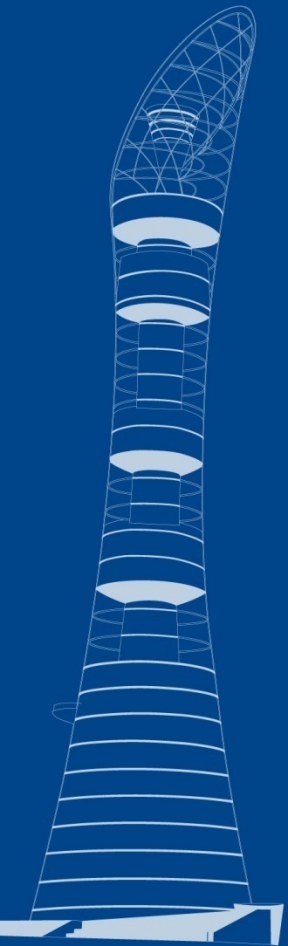# Match running performance and physical capacity in youth football (soccer)

Martin Buchheit, Alberto Mendez-Villanueva, Ben Simpson
and Pitre Bourdon

Sport Science Department, Physiology Unit, ASPIRE, Academy for Sports Excellence, Doha, Qatar.
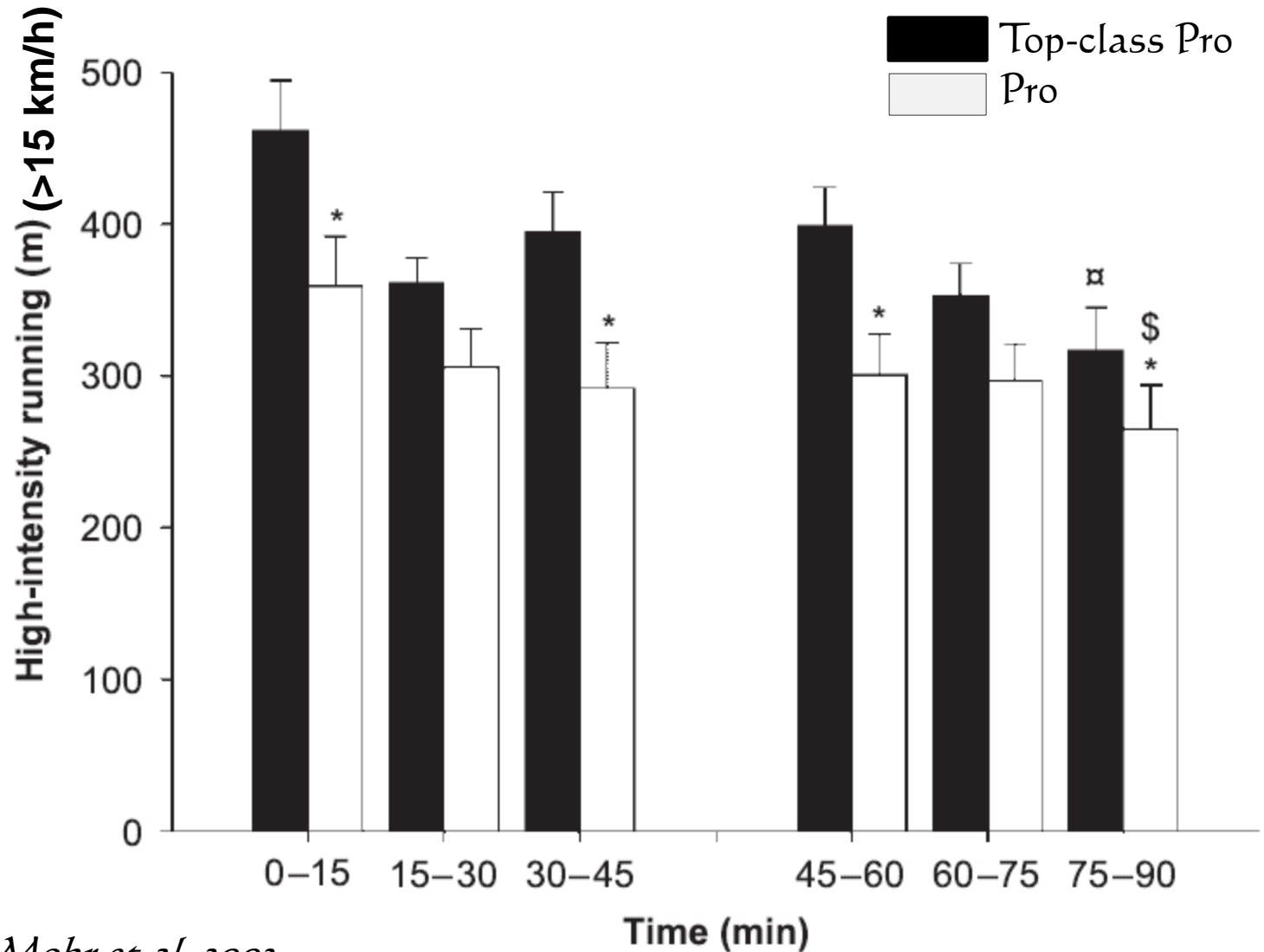
Determinants of football performance

