

THE INFLUENCE OF ISOMETRIC STRENGTH SPECIFICITY ON FUNCTIONAL TASK ABILITIES

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PURPOSE: To determine if a multi-joint, isometric leg press muscle strength assessment is more strongly associated with functional task performance [i.e., star excursion balance tests (SEBT), countermovement vertical jump test (CMJ), stair climb (SC) assessment] than traditional single-joint measures of leg extension isometric strength.

METHODS: Forty-one men and women (age = 24 ± 5 years) performed an initial familiarization visit. On visit two, peak force (PF) was measured during 3 maximum voluntary contractions (MVCs) on an isometric leg press dynamometer, followed by a timed and weighted (22.73 kg vest) SC. On visit three, leg extension peak torque (PT) was also determined during 3 MVCs, followed by the CMJ and SEBT assessments. Pearson's product-moment correlation coefficients evaluated the relationships between each muscle strength value (PF and PT) and each functional measure of performance with alpha level of 0.05. Steiger Z calculations determined the difference between the relationships for each respective functional task, with $z > 1.96$ being significant.

RESULTS: Isometric PT and PF were associated with higher CMJ average power ($r = 0.756$, $r = 0.817$) and faster SC times ($r = -0.592$, $r = -0.599$), respectively. No significant correlation existed between the SEBT for both legs and PT or PF. When comparing correlation values for each measure of strength, no significant difference ($P \geq 0.483$) existed in the relationships with each functional task.

CONCLUSION: Traditional measures of isometric leg extension strength and multi-joint leg press isometric strength demonstrated similar relationships with CMJ power output and SC time.

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