The Impact of Kinetic Energy Factors on Pitching Performance of NCAA Baseball Players

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ABSTRACT

Kinetic energy is established by a mathematical equation involving the mass of an object and the speed at which the object travels, and is a relevant measure in regards to athletic performance due to frequent transfer of energy during sport (i.e. athlete to athlete (tackling), athlete to object (throwing), object to object (tennis/baseball hitting)). Previous research has utilized the 60-yd run-shuttle to examine kinetic energy factors (k-factor) of different sports, recognizing significant differences in energy capability between gender, sport teams, and individual sport positions. The utilization of k-factor, pertaining to baseball, has distinguished significant positional (i.e. infielder, outfielder, catcher, pitcher) differences. However, the predictive influence of k-factors on in-game baseball performance necessitates further examination.

PURPOSE: Analyzing the impact of k-factor on the pitching performance of NCAA baseball pitchers was the purpose of the current investigation. METHODS: NCAA pitchers (n=10, age 20.2 ± 1.9 yrs., weight 83.8 ± 10.3 kg, height 1.85 ± 0.48 m) completed a laser timed 60-yd run-shuttle, which yielded average k-factor scores for four contiguous agility segments (K1, K2, K3, and K4 of 10, 10, 20, and 20 yds., respectively), as well as Total Average K-Factor (Kavg). In-game performance was recorded upon the completion of the regular season, and included: Earned Runs Average (ERA), Win (W), Loss (L), Appearances (APP), Games Started (GS), Innings Pitched (IP), Runs (R), Hits (H), Earned Runs (ER), Base-on-Balls (BB), Strikeouts (SO), and Opponent Batting Average (B/AVE), measures normalized for innings pitched were R, H, ER, BB, and SO. To assess the impact of k-factor on pitching performance, backwards stepwise multiple linear regression analyses were employed. RESULTS: Results from the multiple linear regressions indicate that k-factor will yield significant prediction models (P<0.05) for each of the following dependent variables: W, GS, and SO/I. Average k-factor accounted for 50% of the variance in GS (R² = 0.50; SEE = 3.1 games), and 41% of the variance in W (R² = 0.41; SEE = 1.5 wins), while K1, K2, and Kavg yielded a model that accounted for 78% of the variance (R² = 0.78; SEE = 0.1) in SO/I. K-Factor did not produce a significant prediction model for ERA, L, APP, IP, H/I, R/I, ER/I, BB/I, or B/AVE. CONCLUSION: These results suggest elevated k-factor scores, or a pitchers capability to proficiently transfer energy during agility drills, contribute to improvements of in-game baseball pitching performance.