



Change of Direction Deficit and Asymmetries in Para-Footballers with Cerebral Palsy: An Application for Evidence-Based Classification

Matías Henríquez, Iván Peña-González, & Raúl Reina



Introduction (1/4)

The **Change of Direction (COD)** is a fundamental pre-planned ability.

Intermittent multidirectional activities in response to **unpredictable movements**.



Players perform a **high frequency of COD actions** during competitive matches.

Introduction (2/4)



The **COD skills** are commonly assessed in closed drills determined during **pre-planned circuits**.



505 test has been used for **assessing the COD multidirectional speed**.



COD deficit was suggested as a **simple metric and isolated representation** of the COD ability.



Introduction (3/4)

Most sports actions and CODs occur **unilaterally** limb.

The COD seems to be a **crucial component** for para-footballers with **cerebral palsy (CP)**.

Footballers with CP present **motor disorders** that cause permanent **activity limitations**.



Hypertonia



Ataxia



Athetosis

Introduction (4/4)

A **classification process** is necessary to group according to the **degree of impact** on relevant **football skills** (i.e., COD).

Several studies reported COD performance its **applicability** for classification propose.

Previous studies only used measurements by **completion time**.



Aim of this Study

To examine the differences in **COD performance**, **COD deficit**, and **asymmetries in para-footballers with CP**, also considering **gender differences**.

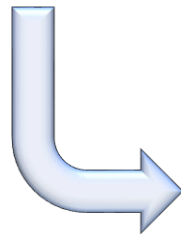


Material and Methods: Participants (1/5)

1



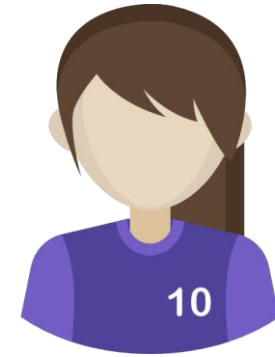
18 male CP footballers from the Spanish national team.



3

Ethical Approval from the Miguel Hernández University (no. DPS.RRV.03.17)