- Football is first a **tactical / technical** game
- Knowledge of the physical demands of a match is however of interest for the **implementation of physical training strategies**
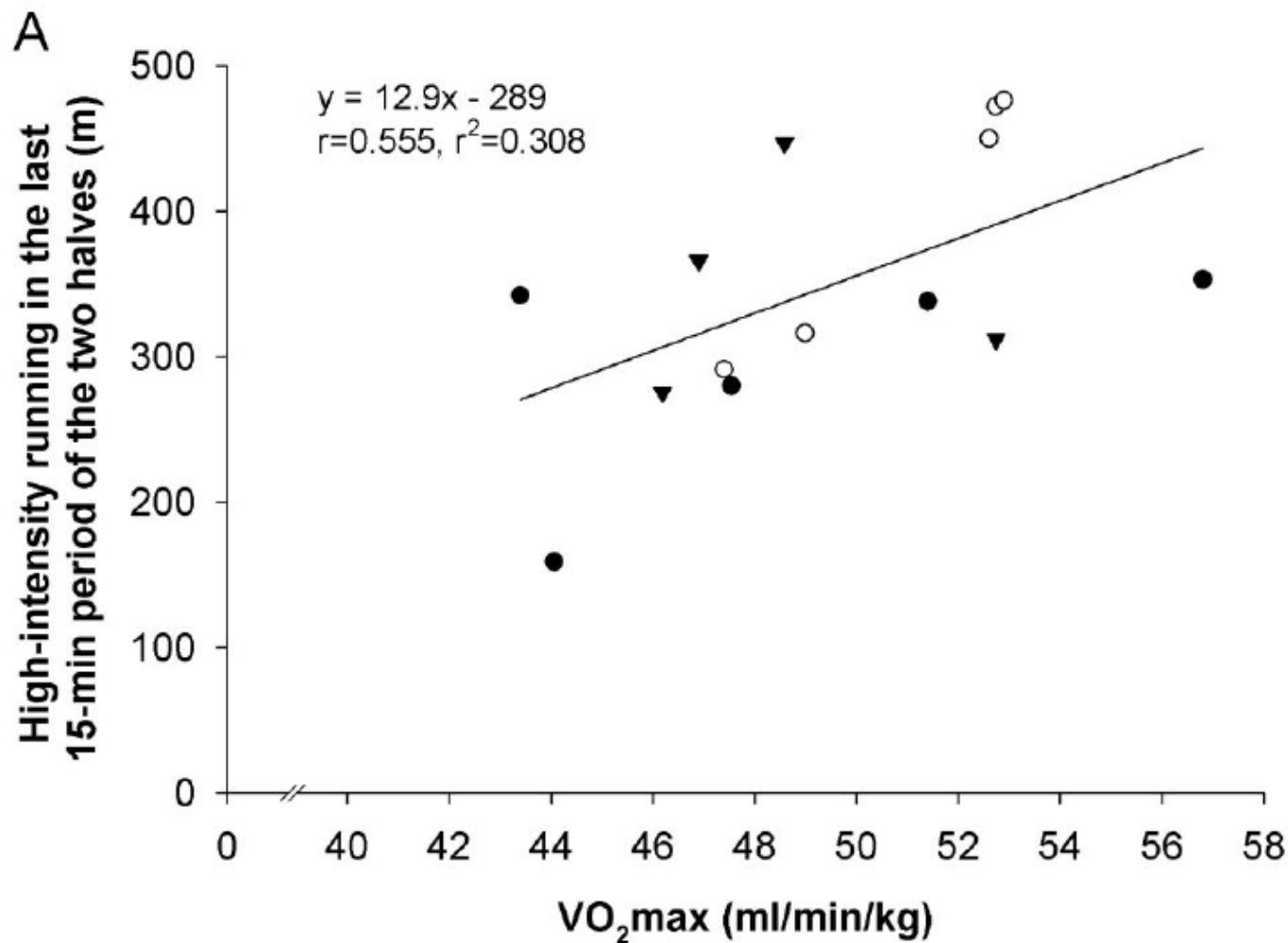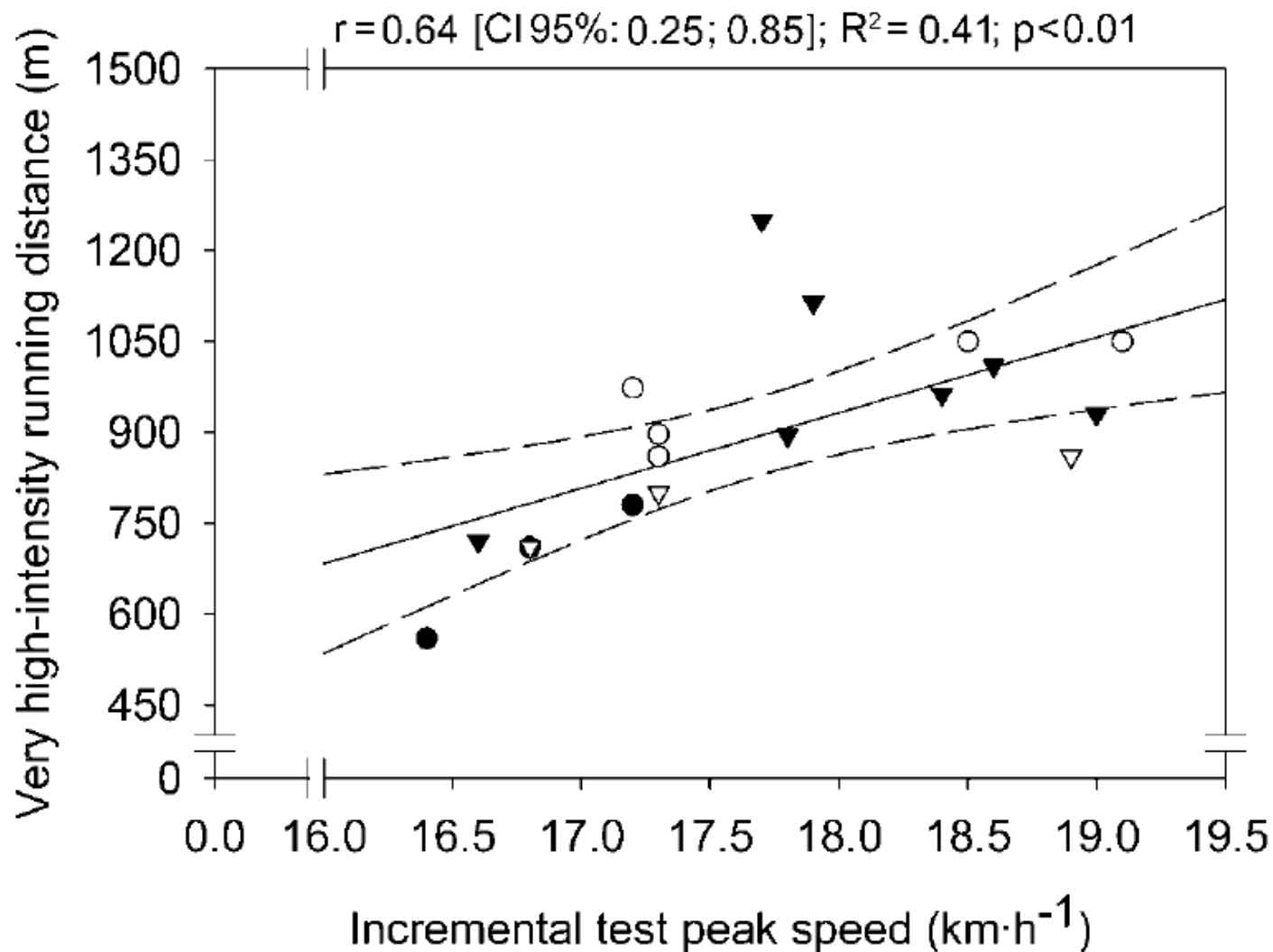
Match running performance in Football

