Speed and Agility Prediction Models in High School Football Players

James Tufano (UG),[1] William E. Amonette,[1,2] A. Eugene Coleman,[1] Terry L. Dupler,[1,2] Troy Wenzel,[2]

[1]University of Houston – Clear Lake, Human Performance Laboratory, Houston, TX, [2]Memorial Hermann Sports Medicine Institute, Houston, TX

Background: Optimal relationships between speed, agility, power and body mass are essential in American football. An increase in body mass, theoretically, reduces acceleration (Newton's 2nd Law). However, an increase in lean body mass may enhance overall force or power generating potential and momentum of an athlete. Body mass, height, and vertical jump height are routinely measured, easily obtainable, and may be used as predictors of speed and agility. **Purpose:** To determine associations between height, vertical jump height, and body mass to speed and agility in high school football players. **Methods:** Data were collected on 1261 male football players (16.4 ± 0.9yrs, 179.7 ± 6.9cm, 87.5 ± 18.4kg) at a regional football combine. In successive order, each athlete completed the following tests: height (HT; cm), body mass (BM; kg), 40-yard sprint (SP; s), pro-agility (AG; s), and vertical jump (VJ; cm). The data were collected after a self selected warm-up and athletes were provided three trials on performance drills. HT was measured using a standard stadiometer and BM using a calibrated scale. SP and AG times were measured with hand held stop watches. Finally, a contact mat was used to measure flight time during a countermovement VJ; subsequently VJ height was calculated from flight time using freely falling body equations. Model prediction equations for SP and AG were generated using SigmaStat statistical software package. For each equation, HT, BM, and VJ were set as predictor variables. Non-significant variables were eliminated from the model with an alpha level of $p < 0.05$. **Results:** VJ (R=-0.73), BM (R= 0.67), and HT (R = 0.17), were all significant predictors of SP. The combined regression model SP(s) = $6.60561-0.0217_{VJ}+0.00753_{BM}-0.00438_{HT}$ explains 73% of the variance in forty yard sprint time (R=0.086; SEE =0.20). HT (R=0.08), BM (R=0.44), and VJ (-0.62) were significantly correlated with AG and were included in the combined regression model: AG(s) = $6.479-0.00437_{HT}+0.00394_{BM}-0.0180_{VJ}$ (R=0.40; SEE=0.304). **Conclusions:** HT, VJ, and BM are strong predictors of linear speed. American football players may be able to increase speed by engaging in exercise programs that reduce body mass and improve vertical ground reaction force production. However, these data suggest that HT, BM, and VJ are not as strong of predictors of agility. Future research should address associations between other potential testing constructs and agility in American football players.