

Relationships between Four-Seam Fastball Velocity and Countermovement Jump Performance Across the Competitive Season in NCAA Division I High-Inning Pitchers

Adam A. Burke, Erica L. King, Jennifer B. Fields, Andrew R. Jagim, B. Chris Green, Margaret T. Jones



PRESENTER:
Adam Burke



INTRODUCTION

With increasing emphasis on within season performance monitoring in baseball, methods like the countermovement jump (CMJ) have been utilized to evaluate indices of neuromuscular fatigue because lower-body power can have a strong impact on overhead throwing abilities. However, there is a lack of longitudinal research examining the relationship between CMJ performance and pitch velocity beyond controlled laboratory environments

PURPOSE: Investigate relationships between CMJ performance and FSFB velocity in high-inning pitchers during the regular season

METHODS

National Collegiate Athletic Association Division I baseball pitchers (mean ± SD: n=23.2 ±1.4 years, 185.9 ±5.9 cm, 90.8 ±10.9 kg) completed weekly CMJ testing throughout the regular 52-game season, over an 18-week period.

Data were included from pitchers who attended > 75% of CMJ testing sessions and pitched > 25 innings during the season.

Total pitch count ranged from 467-1266 pitches thrown per pitcher across the regular competitive season.

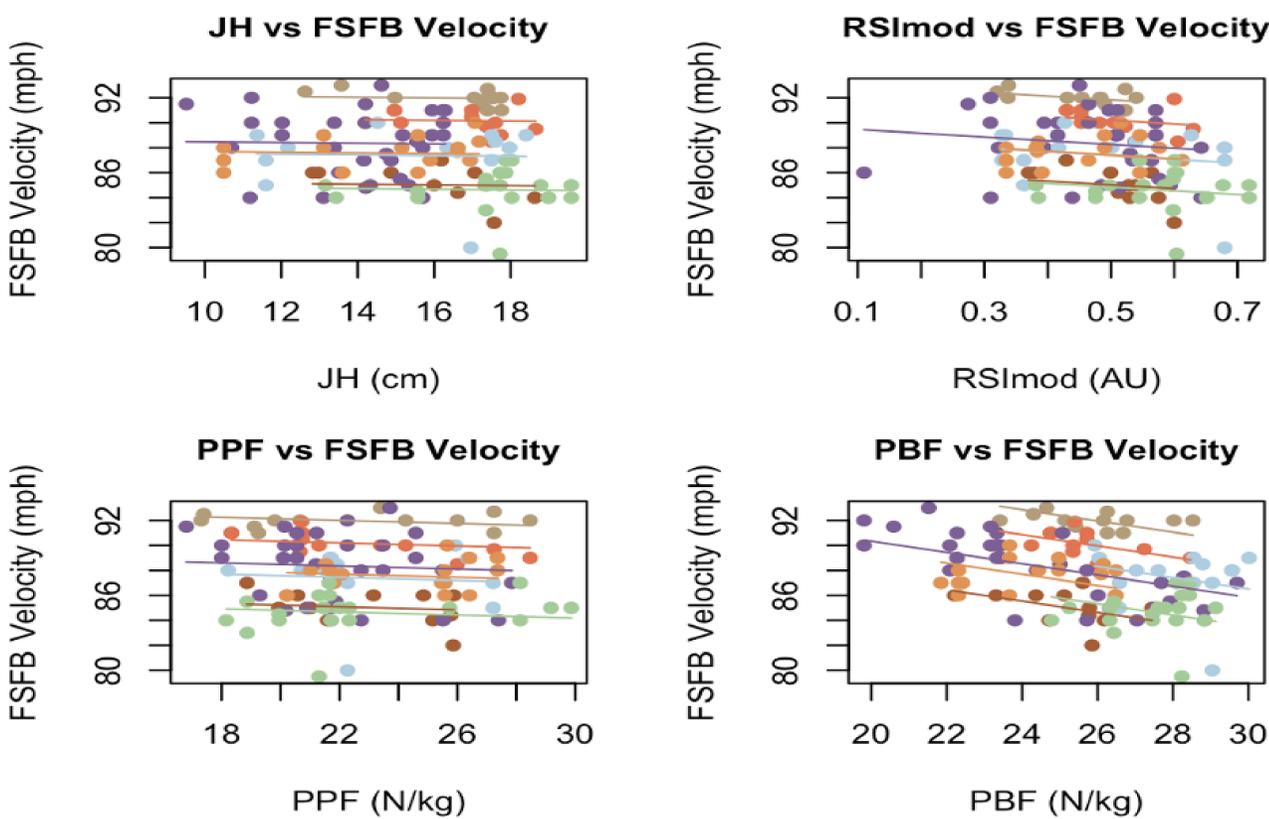
Weekly testing sessions took place at the same time of day, using bilateral force plates. CMJ metrics included jump height (JH, cm), reactive strength index modified (RSImod, AU), peak braking force relative to body mass (PBF, N/kg), and peak propulsive force relative to body mass (PPF, N/kg).