Mohr et al. 2003

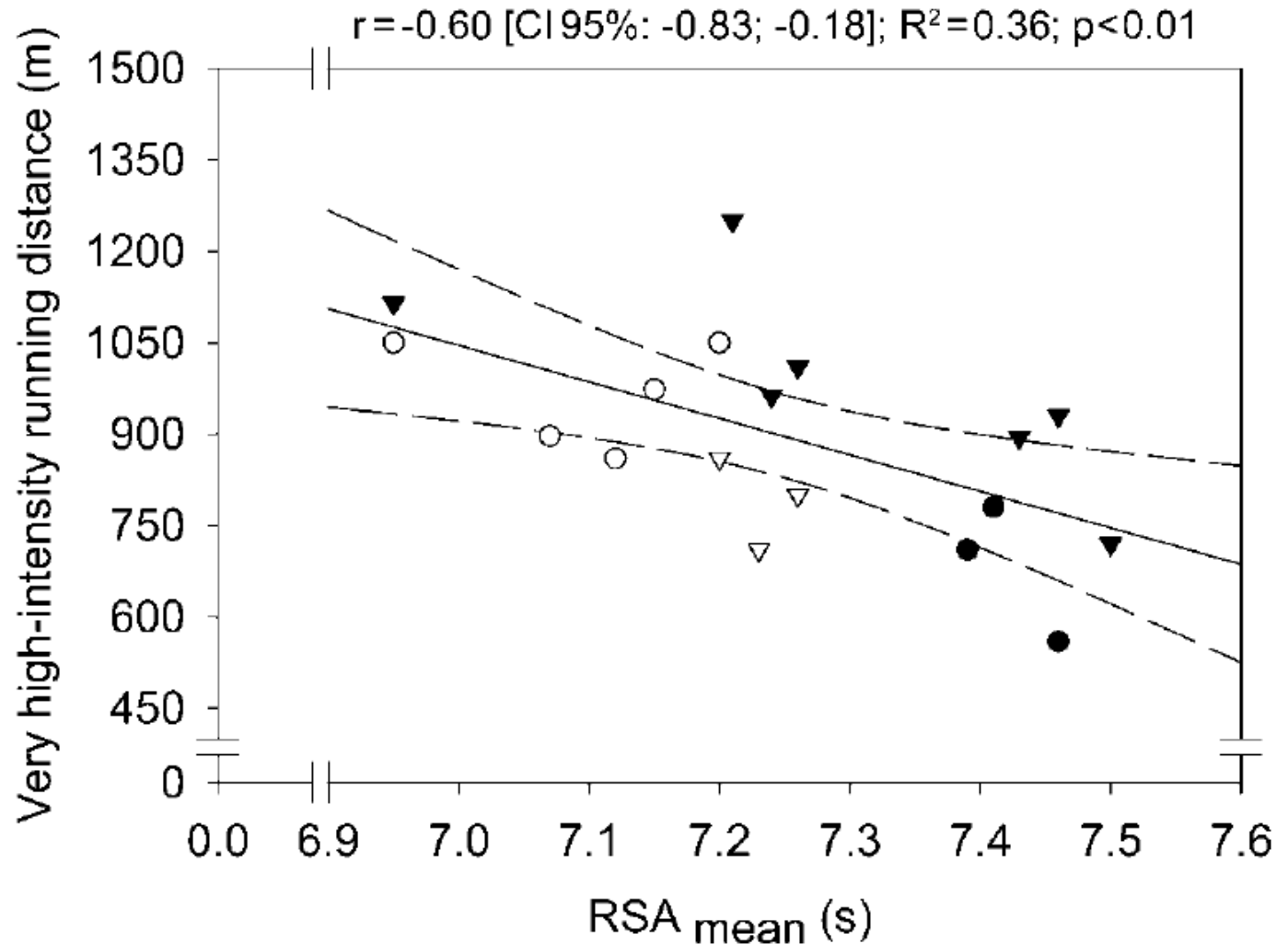# Match running performance and
PHYSICAL CAPACITIES

