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Change of Direction Ability: Investigating its relationship with sprint performance and maturation in youth soccer players



Shaun M. Phillips, Euan Donaldson
The University of Edinburgh, Scotland



@DrShaunPhillips

INTRODUCTION & AIM

- The 5-0-5 agility test is a common test of change of direction (COD) ability in soccer players (1). However, the 5-0-5 test may be heavily influenced by linear sprint speed, which is independent of COD ability (2).
- One-metre directional changes are not as influenced by linear sprint speed, suggesting that a '1-0-1' test may be a more valid measure of COD ability (3).
- In youth, biological maturity influences the development of linear speed through a variety of morphological and neuromuscular mechanisms (4). Examining the relationship between tests of COD ability, linear speed, and maturation will allow further quantification of the validity of such tests in youth populations.
- The aims of this study were to 1) Examine the relationship between 5-0-5 and 1-0-1 agility test performance and linear sprint performance in youth soccer players, and 2) Investigate the influence of maturation on agility and sprint performance.

METHODS

- Twenty-eight elite academy soccer players (age 12.9 ± 2.0 years, height 1.62 ± 0.14 m, body mass 49.9 ± 14.7 kg).
- Maturity offset calculated using the equation of Mirwald et al. (5).
- Linear sprint performance was assessed over 5m and 20 m.
- Participants completed the 5-0-5 and 1-0-1 agility tests:

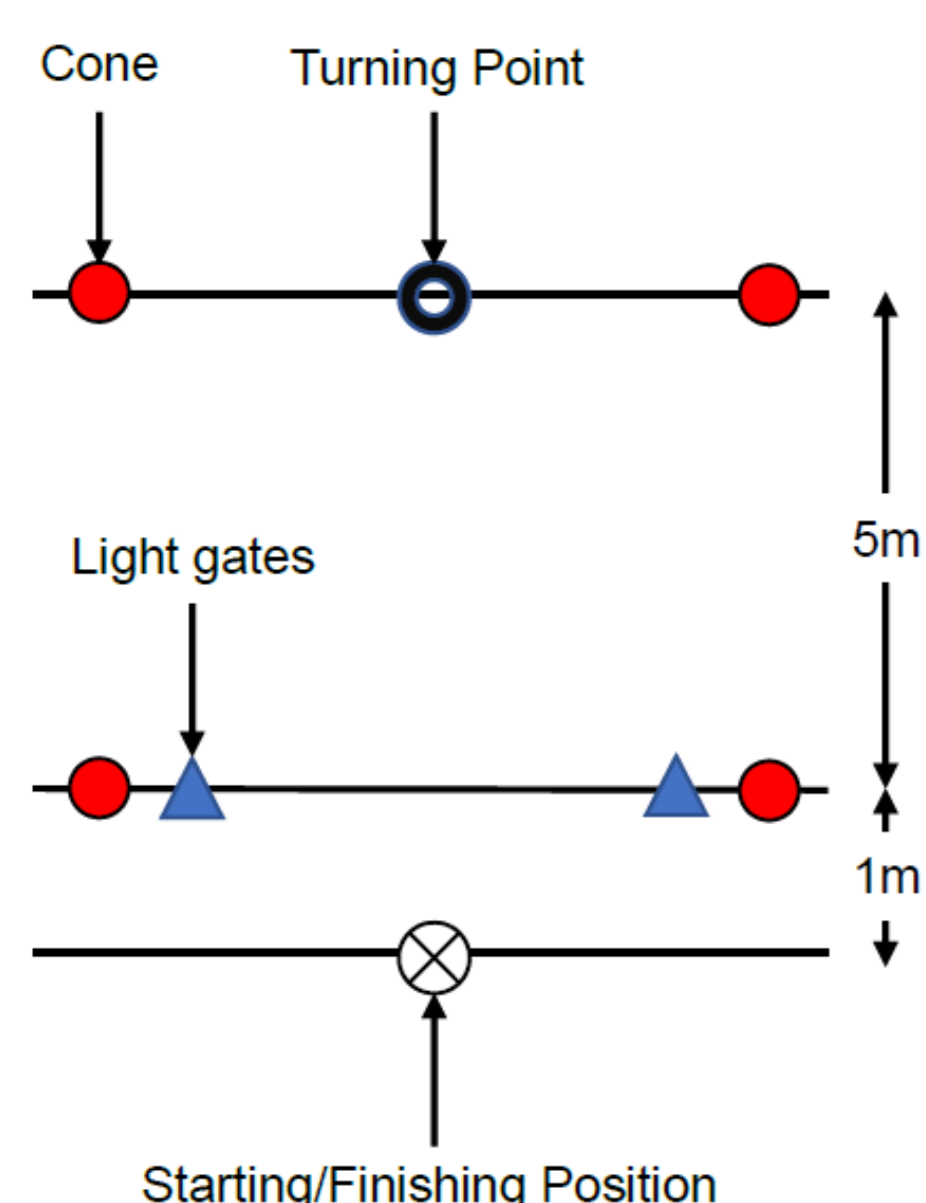


Fig. 1: 5-0-5 Agility Test

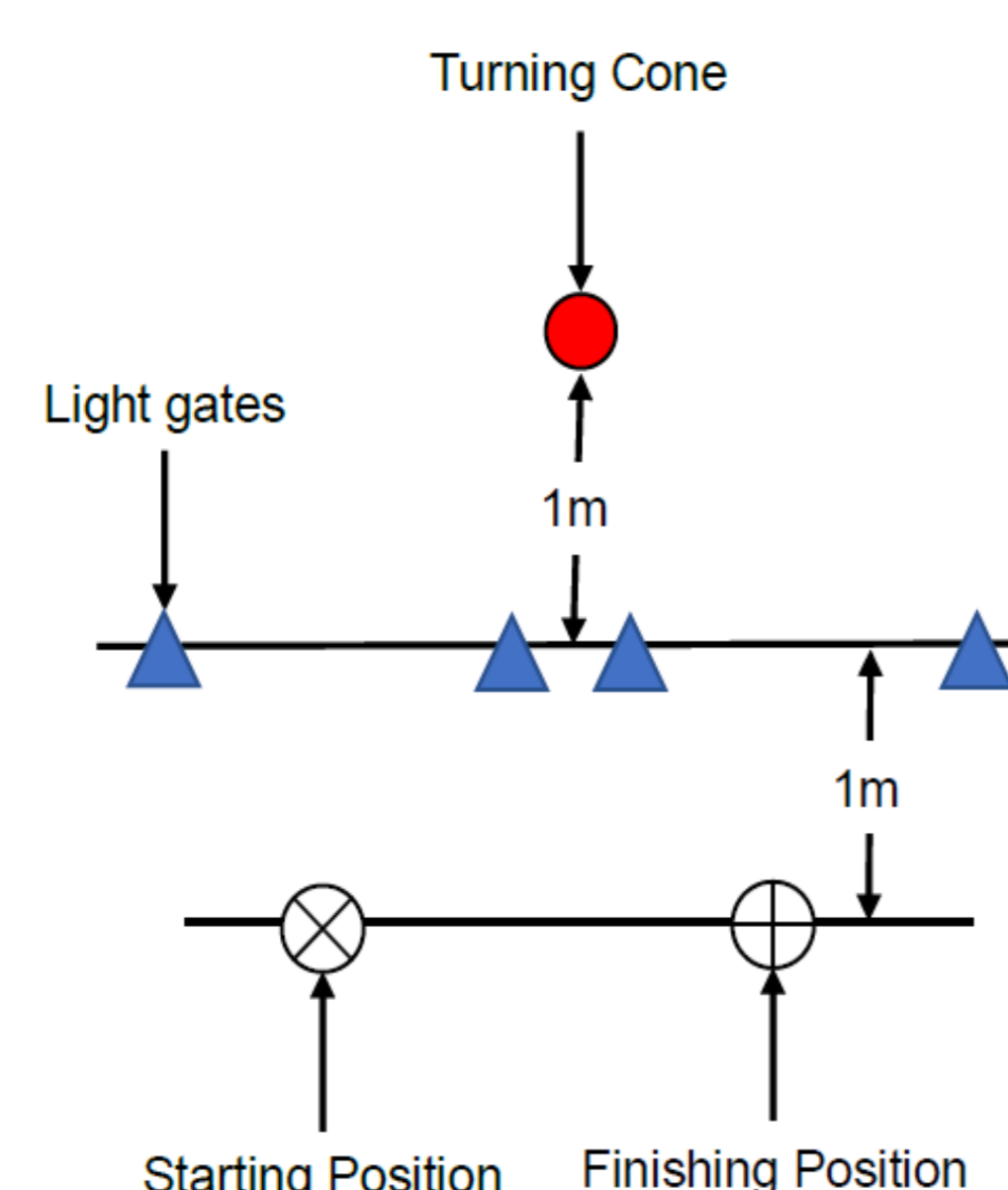


Fig. 2: 1-0-1 Agility Test

RESULTS

Table 1: Descriptive statistics

| Test | Mean \pm SD | 95% CI |
|-------------------------|------------------|---------------|
| 5 m (s) | 1.05 \pm 0.06 | 1.03 – 1.07 |
| 20 m (s) | 3.23 \pm 0.35 | 3.09 – 3.36 |
| 505L (s) | 2.67 \pm 0.19 | 2.59 – 2.74 |
| 505R (s) | 2.65 \pm 0.21 | 2.57 – 2.73 |
| 101L (s) | 0.88 \pm 0.09 | 0.85 – 0.92 |
| 101R (s) | 0.90 \pm 0.08 | 0.87 – 0.93 |
| Age @ PHV (years) | 13.83 \pm 0.69 | 13.57 – 14.10 |
| Maturity offset (years) | -0.54 \pm 1.88 | -1.27 – 0.19 |

Table 2: Correlations between agility performance and sprint times

| | 505R v. 101R | 505R v. 5m | 505R v. 20m | 101R v. 5m | 101R v. 20m | 505L v. 101L | 505L v. 5m | 505L v. 20m | 101L v. 5m | 101L v. 20m |
|-----------------------|-----------------|---------------|----------------|---------------|----------------|-----------------|---------------|----------------|---------------|----------------|
| <i>r</i> | 0.03 | 0.68 | 0.54 | 0.10 | -0.31 | 0.23 | 0.81 | 0.56 | 0.11 | -0.31 |
| <i>r</i> ² | 0.00 | 0.47 | 0.23 | 0.01 | 0.09 | 0.05 | 0.66 | 0.32 | 0.01 | 0.10 |
| <i>P</i> | 0.87 | <0.001 | 0.003 | 0.60 | 0.11 | 0.23 | <0.001 | 0.002 | 0.59 | 0.11 |

505R = 5-0-5 agility test turning on right foot; 505L = 5-0-5 agility test turning on left foot; 101R = 1-0-1 agility test turning on right foot; 101L = 1-0-1 agility test turning on left foot.

- Performance in the 5-0-5 agility test was significantly correlated with 5 m and 20 m sprint performance.
- However, performance in the 1-0-1 agility test was not significantly correlated with 5 m or 20 m sprint performance.

Table 4: Correlations between maturity offset and physical test performance