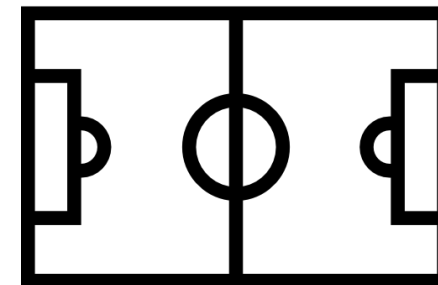
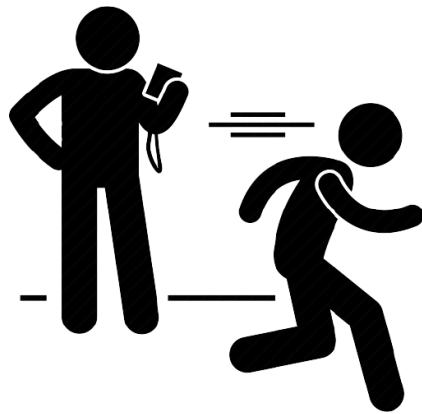
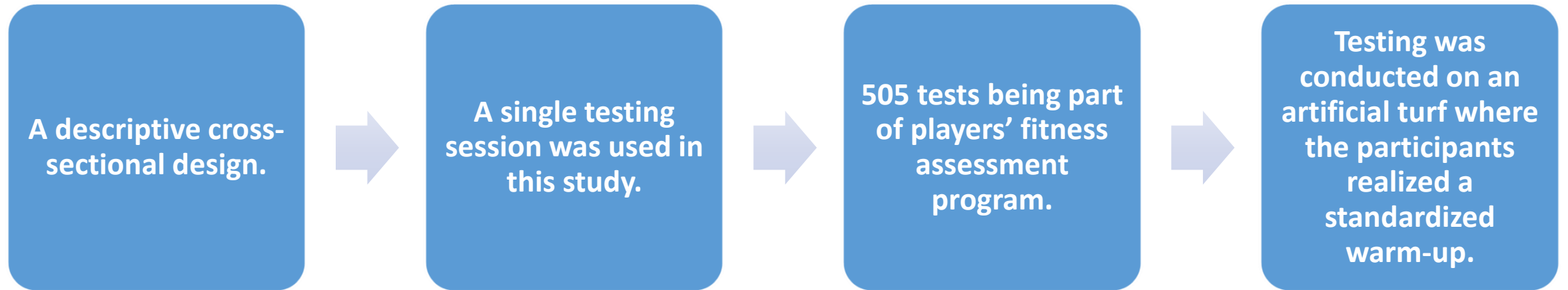
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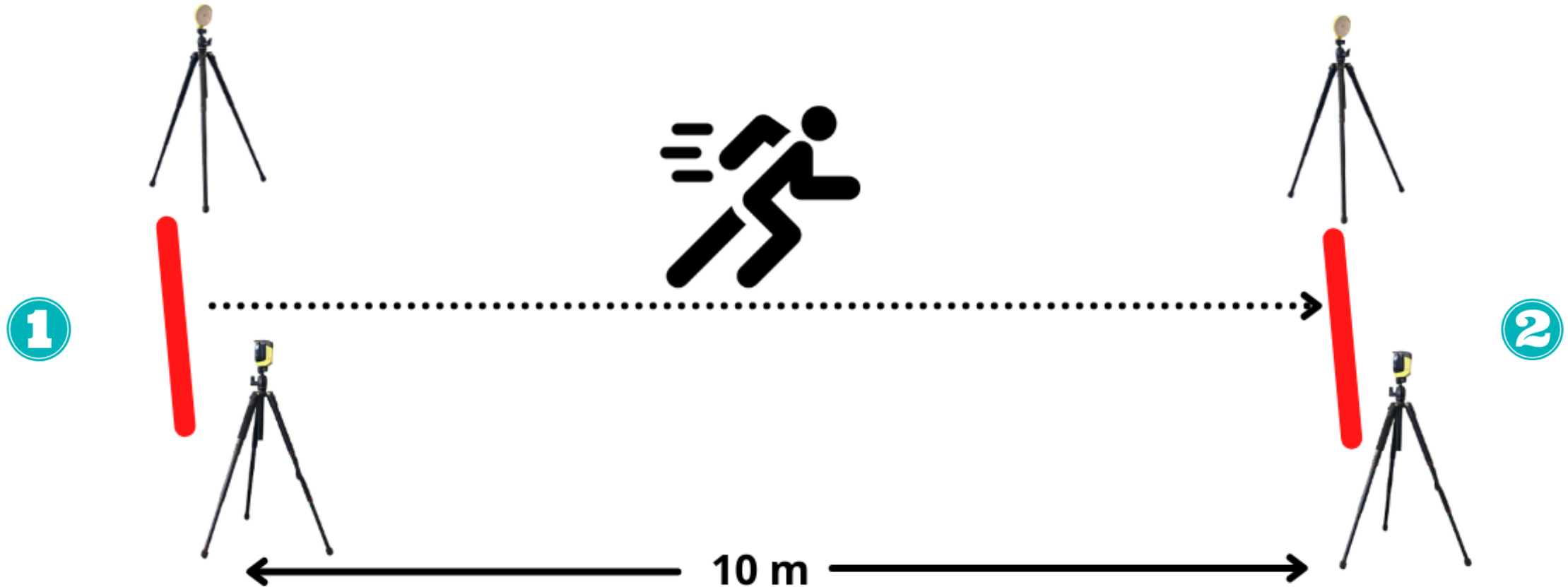
10 female CP footballers from the Spanish national team.