Krustrup et al. 2005

Match running performance and PHYSICAL CAPACITIES

Rampinini et al. 2007

Match running performance and
PHYSICAL CAPACITIES

Rampinini et al. 2007
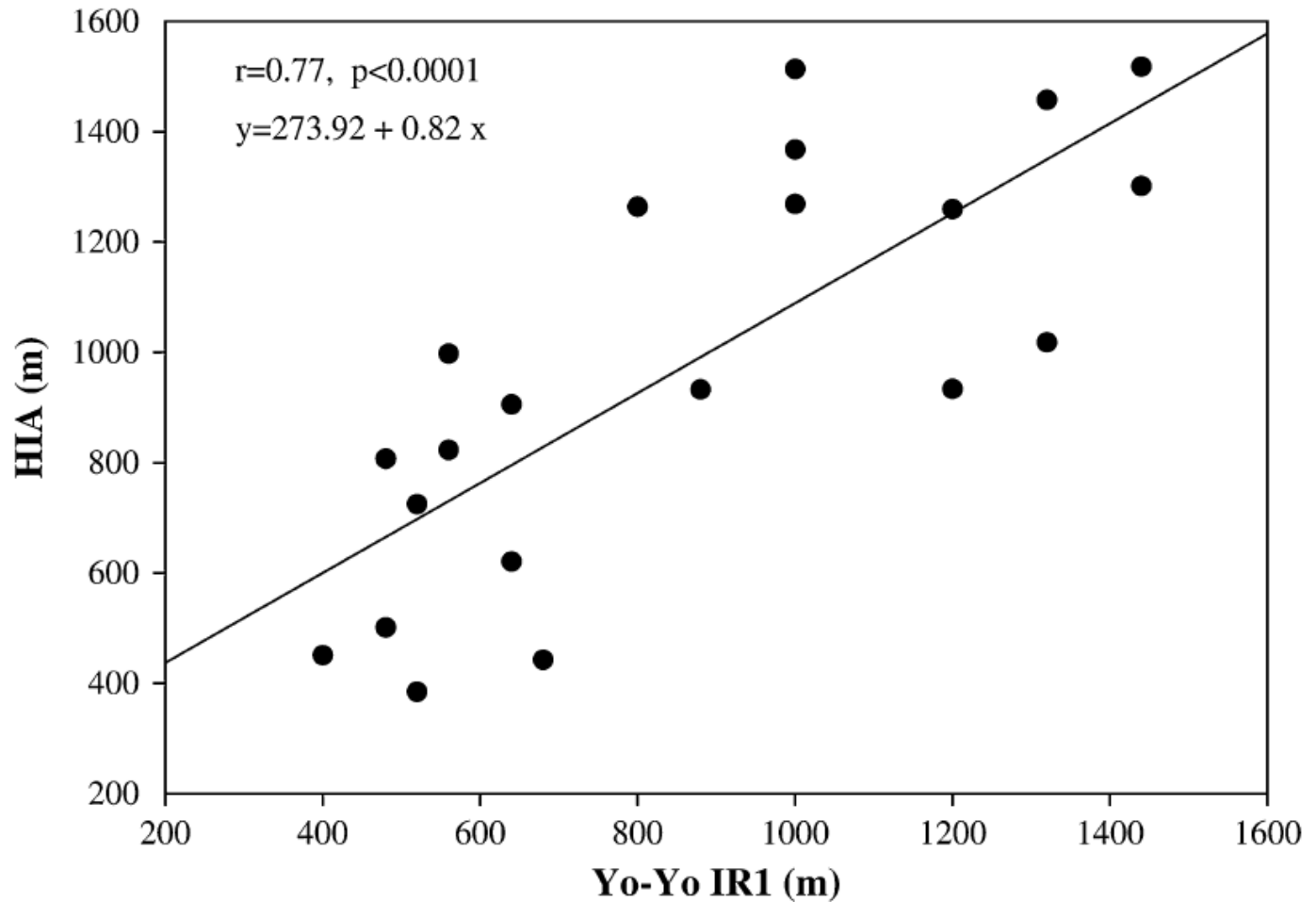
Match running performance and
PHYSICAL CAPACITIES

Castagna et al. 2009

- <u>Simplistic view</u>: the FITTER the players, the GREATER the distance covered at high-intensities !?

    - Game constraints?

    - Opponent?

    - Individual standard?

    - Tactical ploy?

    - Playing position?

Match running performance and
PLAYING POSITION

Di Salvo et al. 2009

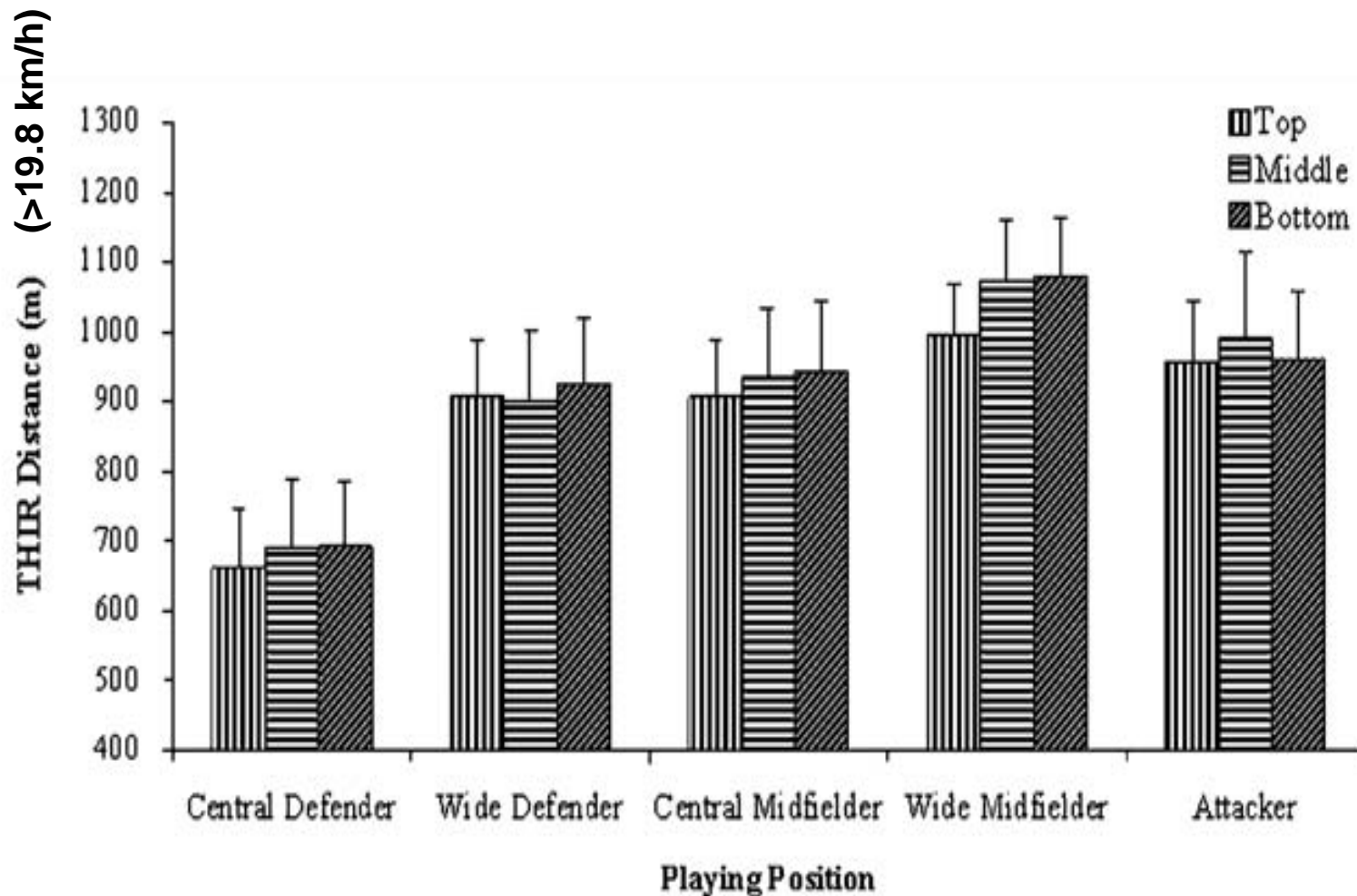# Match running performance and PHYSICAL CAPACITIES