| | 5 m | 20 m | 505L | 505R | 101L | 101R |
|----------|-------|--------|-------|--------|-------|------|
| ρ | -0.43 | -0.63 | -0.61 | -0.71 | -0.14 | 0.15 |
| ρ^2 | 0.18 | 0.39 | 0.37 | 0.50 | 0.02 | 0.02 |
| <i>P</i> | 0.02 | <0.001 | 0.001 | <0.001 | 0.49 | 0.46 |

- Maturity offset was significantly correlated with sprint and 5-0-5 agility performance, but not 1-0-1 agility performance.

CONCLUSION

- In elite youth soccer players, the 5-0-5 agility test was significantly correlated with linear sprint performance and maturity offset.
- However, the 1-0-1 agility test was not significantly correlated with either linear sprint performance or maturity offset.
- Therefore, the 1-0-1 agility test may offer a more valid assessment of COD ability by isolating COD ability from linear sprint speed.
- The 1-0-1 agility test also appears to be a measure of COD ability that is less influenced by maturation than the 5-0-5 agility test. This again reinforces the objectivity and validity of the 1-0-1 test.

PRACTICAL APPLICATIONS

- The findings of the current study suggest that the 1-0-1 agility test is not significantly related to either linear sprint speed or maturity offset. Therefore, practitioners should consider using the 1-0-1 agility test instead of the 5-0-5 agility test when assessing COD ability in young soccer players.
- The lack of correlation between 1-0-1 agility test performance and maturity offset also suggests that the 1-0-1 test may be a more objective tool than the 5-0-5 test for evaluating and monitoring COD ability during the selection process of soccer academies. In particular, maturation assessment may not be necessary in order to interpret test results using the 1-0-1 test.

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