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Eccentric hamstring strength: Influence on leg stiffness and reactive strength in elite female youth soccer players

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There is strong evidence that eccentric hamstring strength can be increased through high compliance with the Nordic hamstring exercise (NHE), leading to substantial injury rate reduction (of up to 51%) in soccer players (Al Attar, Soomro, Sinclair, Pappas & Sanders, 2017, *Sports Medicine*, 47, 907-916). Leg stiffness and reactive strength have important performance and injury implications, however there is a paucity of research that has investigated how eccentric hamstring strength in the NHE may influence these metrics particularly in female and youth populations. Therefore, the aim of this study was to examine the influence of eccentric hamstring strength on measures of leg stiffness and reactive strength in elite female youth soccer players. Following institutional ethical approval eighteen players (age:  $14.5 \pm 1.1$  years; stature:  $1.58 \pm 0.06$  m; body mass:  $49.7 \pm 7.6$  kg) were assessed for: (1) eccentric hamstring strength during the NHE measured using load cells attached to the ankle straps on the Hamstring Solo Elite (NJ Doherty Solutions, Ireland) and (2) leg stiffness (Dalleau, Belli, Viale, Lacour & Bourdin, 2004, *International Journal of Sports Medicine*, 25, 170-176) and reactive strength index (RSI) calculated from the average of the best 5 in a series of 10 maximal repeated bilateral hops (10/5 repeated jump test (RJT), Harper, Hobbs & Moore, 2011, *BASES Student Conference*). Players were grouped according to average peak eccentric hamstring force (N) of both legs ( $> 228$  N: ECC<sub>high</sub>;  $< 228$  N: ECC<sub>low</sub>). Differences in leg stiffness and RSI between groups were analysed using magnitude-based inferences (Hopkins, 2007, *Sportscience*, 11, 16-20). Differences in jump height and leg stiffness obtained during the 10/5 RJT were *unclear* between ECC<sub>low</sub> and ECC<sub>high</sub>, whereas *likely* lower ground contact times (GCT) and higher RSI were found in players with ECC<sub>high</sub> (GCT,  $0.19 \pm 0.02$  s; RSI,  $1.34 \pm 0.27$ ) compared to ECC<sub>low</sub> (GCT,  $0.21 \pm 0.03$  s; RSI,  $1.14 \pm 0.22$ ). In addition to reducing injury rates higher eccentric hamstring strength in the NHE can enhance reactive strength qualities mainly by reducing the time on the ground in which jump height is obtained. These findings have important implications for soccer performance in which the production of force during very short ground contact times is repeatedly required.