- If individual match running performance was simply **dictated** by a player's physical capacities,

    - Central **defenders** would have consistently the **lowest** physical capacities

    - **Midfielders** would display the **greatest** physical capacities

- BUT such **between-position differences** in physical capacities are **not always apparent** (Impellizzeri 2008) or even **absent** (Taskin 2008)

Purpose

- Examine match running performance in highly-trained young players as a function of **age and playing positions**

- Examine, as a function of playing positions, the relationships between **match running performance and physical capacities**

Methods

Testing

- Anthropometry

- Peak Height Velocity (PHV)

- Counter movement jump (CMJ)

- 40-m sprint with 10-m split times

    - Acceleration (1st 10 m) / PV (best split)

- Repeated-sprint ability (RSA$_{mean}$)

- Incremental track test (V$_{Vam-eval}$)

Match analyses

- GPS (1Hz , SPI Elite, GPSports, Canberra, Australia)

- 635 player-matches from 99 different players during 42 international games (4 months period), 1-9 games / players.

→ Final n = 186 files from 77 different players (full games)

Match analyses

- 4-4-1-1 formation

- Playing positions

  - fullbacks (FB, n = 15 players ↔ 36 files)

  - centre-backs (CB, n = 16 players ↔ 54 files)

  - midfielders (MD, n = 13 players ↔ 40 files)

  - wide midfielders (W, n = 13 players ↔ 16 files)

  - second strikers (2^{nd}S, n = 9 players ↔ 19 files)

 - strikers (S, n = 11 players ↔ 21 files)

Match analyses

Castagna et al. 2009

- Match running categories

  - total distance covered (TD)

  - low-intensity running (LIR; <13.0 km·h⁻¹)

  - high-intensity running (HIR; 13.1 to 16 km·h⁻¹)

  - very high-intensity running (VHIR; 16.1 to 19 km·h⁻¹)

  - sprinting distance (Sprinting; >19.1 km·h⁻¹)

  - very high-intensity activities (VHIA, VHIR + Sprinting)
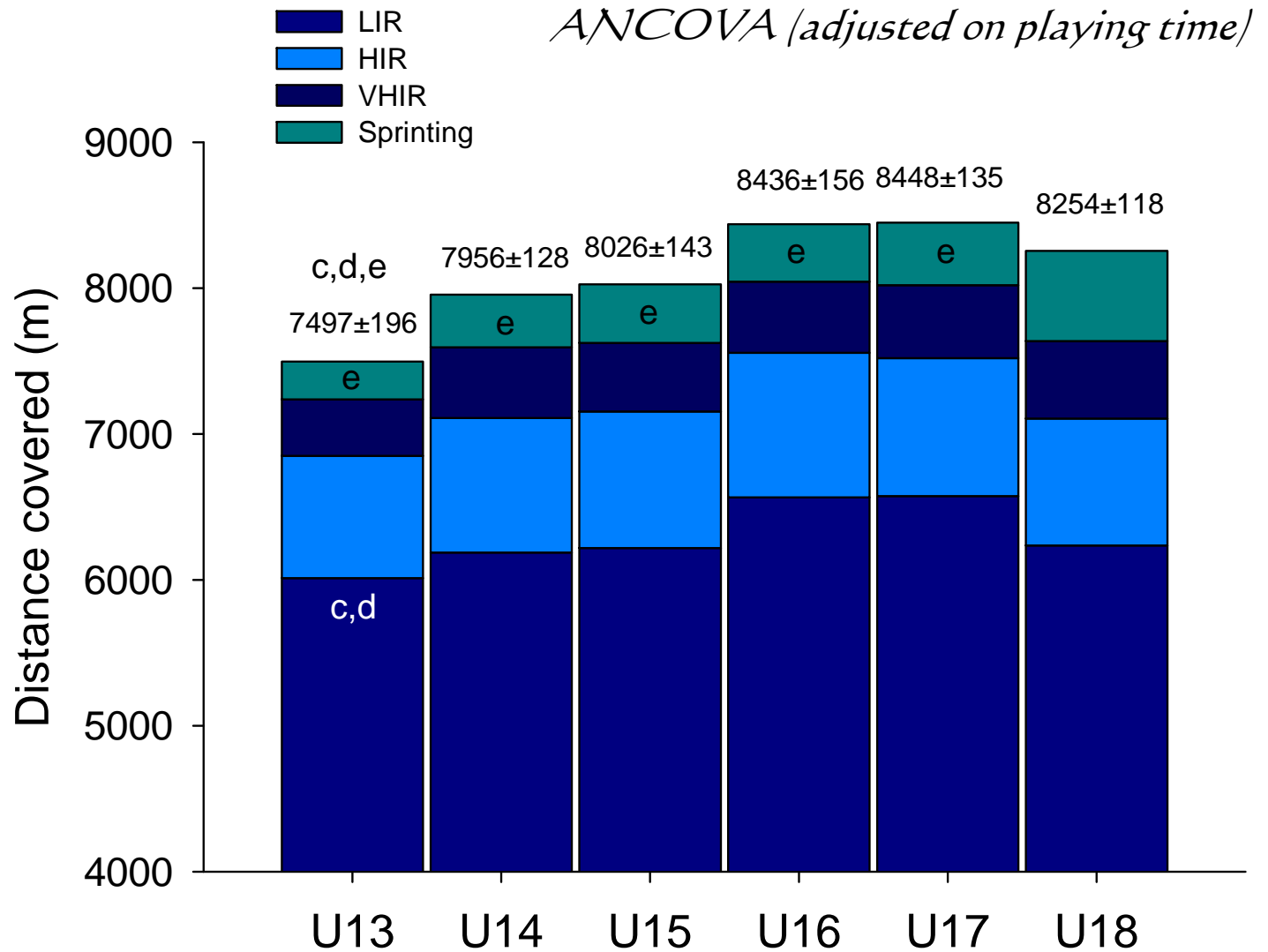
  - peak game running speed

