THE RELATIONSHIP BETWEEN PERFORMANCE CHARACTERISTICS OF THE COUNTERMOVEMENT JUMP AND A MAXIMAL SPRINT

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Introduction

Peak force and power output are important attributes in sport performance (4). The countermovement jump (CMJ) is a field test often used to assess lower body strength and power, as well as athlete performance (3). The CMJ has been positively correlated with shorter distance sprinting (10m), likely due to the short-duration maximal effort required by both activities (2). In addition, the relationship between jump and sprint performance has been demonstrated over slightly longer distances (36.6m) (5). Measures of sprint and jump performance have been used to differentiate starters vs, nonstarters, as well as level of competition in collegiate football players (1). Therefore, the CMJ may be useful in assessing sprint-related performance metrics during training.

Purpose

The purpose of this study was to assess the relationship betweer CMJ and 35-meter sprint performance..

Methods and Materials

- Eighteen apparently healthy, active college-aged males and females (X ± SD; age = 20.7 ± 1.1 yrs, height = 171.4 ± 7.8 cm, mass = 70.3 ± 15.4 kg) participated in this study.
- Participants completed three maximal countermovement jumps (CMJs) interspersed with 30-60 sec of rest.
- Reach and peak jump heights were measured with a Vertec with jump height (JH) calculated as the difference between standing reach height and peak jump reach height.
- A Tendo Weightlifting Analyzer recorded peak concentric jumping power (PPJ), velocity (PVJ), and force (PFJ) during the jumps. The Tendo was attached to the back of a vest in a position just superior to the waist. The jump with the greatest JH was used for analysis.
- Participants then completed 6 maximal 35-meter sprints. Sprint time was used to calculate mean velocity (MVS) for all sprints, with the fastest sprint used for analysis.
- Pearson product-moment correlations assessed the relationship between peak jump and sprint measures and FI ($p < 0.05$).

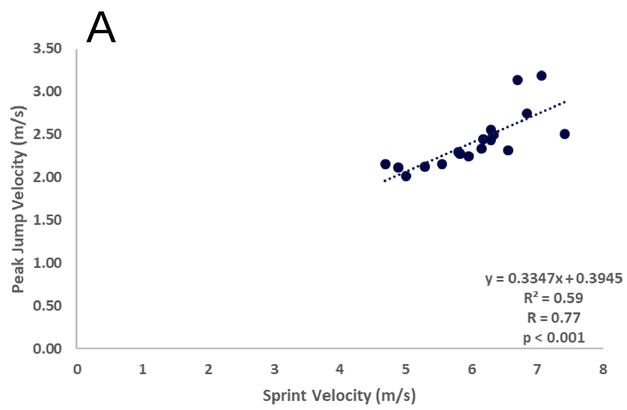

Figure 1. Scatterplots with linear lines of best fit, linear regression equations, r^2 values, and r values for sprint velocity vs. jump velocity (A), sprint velocity vs. jump height (B), and jump velocity vs. jump height (C).

Results

- Strong linear relationships were noted between MVS and the following vertical jump variables:
  - **MVS and PVJ (r = 0.77, p < 0.001)**
  - **MVS and JH (r = 0.76, p < 0.001)**
- A substantial amount of the variance in sprinting velocity can be explained by **CMJ velocity (r^2 = 0.59)** and **jump height (r^2 = 0.58)**.
- A very strong correlation was noted between **PVJ and JH (r = 0.90, p < 0.001)**.
- A moderate correlation was found between **MVS and PPJ (r = 0.61, p = 0.008)**.
- **MVS and PFJ were not significantly related (r = 0.31, p = 0.21)**.
- **PFJ was not a strong predictor of JH (r = 0.37, p = 0.13)**.

Conclusion

PVJ and JH were very strong predictors of sprinting velocity. As both sprinting and jumping require short-duration power production, the correlations found between these activities may be related to similar performance characteristics (5). In addition, the findings of the current study align with previous work, which has demonstrated strong correlations between sprinting and jumping performance (2). Due to the strong correlations between CMJ and sprint performance, the assessment of CMJ metrics may be a simple, economical method to evaluate and monitor athletic performance variables related to peak anaerobic performance.

Practical Application

Coaches and practitioners often assess and monitor athlete performance. Sprint testing may not always be feasible due to space and time constraints. The CMJ appears to be a variable that can be used to monitor sprint-related performance metrics during training.

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