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A comparison of the maximum locomotor intensities in age-grade international and academy rugby union

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Introduction

Age-grade (e.g., U18) rugby union players play in multiple playing levels across a season, including international and academy competition. One method for quantifying the physical characteristics of different playing levels is to calculate the maximum locomotor intensity using relative distance ($m \cdot min^{-1}$) and high-speed ($>5.5 m \cdot s^{-1}$) relative distance ($HSm \cdot min^{-1}$). The aims of the study were to quantify the maximum locomotor intensities from match-play and compare between U18 international and academy levels.

Methods

In total, 142 U18 male rugby union players provided 232 observations. During match-play each player wore a micro-technology device (S5 Optimeye, Catapult Sports) that contained a global positioning system. Using the raw instantaneous speed ($m \cdot s^{-1}$) downloaded at 10 Hz, variables were calculated through the use of a 0.1 s rolling mean for time durations (15, 30 s and 1, 2, 2.5, 3, 4, 5, 10 min) relevant to age-grade rugby union. Players were split into four positional groups of: front row, back five, scrum-halves, and inside and outside backs. A linear mixed model was used to account for the repeated measurements of players and then results were interpreted with effect sizes (ES) $\pm 90\%$ confidence intervals and classified as *trivial* (0.00-0.19); *small* (0.20-0.59); *moderate* (0.60-1.19) and *large* (1.20-1.99). Ethics approval was granted from Leeds Beckett University.

Results

Differences between levels in relative distance were *trivial* or *small* for all time durations and positions, with the relative distance ranging from 148 ± 16 to $189 \pm 17 m \cdot min^{-1}$ in the one-minute duration. High-speed relative distance for one-minute ranged from 26 ± 11 to $71 \pm 24 HSm \cdot min^{-1}$ and throughout all comparisons were greater in international players. The differences in high-speed relative distance were *moderate* to *large* ($ES = 1.17 \pm 0.64$ to 1.59 ± 0.64) in front row players. The differences between the back five positional groups were *small* ($ES = 0.31 \pm 0.52$ to 0.45 ± 0.57) for high-speed relative distance. There were *small* differences between the groups of scrum halves in the 15 s, 30 s and 1 min durations ($ES = 0.56 \pm 0.79$ to 0.59 ± 0.78), with *moderate* to *large* differences in time durations ≥ 2 min ($ES = 0.82 \pm 0.87$ to 1.24 ± 0.93). The differences in high-speed relative distance were *trivial* to *small* ($ES = 0.02 \pm 0.51$ to 0.39 ± 0.58) in the inside and outside backs comparison.

Conclusion

Relative distance was similar between playing levels but appears to be comparable to data from senior international rugby union match-play in previous studies. There is a greater amount of high-speed relative distance per minute completed during U18 international matches compared to U18 academy matches. Coaches working with rugby players can use this information to appropriately overload the intensity of running, specific to time durations and positions.