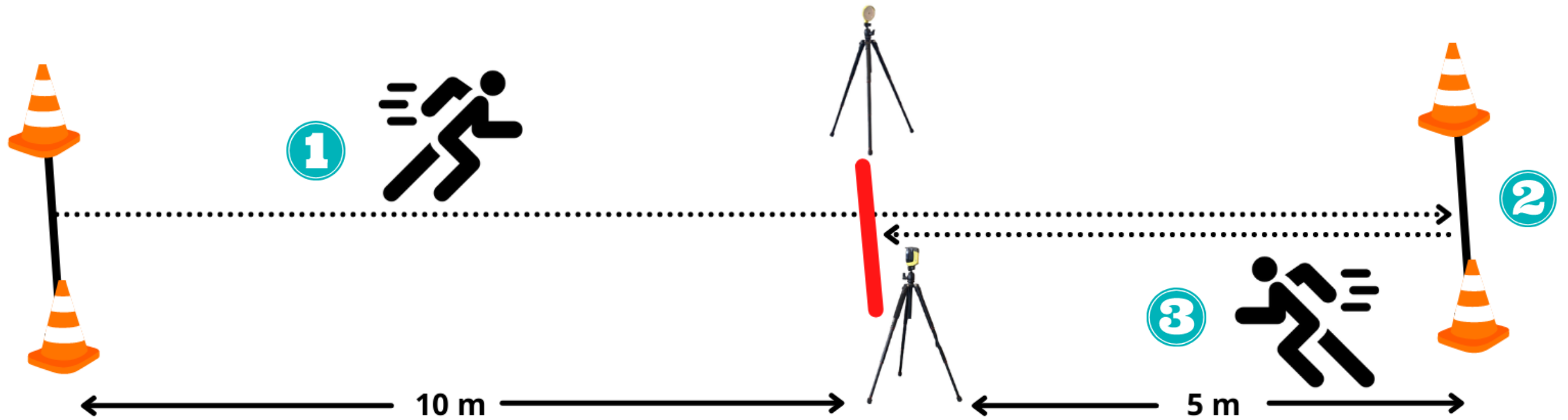
Material and Methods: Procedures (2/5)



Material and Methods: Measures (3/5)



Material and Methods: Measures (4/5)



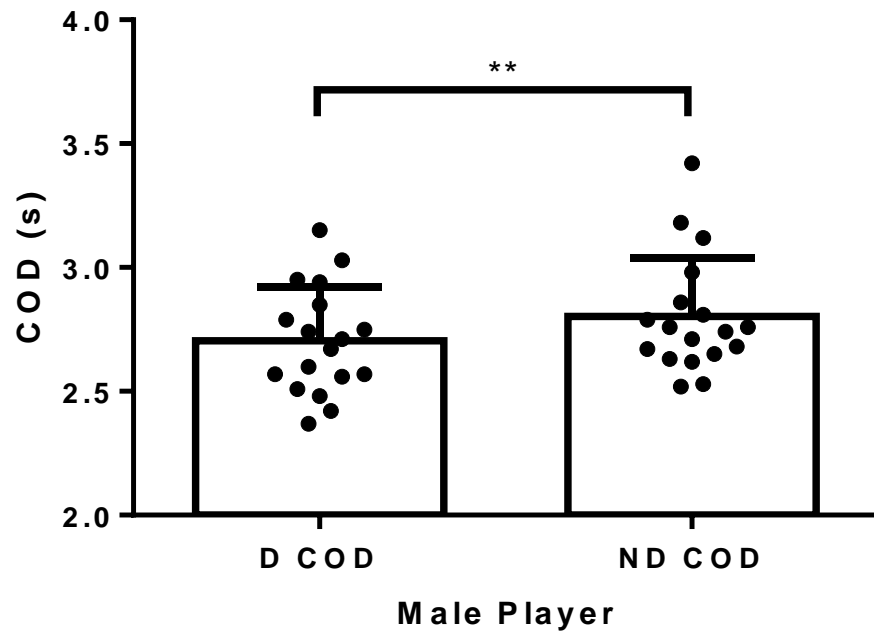
Material and Methods: Measures (5/5)

- **COD deficit** = 505 – 10 m.
- Dominant (D) COD and Non-Dominant (ND) COD.
- **COD Imbalance and Assymetry Index** was calculated by the formula:
(dominant – non-dominant/dominant × 100)
- **Statistical analysis:** Student's paired *t*-test and unpaired *t*-test.