Results

Physical capacities / AGE
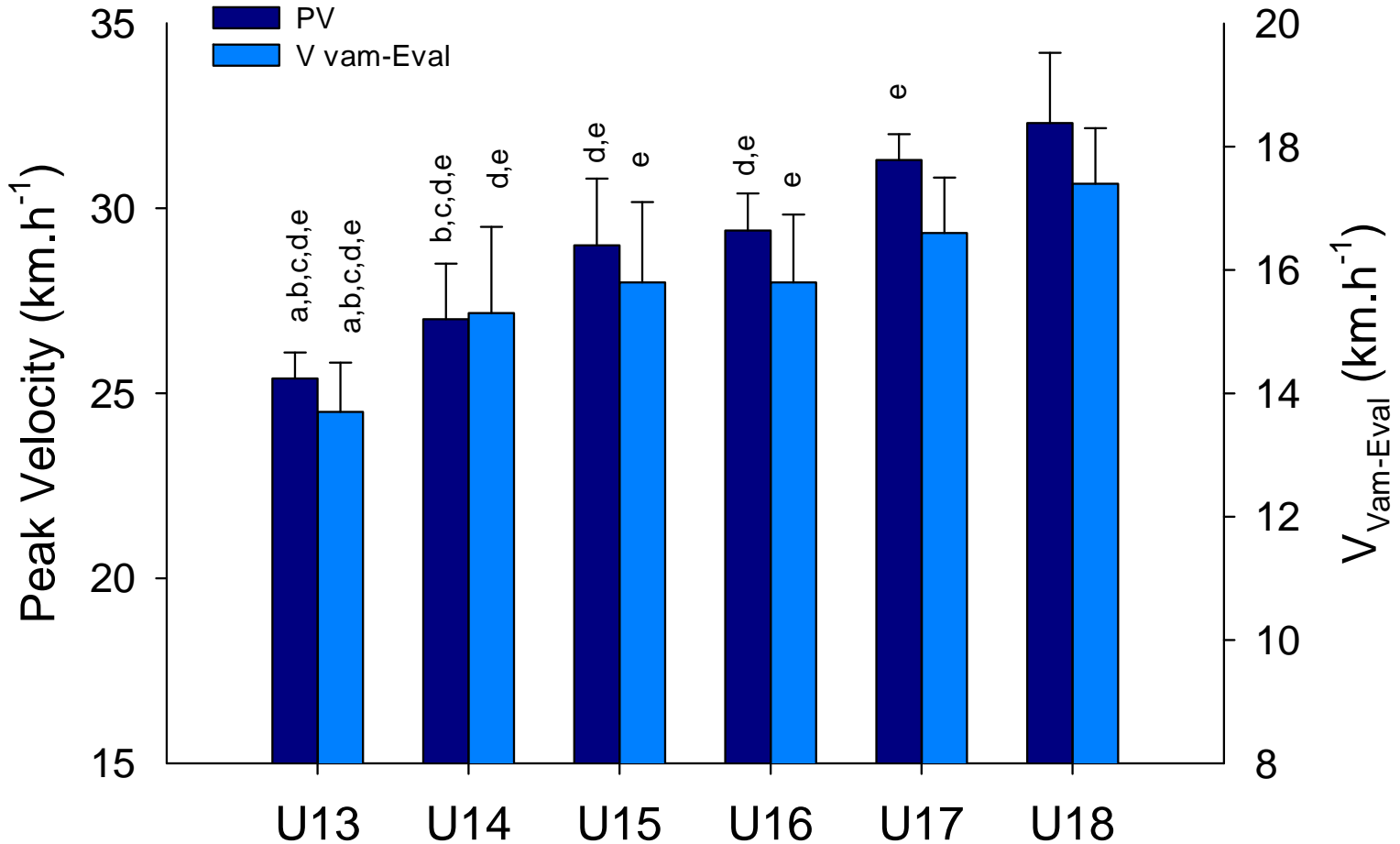
a: significant difference vs. U14 (*P*<0.05), b: vs. U15, c: vs. U16, d: vs. U17, e: vs. U18.

Match running performance / AGE

ANCOVA (adjusted on playing time)

Legend:
- LIR
- HIR
- VHIR
- Sprinting

Y-axis: Distance covered (m), scale 4000–9000

Data labels above bars:
- U13: 7497±196, c,d,e, e, c,d
- U14: 7956±128, e
- U15: 8026±143, e
- U16: 8436±156, e
- U17: 8448±135, e
- U18: 8254±118

X-axis: U13 U14 U15 U16 U17 U18

a: significant difference vs. U14 (P<0.05), b: vs. U15, c: vs. U16, d: vs. U17, e: vs. U18.

