Repeated high-speed activities during youth soccer games in relation to changes in maximal sprinting and aerobic speeds

Martin Buchheit, Ben Simpson and Alberto Mendez-Villanueva
Sport Science Department, Physiology Unit, ASPIRE, Academy for Sports Excellence, Doha, Qatar.

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Sport science support - Training process in an academy

- Football is first a tactical / technical game
- Understanding the physical demands of a game is determinant for the implementation of physical training strategies
  → What should we train?
  → How much should be train?

Time motion games analysis

Repeated high-speed actions and sprints

International games in young highly-trained players

Q: Do/how speed and fitness influence high-intensity running performance and repeated-sprint activity during game?
Playing position 'constrains' the expression of physical capacities during games

The impact of fitness on match running performance is position-dependent

Game running activities vs. physical capacities
- Most of the available data limited to cross-sectional analyses or correlations
- No data on repeated high-speed actions or sprints
- Impact of playing positions on these relationships is unclear
  - Q: which physical capacities can impact high-intensity running performance and repeated-sprint activity during game?
  - Q: can all playing positions benefit from the same 'transfert'? 

Purpose
Examine in highly-trained young players the effect of longitudinal changes in
- Maximal sprint speed (MSS)
- estimated maximal aerobic speed (MAS) on
- Repeated maximal aerobic speed (MAS) on
- Repeated high-speed actions
- Repeated sprints sequences during international games with respect to playing positions
Methods

• 124 young soccer players
  – 14.3 ± 0.8 yrs,
  – 0.3 ± 0.9 yrs from/to peak height velocity
  – 163.0 ± 9.4 cm and 49.1 ± 7.8 kg
• 14 hours of combined soccer-specific training and competitive play per week
• Tested 3 x/year (i.e., October, January and May)
  Physical Performance field tests
• Time-motion analysis during international friendly games

Physical performance tests

• Anthropometry → Maturity status = age from peak height velocity (Mirwald MSS 2002)
• Incremental track test (Vam-eval) → esti. MAS
• 40-m sprint with 10-m split times
  → Acceleration (1st 10 m) / MSS (best split) (Buchheit IJSSP 2012)

Reliability of the performance measures (CV): (n = 65 players)
• MSS: 1.4% (90% CL: 1.2; 1.6)
• MAS: 3.5% (90% CL: 3.0; 4.1)

Match analyses

• GPS, SPI Elite, GPSport, 1Hz
• 109 games → 736 player-matches
  – full-backs (FB, n = 36 different players played at this position)
  – centre-backs (CB, n = 26)
  – midfielders and second strikers (MD, n = 48)
  – wide midfielders (wingers, W, n = 43)
  – strikers (S, n = 19).

124 players tested 3 x / years

Δ
• October to January
• January to May
• May to October
736 player-matches

Substantial (>1/2 CV) decrease in MSS or MAS
No change in MSS or MAS
Substantial (>1/2 CV) decrease in MSS or MAS

At least 2 games played during a given testing period

33 different players, 207 games
Pairs of Δ: 41 for MSS and 28 for MAS

10 different players, 73 games
Pairs of Δ: 9 for MSS and 12 for MAS

Changes in repeated high-speed actions and repeated sprint sequences ?
Changes in repeated high-speed actions and repeated sprint sequences ?
• Getting faster and/or fitter
  – Enables greater repeated high-speed activities
  – but does not translate into greater repeated-sprint activity during games
  – ↓ the occurrence of sprints (↓ load)
  – Large position differences
  → Game constrains limit the expression of fitness
• Loosing speed and/or fitness
  – Does not compromise the actual match running activity → fitness was not limiting before
  – But ↑ relative running load during games

• Physical fitness
  ✓ is not THE first determinant of repeated high-speed actions during games → actual game demands are likely more important

✓ May modulate relative physical load
  → Injury risk, fatigue
  → Passing ability, decision making, etc...
How much should we train physical capacities?

- Who can do more, can do less!
- Thresholds? ‘Minimum required’ to play...
- Cost/benefits in relation to player’s
  - Physical profile
  - Playing style
  - Playing position
  - Playing standard

Martin Buchheit
Physiologist
ASPIRE Academy for Sports Excellence
P.O. Box 22287, Doha, Qatar
Tel: (+974) 55232540
Email: martin.buchheit@aspire.qa

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