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## PEAK RUNNING INTENSITIES IN RUGBY UNION MATCH-PLAY: COMPARISONS TO WHOLE MATCH DATA

Peak running intensities in comparison to whole match data

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**Purpose:** Data from global positioning systems (GPS) such as relative distance ( $\text{m}\cdot\text{min}^{-1}$ ) is typically presented as an average from the whole match. The purposes of the study were to establish the peak running intensities of rugby union match-play and secondly, to make comparisons between the peak intensities and a whole match average.

**Methods:** With ethical approval, 125 rugby union players were recruited from 6 English rugby union academies (age:  $17.6 \pm 0.6$  years; stature:  $182.3 \pm 12.2$  cm; body mass:  $92.6 \pm 12.9$  kg). Players were divided into forwards ( $n = 70$ ) and backs ( $n = 55$ ). One game from each academy during the 2016 / 2017 season was assessed with each player wearing a 10 Hz GPS unit (S5 Optimeye, Catapult Sports) during the match. The file was trimmed so that it only contained data from the match and analysed using a customised spreadsheet (Microsoft Excel). Peak values for relative distance were calculated for different moving averages (1, 5, 10 min) alongside the average for the whole match. For example, a 1 min moving average analysed 600 consecutive data points and the highest value for the duration was recorded for each player. Data were analysed using Cohen's  $d$  effect sizes (ES) and classified as *trivial* (0.00-0.19); *small* (0.20-0.59); *moderate* (0.60-1.19); *large* (1.20-1.99); *very large* (2.00-3.99) and *extremely large* ( $>4.00$ ).

**Results:** The difference between average relative distance and peak 1 min was *extremely large* for forwards ( $73.6 \pm 8.4$  vs.  $157.3 \pm 18.1$   $\text{m}\cdot\text{min}^{-1}$ , ES = 10.00) and backs ( $79.8 \pm 10.5$  vs.  $174.9 \pm 23.9$   $\text{m}\cdot\text{min}^{-1}$ , ES = 9.02). The difference between average relative distance and peak 5 min was *very large* for forwards ( $98.5 \pm 15.1$   $\text{m}\cdot\text{min}^{-1}$ , ES = 2.97) and backs ( $109.2 \pm 14.5$   $\text{m}\cdot\text{min}^{-1}$ , ES = 2.79). The difference between average relative distance and peak 10 min was *large* for forwards ( $84.8 \pm 11.6$   $\text{m}\cdot\text{min}^{-1}$ , ES = 1.33) and backs ( $94.8 \pm 11.8$   $\text{m}\cdot\text{min}^{-1}$ , ES = 1.43). The difference between 1 and 5 min peak was *large* for forwards (ES = -1.74) and backs (ES = -1.71). The difference between 5 and 10 min peak was *moderate* for forwards (ES = -0.94) and backs (ES = -0.96).

**Conclusions:** This study highlights that peak running intensities are substantially higher than whole match averages. Additionally, the intensity decreases with the duration of time. It provides sport and position specific intensities that players should be exposed to during training for a range of durations, which prepares athletes for the most demanding phases of play.

**Practical Applications:** The quantification of peak running intensities allows the conditioning coach to prescribe high intensity running drills during training. The study provides evidence that coaches should not use whole match data for conditioning purposes. In team sports where the play is intermittent in nature, the use of whole match data is likely to underestimate the demands of match-play.

Figure 1. Peak average relative distance ( $\text{m}\cdot\text{min}^{-1}$ ) of rugby union players for whole match, 1, 5 and 10 min durations