LEEDS BECKETT UNIVERSITY

Carnegie Applied Rugby Research

CARR centre

COUNTERMOVEMENT JUMP QUALITIES OF ELITE ACADEMY RUGBY UNION PLAYERS

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RFU

INTRODUCTION

- Jump height is considered the most popular variable when assessing countermovement jump (CMJ) performance, however due to differences in body mass it may be beneficial to use multiple kinetic and kinematic variables.
- While collecting large amounts of data can be advantageous in understanding athletic performance, this can lead to information overload and alienate coaches.
- The aim of this study was to identify positional differences in countermovement jump qualities using dimension reduction techniques.

METHOD

- With ethics approval, 166 U18 male rugby union players participated from six English Regional Academies.
- Participants completed two maximal CMJ on portable force platforms (Pasco PS-2141, Roseville, California, USA) sampling at 500 Hz. The best of the two trials was used for analysis.
- A custom-designed R-script was used to find kinetic (peak force, mean rate of force development, impulse, peak power and total area under the force velocity curve) and kinematic variables (take-off velocity, jump height, centre of mass displacement and reactive strength index modified) for each jump identifying eccentric and concentric jump phases where applicable.
- Principal component (PC) analysis was conducted to identify the variance explained by the variables and collinearity. From the first three PCs (i.e., power and force variables [PC1; 35.0%], impulse variables [PC2; 26.9%] and velocity variables [PC3; 25%])
- Variables with the greatest loading factors were selected for analysis using a one-way ANOVA and Tukey Kramer post hoc (α = 0.05) to identify positional differences.

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RESULTS

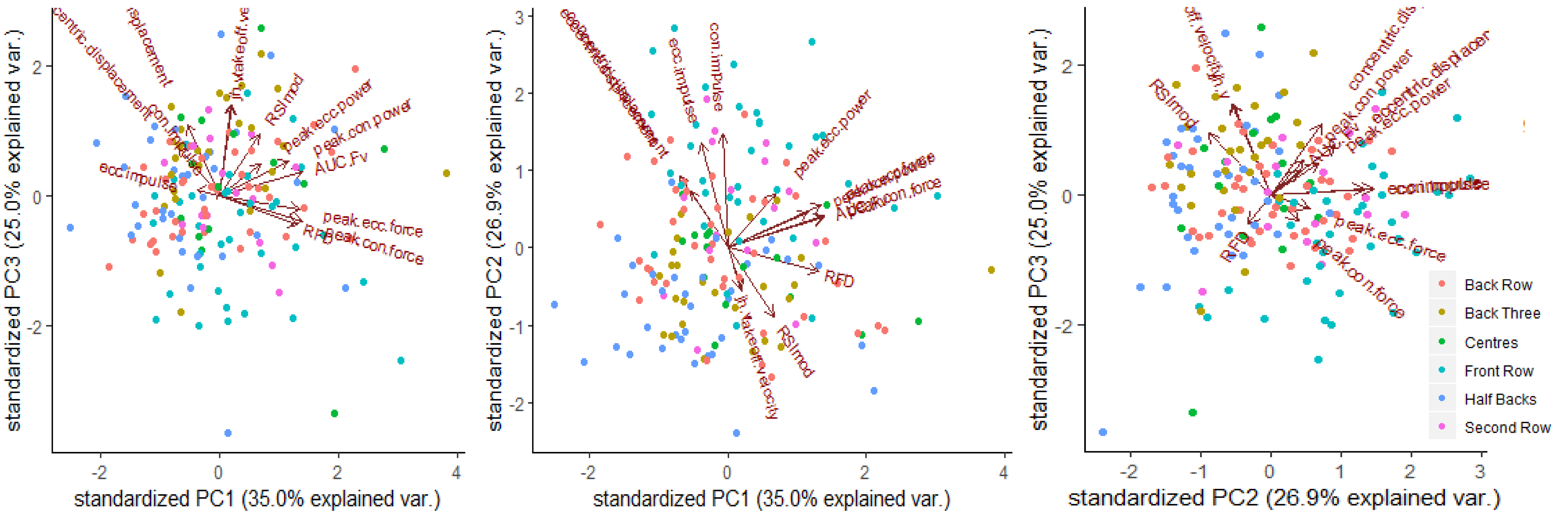

Figure 1. Principal component analysis plots showing positions differences and variable loadings.

Table 1. A comparison of the highest loading variables for each principal component between playing positions for U18 academy rugby union players (mean ± SD)

Playing Position	PC1 Area under the force velocity curve (W)	PC2 Concentric impulse (N.s)	PC3 Take-off velocity ($m.s^{-1}$)
Front Row (*n*=35)	6640 ± 858*	267 ± 54*	2.38 ± 0.19
Second Row (*n*=16)	6532 ± 596*	235 ± 50*	2.55 ± 0.18
Back Row (*n*=40)	6239 ± 1006	211 ± 43†	2.58 ± 0.18†
Half Backs (*n*=34)	5630 ± 1008	169 ± 38	2.64 ± 0.23†
Centres (*n*=15)	6612 ± 1055*	193 ± 35†	2.64 ± 0.28†
Back Three (*n*=26)	6244 ± 970	187 ± 29†	2.73 ± 0.18†#

*Significantly different, $p < 0.05$, compared to half backs
† Significantly different, $p < 0.05$, compared to front row
# Significantly different, $p < 0.05$, compared to back row

CONCLUSIONS

- Countermovement jump qualities vary by playing position in U18 academy rugby union players.
- PC analysis provides a way of reducing the dimensionality of the data in order to observe differences.

PRACTICAL APPLICATIONS

- Results from the present study suggest that a multivariate approach may provide additional information for monitoring neuromuscular performance.
- The positional differences observed in this study should be combined with knowledge of match demands to determine a suitable training intervention for U18 rugby union players.

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