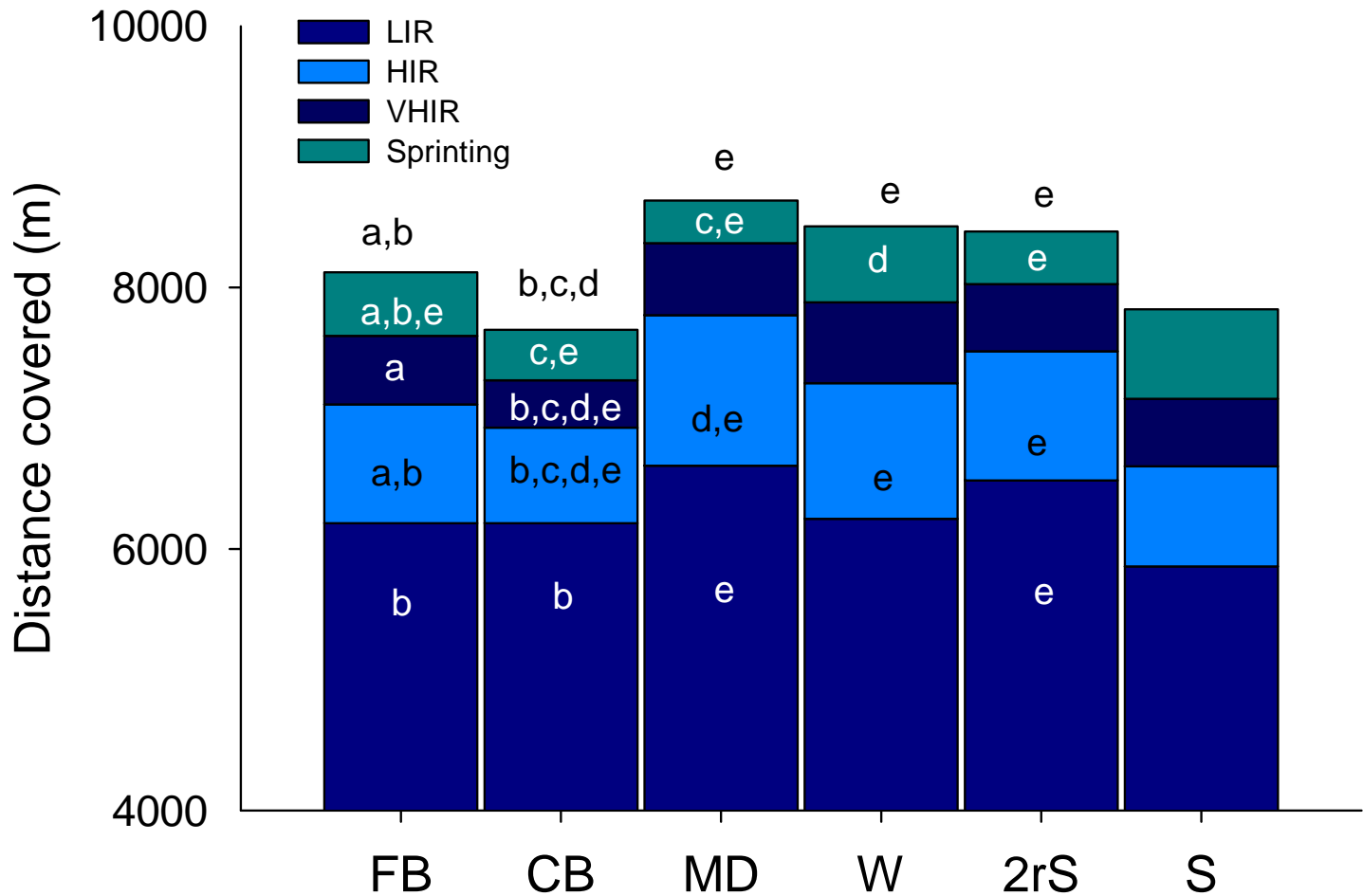# Physical capacities / Playing position
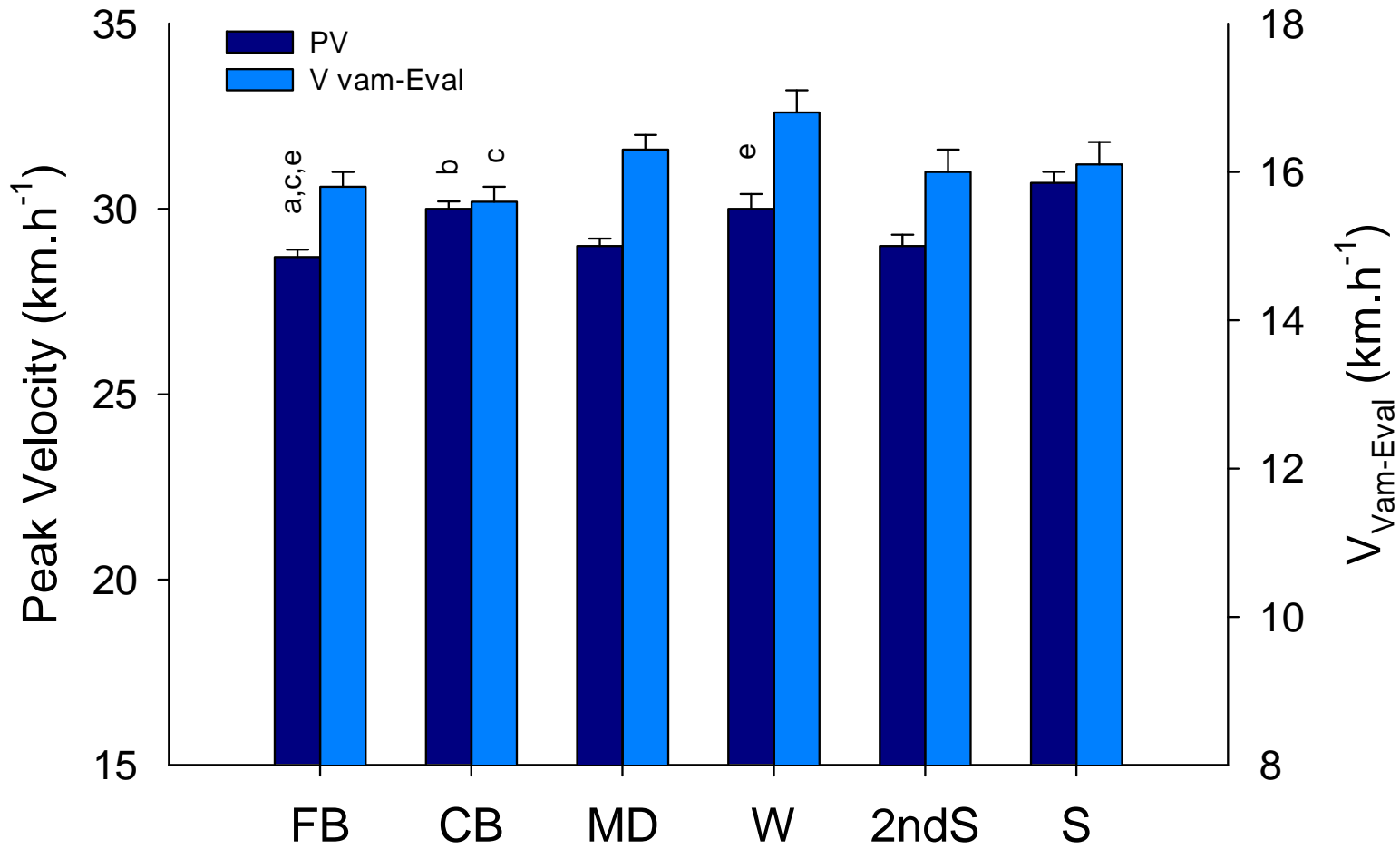
ANCOVA (adjusted on age)

a: significant difference vs. CB ($P<0.05$), b: vs. MD, c: vs. W, d: vs. 2dS, e: vs. S.