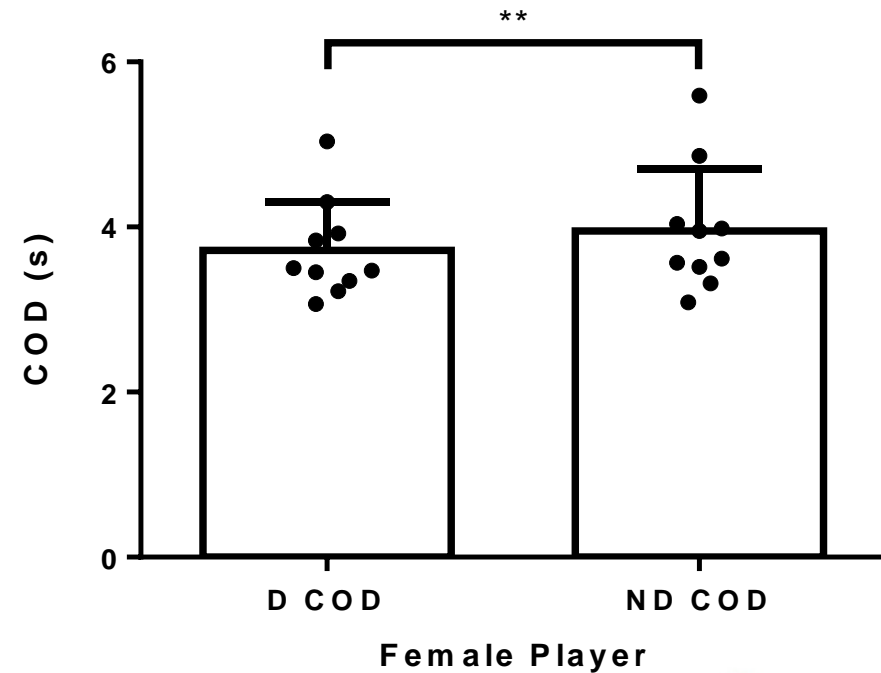
Results (1/4)



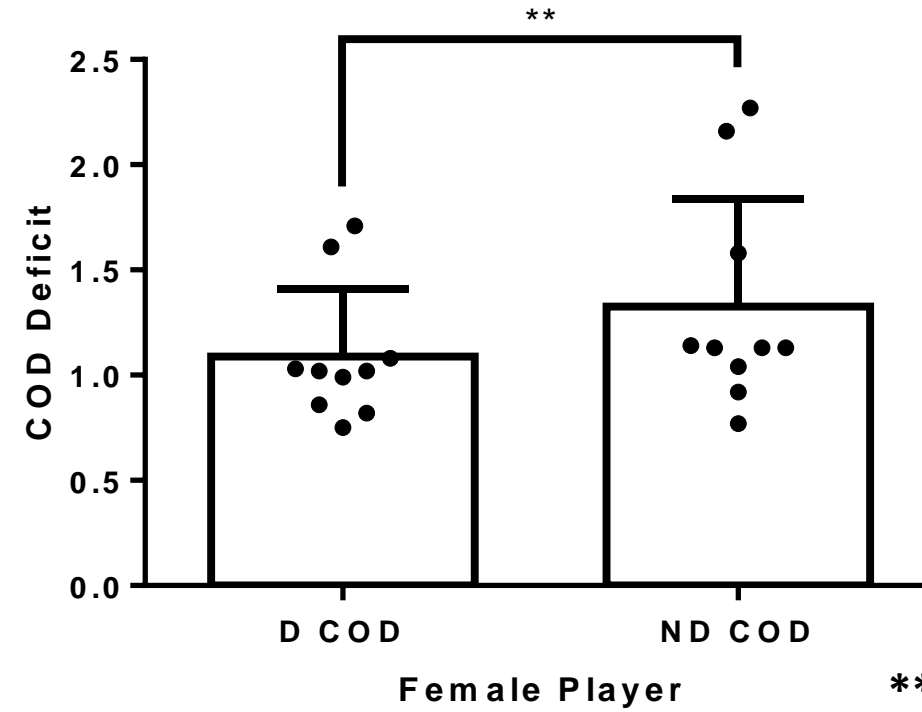
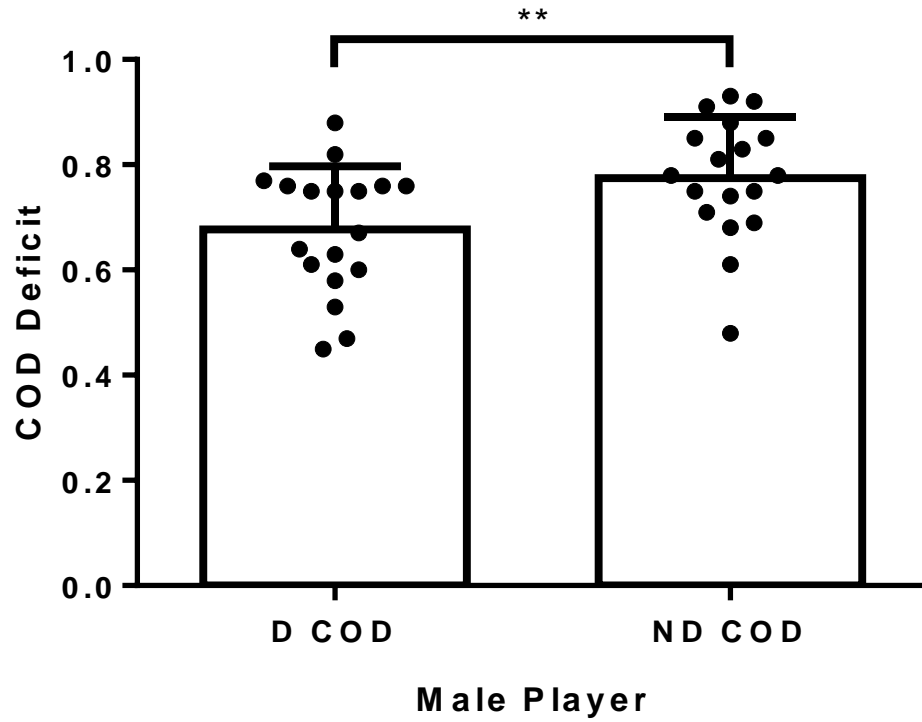
Group	Dominant (s)	Non-Dominant (s)
Male	2.70 ± 0.22	2.80 ± 0.24
Female	3.72 ± 0.59	3.95 ± 0.75



