ACCELERATIONS IN FOOTBALL: TOWARD A BETTER UNDERSTANDING OF HIGH-INTENSITY ACTIVITY

Varley, M.C. 1), Pedrana, A. 3) & Aughey, R.J. 1)2)

1) Institute of Sport, Exercise and Active Living, School of Sport and Exercise Science, Victoria University, Australia
2) Western Bulldogs Football Club, Australia
3) Melbourne Victory Football Club, Australia

Keywords: football, acceleration, high-intensity

Introduction

In football, high-intensity running (distance covered during high-velocity movements) has been suggested to be a valid measure of physical performance.[1] The ability to accelerate is a physically demanding task that can occur from a low velocity and should be considered a high-intensity action. Match analysis research excluding accelerations may underestimate the high-intensity activities performed by players. The aim of the study was to quantify the high-velocity running and acceleration efforts undertaken by elite football players and combine the two to form a high-intensity activity index (HIA).

Methods

Player velocity data was recorded from 13 outfield players for a total of 67 game files using a 5Hz Global Positioning System (GPSports, Australia) over the 2010-2011 A-League season. Raw velocity data was analysed using a custom-spreadsheet. Movement efforts were defined as the following: high-velocity running (HiVR) (≥4.17 $m.s^{-1}$), sprinting (≥6.94 $m.s^{-1}$), maximal acceleration (≥2.78 $m.s^{-2}$) and high-intensity activity (HiVR + maximal accelerations). Effort frequency and total distance were determined in addition to the commencement velocity for maximal accelerations. All data was analysed using the effect size statistic.

Results & Discussion

Players performed a ~6-fold greater number of maximal accelerations than sprint efforts. The number of HIA efforts was 20% greater than that of HiVR. Interestingly, 96% of maximal accelerations commenced from a velocity of ≤3 $m.s^{-1}$, which under traditional movement classifications would not be considered a high-intensity effort.

Table 1. Effort frequency and total distance. All data is mean±SD

Effort	Frequency	Total Distance (m)
HiVR	161 ± 52.6	1522 ± 490.8
Sprint	9 ± 7.1	91 ± 81.8
Max Accel	54 ± 18.3 †	153 ± 60.4
HIA	195 ± 61.6 *	1636 ± 516.7

* small increase compared to HiVR
† very large increase compared to Sprint

Conclusion

The number and distance of maximal acceleration and HIA efforts exceeded that of sprint and HiVR respectively. Further, as most accelerations commenced from a low velocity, HIA will be underestimated when based purely on high-velocity movements.

References: 1. Mohr, M. et al. (2003). *J Sports Sci,* 21(7): 519-528.