Relationships between CMJ variables and FSFB velocity were evaluated via repeated measures correlation coefficients (RMCORR), which were defined as very weak: < 0.20; weak: 0.20–0.39; moderate: 0.40–0.59; strong: 0.60–0.79; very strong: >0.80 (p<0.05).

KEY FINDING

Findings suggest that while lower-body force production may influence FSFB velocity, the relationship between specific CMJ performance metrics and pitching velocity throughout a season remains inconclusive

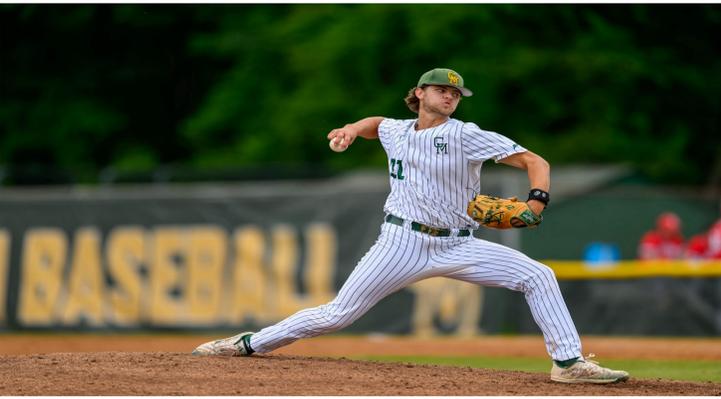
Figure 1. Repeated Measures Correlation between Neuromuscular Performance and Pitching Velocity



Legend
 JH (cm) = Jump Height
 RSImod (AU) = Reactive Strength Index Modified
 BF (N/kg) = Peak Braking Force Relative to Body Mass
 PF (N/kg) = Peak Propulsive Force Relative to Body Mass
 FSFB Velocity (mph) = Four Seam Fastball Velocity

RESULTS

- Relationships between CMJ metrics and FSFB velocities are shown in Figure 1.
- There were no significant relationships between FSFB and JH (p = 0.76, r=-0.02), RSImod (p = 0.07, r=-0.16), or PPF (p = 0.28, r=-0.10).
- However, PBF (p<0.001, r=-0.44) showed a moderate negative association with FSFB velocity.



CONCLUSIONS & PRACTICAL APPLICATIONS

- No significant associations were observed with FSFB velocity except for a moderate negative relationship with PBF.
- Findings suggest that while lower-body force production may influence FSFB velocity, the relationship between specific CMJ performance metrics and pitching velocity throughout a season remains inconclusive.
- Weekly CMJ testing varied within 24 hours due to game and travel schedules, which may have contributed to the lack of association between CMJ performance and pitching performance.
- It is recommended that practitioners follow a strict, standardized time frame to better identify potential relationships between CMJ performance and FSFB velocity.

