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The Effect of Quadriceps Femoris and Gluteus Strength on the Star Excursion Balance Test

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The Star Excursion Balance Test (SEBT) is used to evaluate balance and lower extremity function. Performance in the three reach directions: posteromedial (PM), posterolateral (PL), and anterior (ANT) requires coordination, balance, and flexibility. It is not known how strength relates to reach performance in the SEBT. **PURPOSE:** The purpose of this study was to analyze SEBT reach distance and muscle strength. **METHODS:** Twenty-four healthy college aged adults with no history of ankle injury or balance impairments participated in the study. Each participant completed the SEBT and had their quadriceps (Quad) and gluteus medius (GM) maximum isometric strength measured with a handheld dynamometer. Three trials were completed bilaterally for the SEBT and strength testing. Leg lengths were measured and used to normalize reach distances. Subject mass was measured and used to normalize strength scores. Averages of the three trials of each test were taken. Pearson-product moment correlations were calculated between the average normalized strength scores (Quad and GM) and the average normalized PM, PL, and ANT reach distances. **RESULTS:** There was a moderate significant negative correlation between QUAD strength and ANT reach for the right leg ($r = -0.49$, $p = 0.015$) and a weak negative correlation for between QUAD strength and ANT reach for the left leg ($r = -0.26$, $p = 0.219$). There was a moderate significant positive correlation between GM strength and PL reach for the left leg ($r = 0.41$, $p = 0.045$) and a weak to moderate correlation between GM strength and PL reach for the right leg ($r = 0.37$, $p = 0.079$). GM strength was weakly related to PM reach for right ($r = 0.25$, $p = 0.238$) and left legs ($r = 0.33$, $p = 0.120$). All other correlations were less than $r = 0.15$. **CONCLUSIONS:** GM strength explained an average of 8% of the variation in PM reach and 15% of the variation in PL reach performances. The weak to moderate positive correlation between GM strength and posterior reaches suggests that stronger proximal stabilizers allow for further reaches in the posterior direction. Quad strength explained an average of 15% of the variation for ANT reach performance. The negative correlation between quadriceps strength and ANT reach could be related to flexibility or quadriceps:hamstring ratios (Q:H) in people with greater Quad strength.