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**Conference Paper** *in* Medicine & Science in Sports & Exercise · May 2019

DOI: 10.1249/01.mss.0000562835.00028.55



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MEDICINE & SCIENCE IN SPORTS & EXERCISE
DOI: 10.1249/01.mss.0000562835.00028.55
June, 2019
51(6S): 783

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# Kinematic Factors that Contribute to Batting Performance in Collegiate Baseball

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To remain competitive in collegiate athletics, sports teams now employ advanced analytical tools to identify improvable domains. In baseball, technological limitations have precluded comprehensive interpretation of swing mechanics. Recent developments in technology now permit more complex assessments. **PURPOSE:** To test how kinematic factors of bat swing associate with in-season batting performance in college athletes. **METHODS:** We enrolled 13 batters from a D1 baseball team in Northern California and used Proteus (Boston Biomotion, USA) to conduct three-dimensional analyses of swing mechanics. Each athlete performed six five-repetition sets of swings at increasing loads of magnetic resistance: 1lb, 2lb, 3lb, 5lb, 7lb, and 9lb. Proteus software computed explosiveness (rate of power production) and endurance (replication of power production in successive swings). Players were tracked through the 2017 season and all batting statistics were recorded. Linear regressions tested the effects of explosiveness and endurance on in-season batting performance. Significance was set at $p<0.05$; owing to a small sample and the novel equipment, trends ($p<0.08$) were considered. **RESULTS:** 11 of 13 players had a base hit during the study season; these 11 constituted the study sample. They played 40.1±13.2 games and batted .264±.048. Mean swing explosiveness was 313.7±59.3 and endurance was 97.7±1.4. Batting average was positively related to swing endurance ($R=0.638$); an additional point of endurance predicted an 8.7% increase in batting average ($p=0.047$). Runs ($R=0.869$), triples ($R=0.628$), and home runs ($R=0.585$) per at-bat were positively correlated with swing explosiveness; in each at-bat, an additional point of explosiveness predicted a 0.2% increase in runs ($p=0.001$), 1.3% increase in triples ($p=0.052$), and 0.8% increase in homeruns ($p=0.075$). Neither explosiveness ($p=0.121$) nor endurance ($p=0.529$) associated with games played. **CONCLUSIONS:** In three-dimensional analyses of swing mechanics, increased explosiveness and endurance predicted an improved batting average, more extra base hits, and more runs scored per at-bat. Scouts may be wise to consider swing mechanics in their estimations of a player's value. Likewise, players and coaches may choose training programs that optimize mechanics accordingly.