TACSM Abstract

Performance Predictors for Multi-Event Athletes

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ABSTRACT

Decathletes and heptathletes track performance using a point system after each event, and after each day to determine standings and progress. Predicting point potentials is a sought-after commodity at all levels of track and field competition. **PURPOSE:** The principal aim of this study was to identify the events in which athletes representing the U.S. national team attained lower scores compared to Olympic medal winners (OLY). The secondary aim was to provide predictive algorithms using low-tech field-testing and high-tech motion analysis methods to identify movements highly associated with event performance. **METHODS:** 18 current U.S. national track and field athletes, decathlon (n = 9) and heptathlon (n = 9), who competed at the Thorpe Cup (TC) in Marburg, Germany, underwent field tests and motion capture analysis (DARI Motion). Competition points for each decathlon and heptathlon event were also recorded. A 2-way ANOVA was conducted comparing TC to OLY athletes (medal winners from the last five Olympic Games); multiple regression was used to determine the prediction of competition event points using field test and motion analysis. **RESULTS:** In the decathlon, TC athletes scored significantly lower than OLY in **all** the events, $p < 0.05$, e.g., Long Jump (OLY 996.93 $\pm$ 46.64 pts vs TC 829.28 $\pm$ 77.76 pts). In the heptathlon, TC athletes were significantly lower in **all** events, $p < 0.05$, e.g., Javelin (OLY 816.93 ± 104.49 pts vs TC 587.71 ± 66.63 pts). TC heptathletes regression modeling showed no significant predictive value for competition points. TC decathlete regression models showed that the variables OHS Right Ankle Flex and Vertical Jump Left Ankle Torque improve discus distance in decathletes, for both Model 1 ($F(1,7) = 12.098$, $p = 0.01$) and Model 2 ($F(2,6) = 24.652$, $p = 0.001$). For the field tests, there was no significant prediction. **CONCLUSION:** Coaches are encouraged to use predictive models to improve performance, for example, OHS Right Ankle Flex and Vertical Jump Left Ankle Torque to improve discus distance in decathletes. The integration of predictive algorithms and standard field-testing measures promotes the ongoing pursuit of athletic excellence. Anticipating obstacles, precisely adapting strategies, and maximizing athletes' potential, both in training and in competition, can lead to significant benefits in point accumulation and prediction.