Reliability and validity of the 5-0-5 agility test

Sayers, M.G.L. & Killip, J.V. - School of Health and Sport Sciences, University of the Sunshine Coast

Introduction

The 5-0-5 agility test is a relatively simple test based on measuring the time taken to complete a single 180 deg change over a 15 m up-and-back course (Draper & Lancaster, 1985). The result for the 5-0-5 test is the return time recorded via timing gates positioned 5 m before the turn. Draper and Lancaster (1985) stated that the 5-0-5 agility test isolated the ability to change directions independent of running speed capacity and as a result represented a valid measure of agility performance for many sports. Subsequently, numerous sports have adopted this test (Ellis, et al., 2000), although the reliability of this test has not been presented in the literature. This study will focus on assessing the reliability and validity of the 5-0-5 agility test.

Methods

Data Collection

Fifteen well conditioned agility sport athletes volunteered to participate in this research. Linear running ability was determined via a 20 m sprint test down an indoor running track with data via electronic timing gates (Smart Speed, Fusion Sport, Brisbane, Australia) at 0, 5, 10 and 20 m intervals. Three trials were completed with full recovery between each repetition. Standard protocols were observed for the 5-0-5 testing (Ellis, et al., 2000) with three trials turning towards both the right and left side. Participant's leg dominance was noted prior to testing.

A unique aspect of this study was the use of a three-dimensional (3D) motion capture system (Qualisys AB, Gothenburg, Sweden) to monitor horizontal movements of the whole body Centre of Mass (CoM_{horiz}) during the 5-0-5 direction change. This system (250 Hz) was used to record the time for the CoM_{horiz} to move 0.3 m, 0.5 m and 1.0 m either side of Turn ($Time_{0.3}$, $Time_{0.5}$ and $Time_{1.0}$ respectively) and the duration of the Deceleration ($Time_{decel}$) and Acceleration Phases ($Time_{accel}$).

Data Analysis

Reliability testing involved standard repeat trial testing to develop Typical Error of Measurement (TEM) Intraclass Correlation Coefficients (ICC) and Coefficient of Variation (CV%) values (Hopkins, 2006). Condition effects for leg dominance and order effects for trial were tested using analysis of variance (ANOVA) with two factors. Test validity was examined by assessing the relationships between sprint measures and agility parameters using Pearson Product Moment correlation coefficients.

Results

Table 1 displays the mean times and reliability values for the 5-0-5 agility test as well as the temporal values recorded for other agility measures. These data indicate that reliability improved with the increased distance of the test. The deceleration phase was shown to be an unreliable measurement, with high TEM and CV values (TEM of 0.1 s and CV of 50.2%) and so this measurement was removed from further analysis.

Table 1. Descriptive statistics and reliability data for the agility measures.

Variable	Mean (s)	SD (s)	TEM (s)	ICC	CV (%)
$Time_{505}$	2.602	0.158	0.072	0.81	2.8
$Time_{1.0}$	1.072	0.058	0.039	0.57	3.7
$Time_{0.5}$	0.741	0.050	0.040	0.39	5.6
$Time_{0.3}$	0.575	0.045	0.039	0.27	6.9
$Time_{decel}$	0.185	0.082	0.080	0.05	39.5
$Time_{accel}$	0.740	0.109	0.070	0.62	9.6

Analyses indicated that each of the linear sprint tests were highly interrelated, with correlation coefficients between 0.97 and 0.99 (Table 2). Similarly, each of the agility measures showed moderate to high interrelationships (r=0.74 to r=0.98). However, Pearson's correlations showed strong significant relationships between $Time_{505}$ and 5 m (r=.889, p=<0.001), 10 m (r=.903, p=<0.001) and 20 m sprint times (r=.925, p=<0.001). In comparison, correlations showed just moderate significant linear relationships between $Time_{1.0}$ and 5 m (r=0.697, p=0.012), 10 m (r=0.691, p=0.013) and 20 m sprint times (r=0.722, p=0.008).

Table 2. Correlation coefficients between sprint and agility measures.

	5 m sprint	10 m sprint	20 m sprint	$Time_{505}$	$Time_{1.0}$	$Time_{0.5}$	$Time_{0.3}$
5 m sprint time (s)							
10 m sprint time (s)	0.99**						
20 m sprint time (s)	0.97**	0.99**					
$Time_{505}$ (s)	0.89**	0.91**	0.93**				
$Time_{1.0}$ (s)	0.66**	0.65**	0.72**	0.87**			
$Time_{0.5}$ (s)	0.53*	0.56*	0.64*	0.77*	0.81**		
$Time_{0.3}$ (s)	0.50	0.52*	0.58*	0.74**	0.84**	0.98**	
$Time_{accel}$ (s)	0.02	0.10	0.16	0.35	0.36	0.69*	0.70*

* P<.05
** P<.001

This trend continued with the strength of the correlations between each of the agility performance times and linear running ability decreasing as the distance over which agility was measured decreased. $Time_{accel}$ did not correlate significantly with any of the linear running speed times. Analysis on the effect of leg dominance Figure 1) indicated that despite the mean $Time_{505}$ for turns off the dominant leg being slightly faster than turns off the non-dominant leg, this difference was not significant (F(65)=.098, p=.756). A similar case was observed for all measures of agility performance with no significant differences between the mean times for turns off the dominant and non-dominant legs

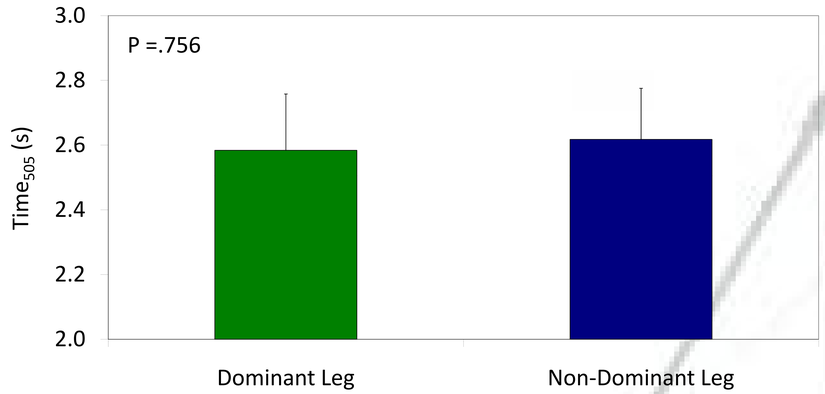

Figure 1. Graph showing differences in $Time_{505}$ for turns to the dominant and non-dominant side

Conclusions

Results question the use of the 5-0-5 test as a measure of agility performance. Although the 5-0-5 test is relatively reliable, results are skewed towards linear running speed and not direction changing ability. To test agility effectively there appears to be a compromise between the validity of the test (reduce a bias towards linear running speed) and reliability. However, side dominance does not appear to influence 5-0-5 time in skilled agility sport athletes.

Practical Implications

- It is recommended that the 5 m change of direction distance in the 5-0-5 test should be reduced to 1 m as this appears to offer an effective compromise between test validity and reliability.
- However, direction changing ability should be assessed over distances less than 1 m to reduce the influence of linear running ability on test results

University of the Sunshine Coast
Queensland, Australia