

Abstract

Reliability and validity of short sprint distance measurement using low cost GPS units

Carl J Petersen¹

¹ *University of Canterbury, Christchurch, New Zealand*

Introduction

Improved technology and increased competition has resulted in more cost-effective (~40% cheaper) global positioning system (GPS) technology options and widespread GPS usage amongst sports coaches. Coaches now routinely compare intra and inter-player match and training performances, and even at the international level budget GPS units are being employed including in tropical environments. However, few studies have quantified the validity and reliability of these commercially available budget GPS units (Visuallex Sport, New Zealand).

Methods

Seven 4Hz GPS units were mounted to a 120 cm length of wood and positioned horizontally across a participant's shoulders. Twenty trials of sprinting 10, 20 and 30m distances and 20 trials for maximum speed were compared against criterion measures (measuring tape, radar gun; 46 Hz, Stalker Acceleration Testing System II). Validity was quantified with the standard error of the estimate (SEE) and reliability estimated using typical error expressed as a coefficient of variation.

Results

The validity (mean \pm 90% confidence limits) of sprinting distances 10 - 30m ranged from 7.3 ± 2.7 to $4.5 \pm 1.7\%$, whereas for maximal sprinting speed the SEE ranged from 7.5 ± 1.3 to $8.0 \pm 1.3\%$ for a mean maximal running speed (radar) of 29.0 ± 2.2 km.hr⁻¹. The reliability (expressed as mean [90% confidence limits]) of estimating running distances from 10 - 30m ranged from 8.1 (7.2 - 9.4) to 4.6% (4.1 - 5.3). Similarly, mean reliability of estimating maximal sprinting speed was 2.9% (2.6-3.3).

Conclusion

While measurement accuracy improved with increased distance, these units compared favourably with other commercially available higher specification units¹. Increased sampling frequency improves GPS receiver performance (Jennings, et al., 2010), yet these results demonstrate improved technology with the passage of time may have also made lower frequency budget GPS units more valid and reliable².

References

1. Petersen C, Pyne D, Portus M, and Dawson B. 2009. Validity and reliability of GPS units to monitor cricket-specific movement patterns. *International Journal of Sports Physiology and Performance* 4:381–393.
2. Jennings D, Cormack S, Coutts A, Boyd L, and Aughey R. 2010. The validity and reliability of GPS units for measuring distance in team sport specific running patterns. *International Journal of Sports Physiology and Performance* 5:328-341