** $p < 0.01$

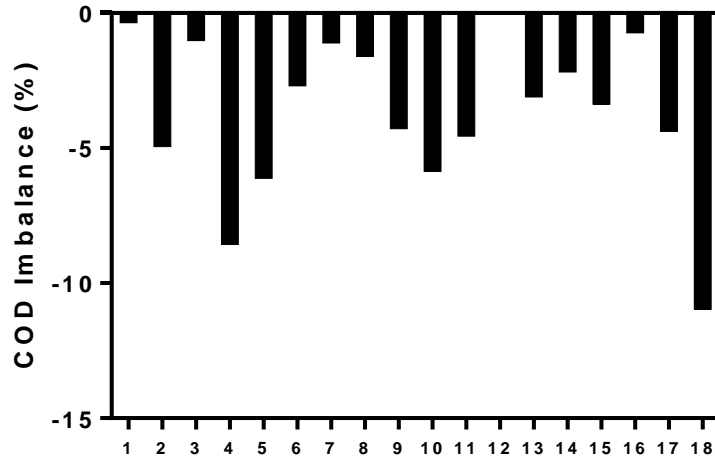


Results (2/4)

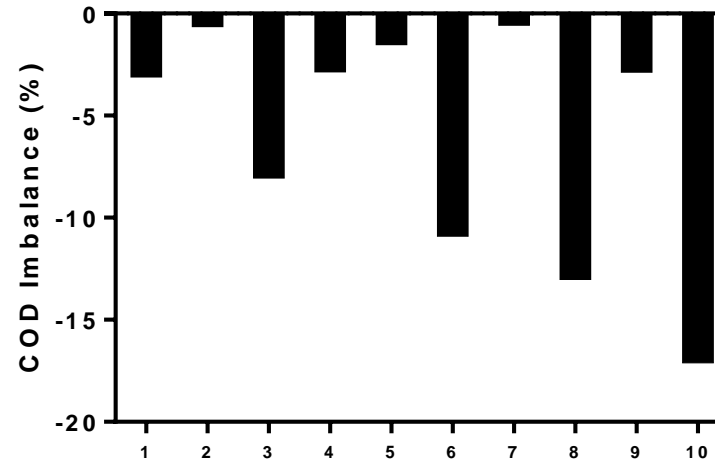


** $p < 0.01$

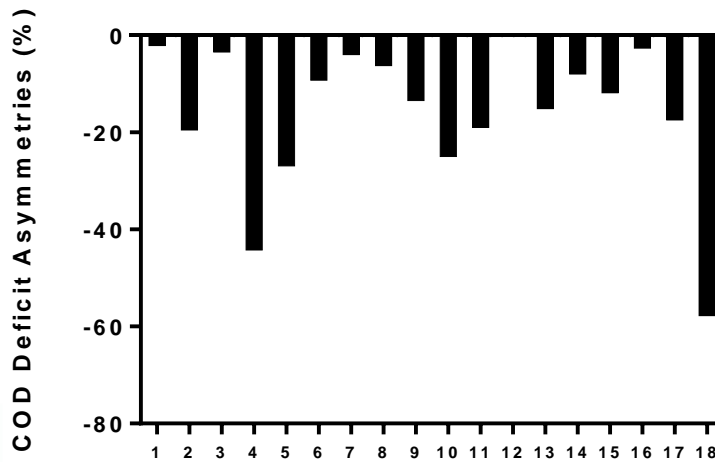
Results (3/4)



