Athlete Monitoring in American Football Using Force Plates Throughout a Competitive Season

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PURPOSE:

Monitoring neuromuscular status in American Football is crucial for optimizing athletic potential, maximizing roster availability, and creating recovery plans. A better understanding of neuromuscular performance trends is needed to add context for practitioners implementing data-driven interventions in pursuit of peak athletic performance. This study aimed to evaluate the neuromuscular status of American football players throughout the competitive season by analyzing trends in weekly hands-on-hip countermovement jump (CMJ) performance. Additionally, the study sought to determine the proportion of flagged athletes concurrently listed with injuries

METHODS:

A total of 60 collegiate D1 Football players performed weekly CMJ tests every Monday on force plates throughout the season. Athlete monitoring included tracking potential neuromuscular fatigue and injury indicators, with specific thresholds (-1 coefficient of variation) used to flag athletes demonstrating abnormal performance decrements. Key metrics included: Peak power, jump height (impulse momentum), reactive strength index modified, and countermovement depth. Descriptive statistics were used to examine trends in flagged athletes and their injury status.

KEY TAKEAWAY #1

Enhancing if-then logic flows and decision-making using countermovement jump tests on force plates can improve athlete monitoring by guiding targeted recovery strategies and workload adjustments to optimize readiness.

Weekly Average % Flagged CMJ of 60 Collegiate D1 Football Players
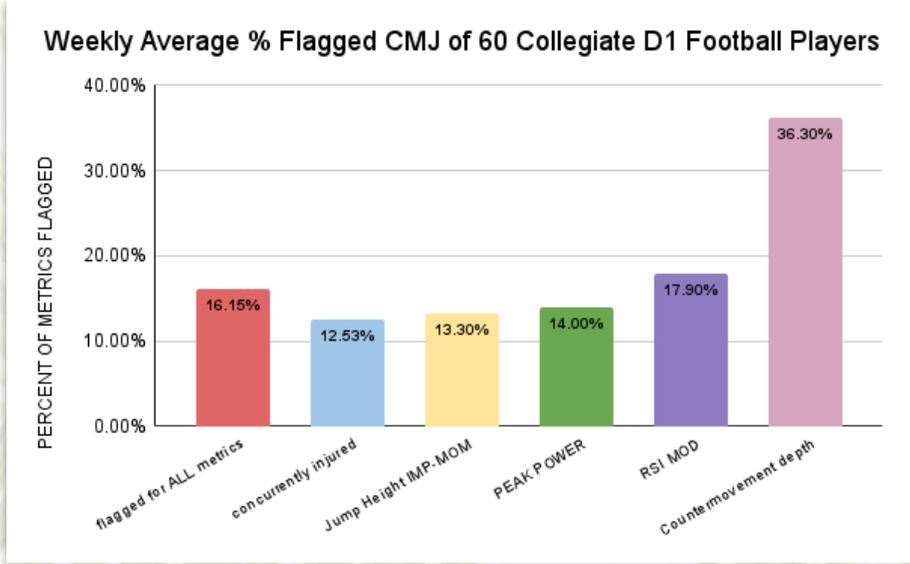
KEY TAKEAWAY #2

Due to the high-impact demands of American football, athletes were more frequently flagged for movement-pattern metrics than output-based measures. Notably, those flagged for countermovement depth and contraction time showed a higher likelihood of concurrent injury.

RESULTS

On average each week, a total of 9.6 (16.15%) athletes were flagged for all metrics. 1.2 (12.53%) athletes flagged for movement based metrics were concurrently injured. Athletes were flagged for Jump height IMP-MOM, Peak Power, RSI MOD, and Countermovement depth 13.3%, 14.0%, 17.9%, and 36.3% of the time, respectively.

CONCLUSION:

The collision-based nature of American football may result in athletes being flagged for metrics associated with movement patterns more often than output-based metrics. Athletes flagged for Countermovement depth and Contraction time were more likely to have a concurrent injury.

PRACTICAL APPLICATION:

The findings of the present study provide context for neuromuscular monitoring in American football by enhancing flagging if-then logic flows and decision-making. Athletes flagged for movement-based metrics should be directed to the sports medicine team to optimize the likelihood of recovering for the next game, whereas athletes flagged for output-based metrics not on the injury report may benefit from modified workloads.