficients were determined to examine levels of agreement for the direction of the asymmetry between trials.



Figure 1. Illustrates examples of the Isometric Mid-thigh Pull testing conducted for this study.

Table 1. Within-Session reliability analysis of the Isometric Mid-thigh pull asymmetries quantified as a percentage and absolute difference

	% Asymmetry				Absolute Difference			
	Trial 1 Mean ± SD	Trial 2 Mean ± SD	ICC (95% CI)	CV	Trial 1 Mean ± SD	Trial 2 Mean ± SD	ICC (95% CI)	CV
All Athletes (n = 77)	6.41 ± 5.00	6.31 ± 5.62	0.57 (0.34-0.73)	52.59	211.55 ± 181.61	207.11 ± 193.77	0.54 (0.27-0.71)	52.41
Track (n = 13)	9.99 ± 6.94	10.03 ± 10.77	0.57 (-0.41-0.87)	47.26	339.75 ± 238.74	348.09 ± 381.63	0.50 (-0.61-0.85)	46.24
Football (n = 55)	5.81 ± 4.38	5.54 ± 3.24	0.49 (0.14-0.71)	52.40	191.81 ± 163.69	181.73 ± 108.84	0.43 (0.03-0.67)	52.35
Basketball (n = 9)	4.89 ± 3.20	5.60 ± 5.30	0.11 (-2.92-0.80)	61.48	147.03 ± 113.55	158.58 ± 137.52	0.03 (-3.26-0.78)	61.71

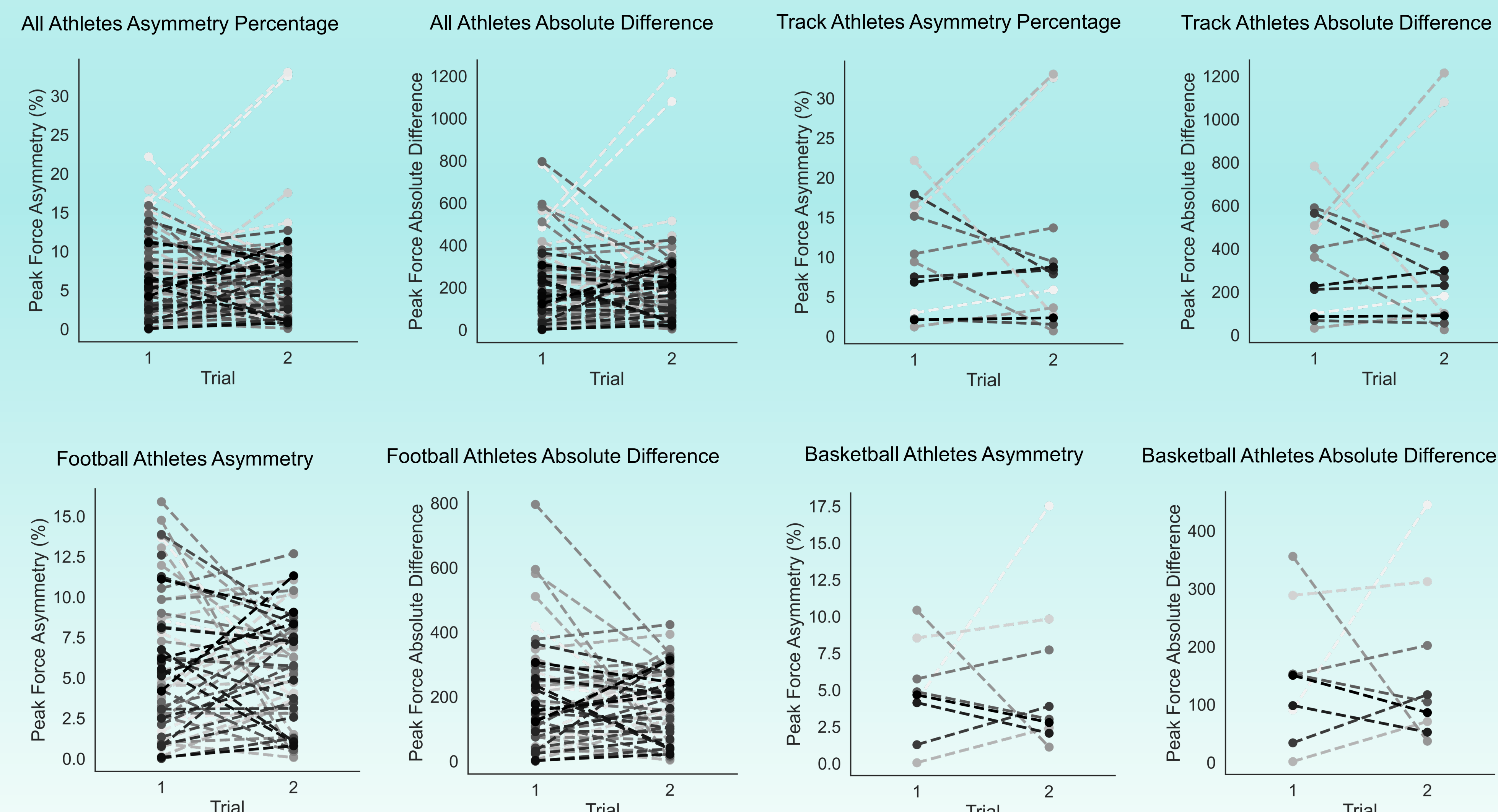


Figure 2. Illustrates the changes in peak force asymmetry and absolute difference measures between trials for all athletes and each sport subgroup.

RESULTS

- When examining asymmetries as a percentage, poor to moderate reliability and high levels of variation were found for all athletes (ICC=0.579, CV=52.59), and for basketball (ICC=0.116, CV=61.48), track (ICC=0.570, CV=47.26), and football (ICC=0.499, CV=52.40) subgroups (See Table 1).
- When quantifying interlimb asymmetries as an absolute difference, there were poor to moderate reliability and high levels of variation for all athletes (ICC=0.542, CV=52.41), and basketball (ICC=0.038, CV=61.71), track (ICC=0.509, CV=46.24) and football (ICC=0.432, CV=52.35) subgroups (See Figure 1).
- Additionally, when examining the direction of the asymmetry, levels of agreement were fair for all athletes (kappa = 0.340), poor for the track and basketball athlete subgroups (kappa = -0.054 - -0.098), and moderate for the football athlete subgroup (kappa = 0.499).

CONCLUSION

- The IMTP does not appear to be a reliable assessment of interlimb asymmetries as low levels of within-session reliability and high levels of variation were observed
- These low reliability and high levels of variation were consistent when quantifying the asymmetries as a percentage and an absolute difference.
- Additionally, these findings were consistent among all athletes, and within each sport subgroup.

PRACTICAL APPLICATIONS

- The reliability of the IMTP asymmetry assessment does not appear to differ when quantifying asymmetries as a percentage or an absolute difference.
- Practitioners may seek alternative assessments to determine interlimb asymmetries that have higher levels of reliability.

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