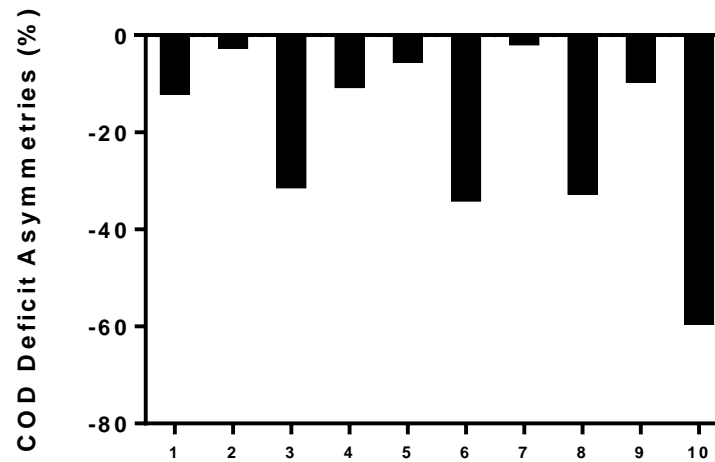
Male Player



Female Player



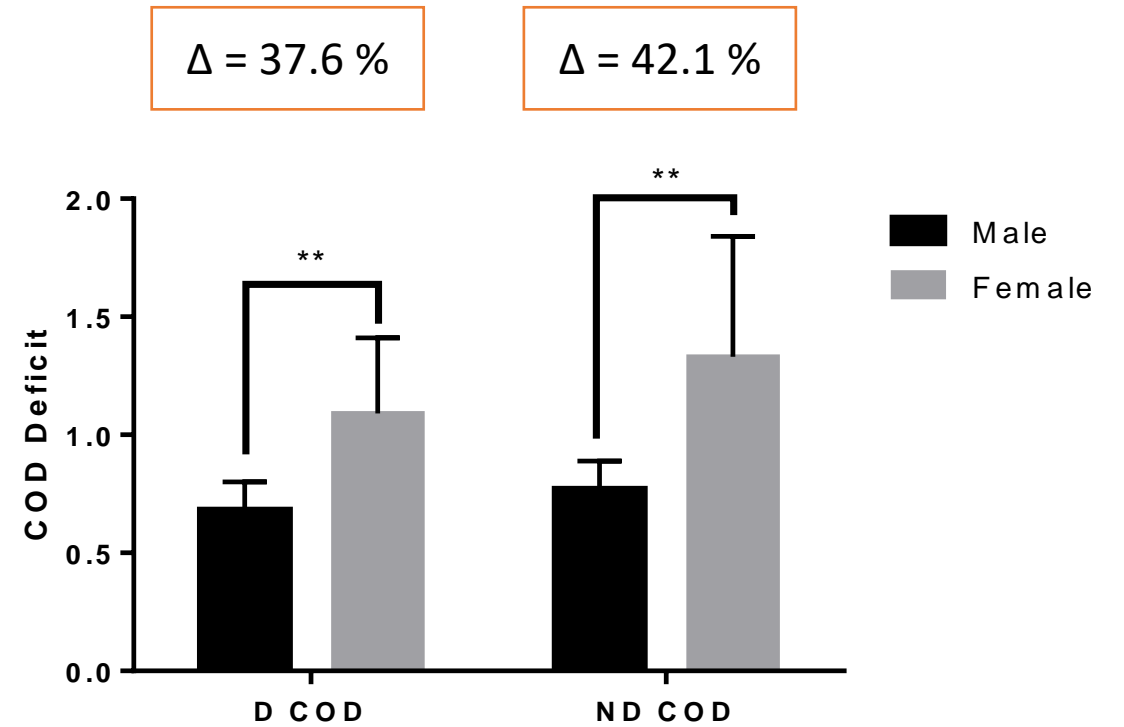
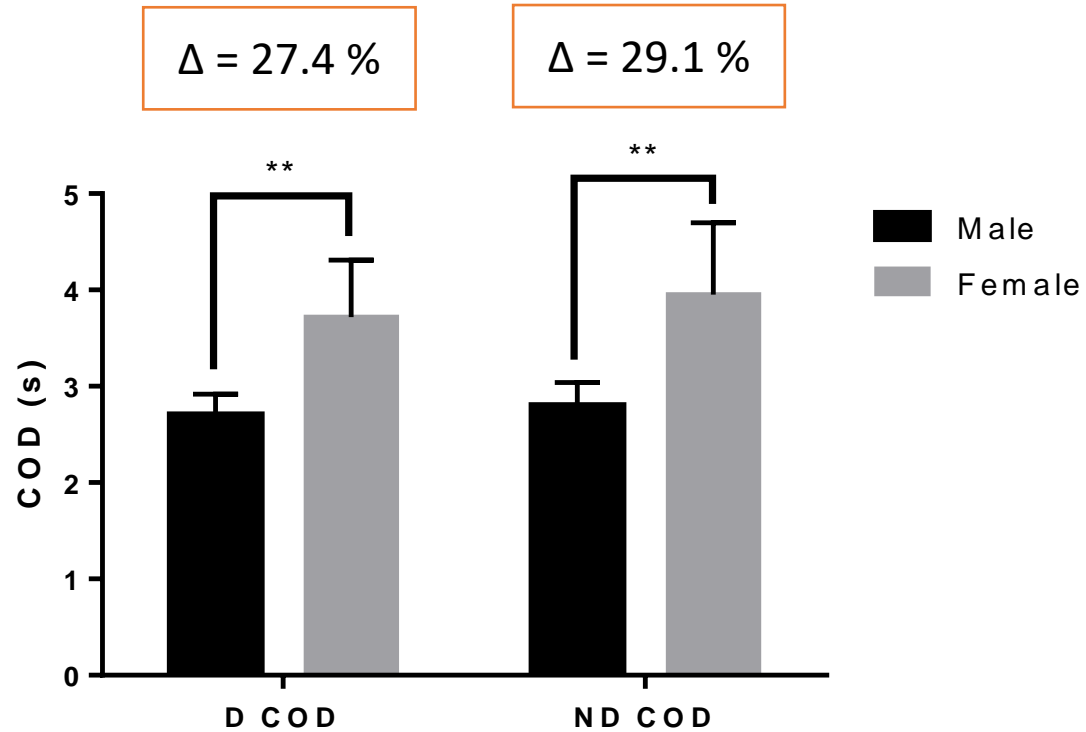
Male Player



