

The Run-Specific Knee Isometric-Push Assessment: A Measurement Reliability Study in Adolescent Athletes

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Abstract

The run-specific knee isometric-push assessment has recently been introduced as a method to both survey injury as well as profile athletic qualities for court and field-based sports. A repeated-measures design was adopted to assess test-retest, intra-rater, and inter-rater reliability. Subjects were recruited from a college sports academy programme (sports included rugby union, football, and American football).

Test-retest, intra-rater, and inter-rater reliability were reported as intraclass correlation coefficients along with 95% confidence intervals. Peak force analyses revealed excellent measurement reliability, relative peak force analyses showed moderate-excellent, while remaining metrics were deemed not acceptable. The run-specific knee isometric-push assessment protocol is collectively a stable, consistent, and agreeable tool when evaluating variables of force-time metric performance in adolescent athletes. Caution and further scrutiny are advised when evaluating time-specific force and epochs of rate of force development due to their higher variability demonstrated.

Background

Force plate-based isometric assessment is a widely recognised and innovative approach to evaluating force-time metric performance in athletic populations (Fahey et al., 2024). This research sort to evaluate the measurement reliability of the run-specific knee isometric-push assessment protocol, in adolescent athletic populations.

Methods

13 males (16.8 ± 0.8 years) and 8 females (17.6 ± 0.5 years) each completed 2 maximal effort pushes (figure 1), each separated by 60 seconds passive rest. Intraclass correlation coefficients (ICC) for test-retest, intra-rater, and inter-rater reliability were examined (range: $< .50$: poor, $.50 - .74$: moderate, $.75 - .89$: good, $> .90$: excellent). 95% confidence intervals (95% CI) were calculated to evaluate precision and true lower bound ICC output (table 1 & 2) (Koo & Li, 2016). Bland-Altman plots evaluated systematic bias and limits of agreement (figure 2)

Figure 1: RSKIP Set Up



Findings

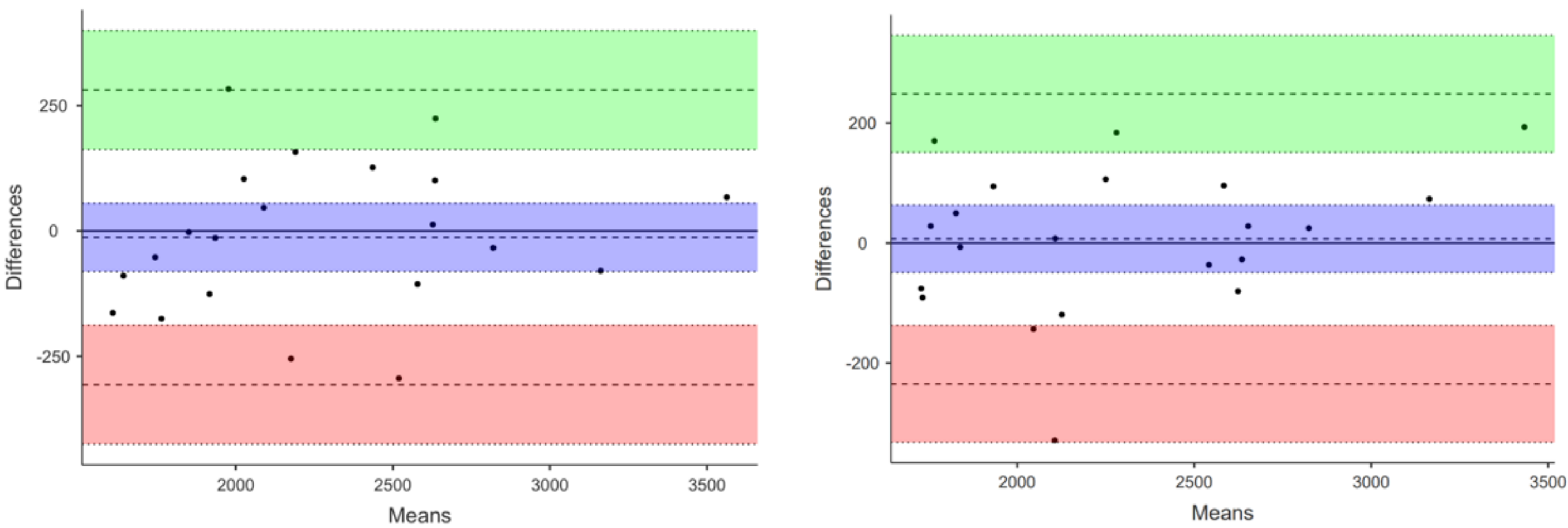
Table 1: Intra-rater and Test-Retest ($ICC_{3,1}$) Statistical Outputs

Metric (Unit)	ICC _{3,1} (CI)	Interpretation
Peak Force (N)	.96 (.91 - .98)	Excellent
Rel. Peak Force (N/kg)	.86 (.72 - .93)	Mod – Excel
Force (100ms) (N)	.69 (.44 - .84)	Poor – Good
Force (150ms) (N)	.71 (.47 - .85)	Poor – Good
Force (200ms) (N)	.74 (.53 - .87)	Mod – Good
RFD (100-150ms) (N/s)	.49 (.16 - .72)	Poor – Mod
RFD (150-200ms) (N/s)	.54 (.22 - .75)	Poor – Good
RFD (100-200ms) (N/s)	.59 (.30 - .79)	Poor – Good

Table 2: Inter-rater ($ICC_{2,1}$) Statistical Outputs

Metric (Unit)	ICC _{2,1} (CI)	Interpretation
Peak Force (N)	.97 (.93 - .98)	Excellent
Rel. Peak Force (N/kg)	.85 (.71 - .92)	Mod – Excel
Force (100ms) (N)	.77 (.56 - .88)	Mod – Good
Force (150ms) (N)	.78 (.58 - .89)	Mod – Good
Force (200ms) (N)	.81 (.63 - .90)	Mod – Excel
RFD (100-150ms) (N/s)	.64 (.37 - .81)	Poor to Good
RFD (150-200ms) (N/s)	.65 (.39 - .82)	Poor to Good
RFD (100-200ms) (N/s)	.68 (.44 - .83)	Poor to Good

Figure 2: Bland-Altman Analysis of $ICC_{3,1}$ and $ICC_{2,1}$ for Peak Force



Practical Application

Practitioners working with adolescent athletes may benefit from administering the run-specific knee isometric-push assessment to profile their respective athletes through a unilateral means, while rehabilitation specialists may gain a deepened insight into the asymmetries of an injured athlete.

References

- 1.Fahey, J., McMahon, J., & Ripley, N. J. (2024). Test Re-test reliability of countermovement jump, single leg countermovement jump, and countermovement rebound jump force plate metrics in female football players: Vertical jump test-rest reliability in female youth football players. International Journal of Strength and Conditioning, 4(1). <https://doi.org/10.47206/ijsc.v4i1.338>
- 2.Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. Journal of chiropractic medicine, 15(2), 155-163. <https://doi.org/10.1016/j.jcm.2016.02.012>