Match running performance and
PLAYING POSITION


ANCOVA (adjusted on age playing time)

a: significant difference vs. CB (P<0.05), b: vs. MD, c: vs. W, d: vs. 2dS, e: vs. S.

Match running performance and physical capacities

- Age-related differences in physical capacities NOT reflected in match running performance

- Great position-related differences in match running performance despite poor disparities in physical capacities

Match running performance vs. field test results

Partial correlation coefficient (90% CI)
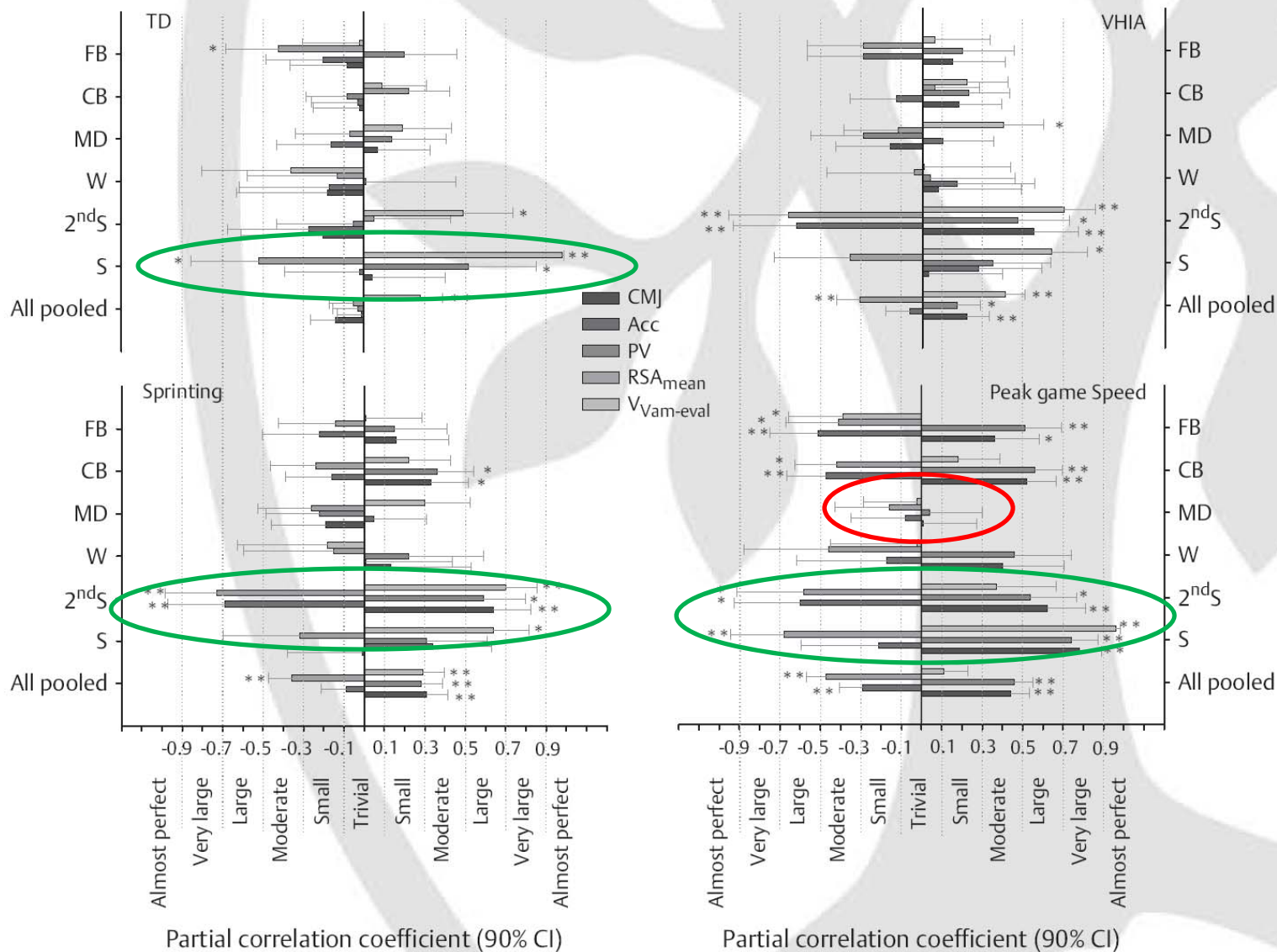
Match running performance vs. field test results

- All players pooled together:

  - TD was only significantly related to $V_{Vam-eval}$

  - VHIA was related to CMJ, PV, RSA_{mean} and $V_{Vam-eval}$

  - However, these correlations were only **small** to moderate (e.g., $r =$ ranging from **0.17** for VHIA vs. PV to **0.41** for VHIA vs. $V_{Vam-eval}$)

Partial correlations (adjusted on age playing time)

Match running performance vs. field test results

- The relationships between match running performance and physical capacities were more clearly position-dependent :

  - **trivial and non-significant** correlations in FB, CB, MD and W : e.g., VH1A vs. $V_{Vam\text{-}eval}$:

    r = 0.06 and 0.022 in FB and CB

  - **Large associations** in $2^{nd}S$ and S:

    e.g., VH1A vs. $V_{Vam\text{-}eval}$: r = **0.70** and **0.64**

    or VH1A vs. RSA_{mean}: r = **0.66** in $2^{nd}S$.

Conclusions

CONCLUSIONS

• Although this requires further tactical/technical analysis, present results suggest that the older/fitter players' ability to use their physical potential might be restricted during games.

• "The fitter, the better " is therefore likely too simplistic

• The **beneficial impact of high physical fitness** on game running performance is likely **position-dependent**, with attackers (i.e., $2^{nd}S$ and S) likely to benefit the most from their physical capacities

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[OP-TC06] Training and Coaching 6 - Running and Sprinting Performance
25.06.2010, Start: 10:20, Lecture room: "Hall 8"

DOES ON-FIELD SPRINTING PERFORMANCE IN YOUNG SOCCER PLAYERS DEPEND ON HOW FAST THEY CAN RUN OR HOW FAST THEY DO RUN?

Mendez-Villanueva, A., Buchheit, M., Simpson, B., Peltola, E., Bourdon, P.