Female Player

**** $p < 0.01$**

Results (4/4)

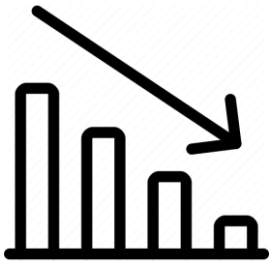


** $p < 0.01$

Discussion & Conclusions (1/3)



- Para-footballers displayed **directional dominance, significant asymmetries** in 505 and COD deficits.



- Males displayed **faster COD** and **shorter COD deficit**.

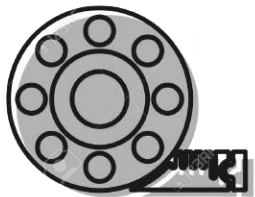


- No differences were found for **COD imbalance** and **COD asymmetry** between sexes.

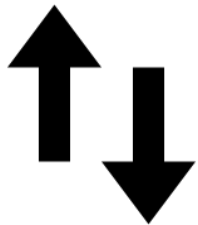
Discussion & Conclusions (2/3)



- These results are in line with previous studies which showed **directional dominance** in different sports.



- According to Nimphius et al. (2016), COD deficit provide a more **isolate measure** of **COD ability**.



- Böhm & Döderlein (2012) described **asymmetries increasing** during running in individuals with CP, which could mainly be associated with impairments.

Discussion & Conclusions (3/3)



- Asymmetry leads into abnormal motor patterns affecting individual general coordination.
- The assessment of symmetry showed to be a pertinent component.
- This study evidences that the use of **COD deficit** and the **asymmetry index** could be helpful to monitor the **impact of the impairment** on a **sport-specific skill**.

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@HenriquezMJV



matias.henriquez@alu.umh.es



https://www.researchgate.net/profile/Matias_Henriquez3

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PhD Raúl
Reina



PhD Iván
Peña



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