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Reliability of a novel indoor GPS technology during a basketball exercise simulation test

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INTRODUCTION:

Exercise tests used to assess acute and chronic athletic performance need to closely simulate the movement characteristics of players during the actual game or match. Such tests also need to have adequate reliability to ensure changes in performance can be appropriately identified. Therefore, the aim of this study was to investigate the measurement reliability of movement characteristics during a simulated basketball exercise simulation test using novel indoor GPS technology (VX Sport, Omni, Wellington New Zealand).

METHODS:

Eighteen regional or national representative basketball athletes (13 males; 20.4 ± 1.3 yr, 185.8 ± 27.5 cm, 87.7 ± 8.0 kg and 5 females; 20.4 ± 1.5 yr, 175.5 ± 7.5 cm, 75.2 ± 6.0 kg mean $\pm$ SD) performed two trials (7-8 days apart) of the basketball exercise simulation test (BEST) on a FIBA-sized basketball court with VXSport Omni devices inserted into custom-made pockets located between thoracic vertebrae T1-T4 in the back of the VXSport Smartvests. Initially, each player completed a standardised movement sequence on an outside field to allow the VXSport unit to calibrate for the players gait cycles and movement patterns before moving inside to the basketball court. Measures taken included total distance and relative distance covered during the test, maximal speed, total number of sprints, total number of jumps, total number of accelerations/decelerations as well as high-intensity accelerations/decelerations ($> 3\text{m/s}^2$) and average heart rate. The test-retest reliability was determined by using the typical (standard) error, coefficient of variation (CV) and intraclass correlation coefficient (ICC).

RESULTS:

All movement parameters showed reasonably high between-trial ICCs ranging from 0.77 to 0.98. Total distance covered during the test, total number of sprints, total number of jumps, total number of accelerations/decelerations and average heart rate all exhibited low CVs ($\leq 5\%$), while relative distance, maximal speed, and total number of sprints over 15 km/h had slightly higher CVs (5.8, 7.0, 7.2%). Total number of high-intensity accelerations and decelerations had high CVs (17.8 and 15.6% respectively).

CONCLUSION:

The novel finding of this study was that the VXSport Omni unit showed adequate reliability for most movement characteristics measured indoors during an on-court basketball simulation test. This suggests that using GPS units with added micro-technology (accelerometers, gyroscopes, and inertia sensor) can reliably measure most simple movement characteristics in basketball players on indoor courts where satellite coverage is unavailable.

Topic: Training and Testing

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