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Test – retest reliability of a 3-minute all-out 15-meter shuttle running test

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INTRODUCTION:
Critical running speed (CS) is the fastest sustainable speed whilst D' is a finite distance above CS, and these parameters can predict performance and inform training (1). A 3-min all-out running test can determine CS and D' (1). Studies have developed 3-min all-out shuttle running tests involving changes of direction (COD) for relevance to team sport players. However, these tests were: not suitable for simultaneously testing a team of players (2), or did not use COD frequencies similar to those expected in team sport (3), or did not convert CS and D' to critical metabolic power (CPmet) and W' to account for accelerations that occur with COD. Further, no studies have assessed test – retest reliability of their 3-min all-out tests. This study assessed the reliability of a 3-min all-out shuttle running test suitable for simultaneously testing a whole team of players, with a COD frequency (COD every 15 m) similar to team-sport activity, and considered speed and metabolic power metrics.
METHODS:
11 English Premier League Academy soccer players (Age 13.6 ± 0.5 years) performed a 3-min all-out shuttle-run test on 3 separate occasions, with consecutive sessions separated by a week. All participants completed the test together. The 3-min all-out test involved running back and forth between two parallel lines set 15 m apart. Running speeds and distances were measured via a GPS unit (STATSports Viper) sampling at 10 Hz. Metabolic power and work were determined from running speed and acceleration using the equations of de Prampero (4). CS and CPmet were average speed and metabolic power in the last 30 s. D' and W' were the areas below the speed-time and work-time curves above CS and CPmet respectively. Between test coefficient of variation (CV) and bi-variate correlation coefficients were determined.
RESULTS:
CVs between test 1 and 2 were 6% (CS), 17% (D'), 10% (CPmet), and 17% (W'). Between tests 2 and 3, CVs improved and were 4% (CS), 11% (D'), 8% (CPmet), and 8% (W'). Bivariate correlation coefficients between test 1 and 2 were weak-moderate (0.38-0.52) for all variables. Correlation coefficients improved between test 2 and 3 (0.4-0.61).
CONCLUSION:
This 3-min all-out test provided acceptably low CVs in CS, D', CPmet, and D' between test 2 and 3, but not between 1 and 2, suggesting coaches should familiarise their athletes with the test at least once to ensure reliable measurements. Whilst correlation coefficients were higher between test 2 and 3 than test 1 and 2, they remained weak-moderate for all variables, which may be due to low between-participant variability in the variables recorded. This test can be reliably completed by a whole team of players simultaneously, and utilises COD frequencies that are similar to team sport activity.

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