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# Sprint performance, trunk muscle strength and trunk classification in wheelchair rugby and basketball athletes.



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# Background



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## **Tweedy and vanlandewijck (2011):**

- Evidence based classification
- Impairment – Performance (equipment)





# Background

## **Tweedy and vanlandewijck (2011):**

- Evidence based classification
- Impairment – Performance (equipment)

The relation between impairment type and sport specific activity limitation has to be known for an evidence based classification system in paralympic sports.



# Background



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Wheelchair rugby

New trunk classification system



# Background



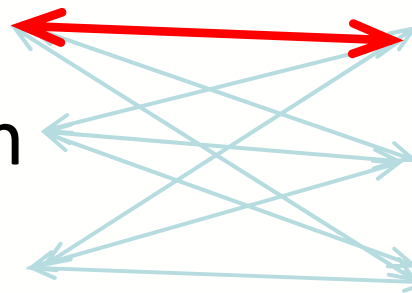
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## Trunk impairment

- Strength
- Range of Motion
- Coordination

## Sport specific activity

- Sprint / Acceleration
- Acceleration
- Coordination



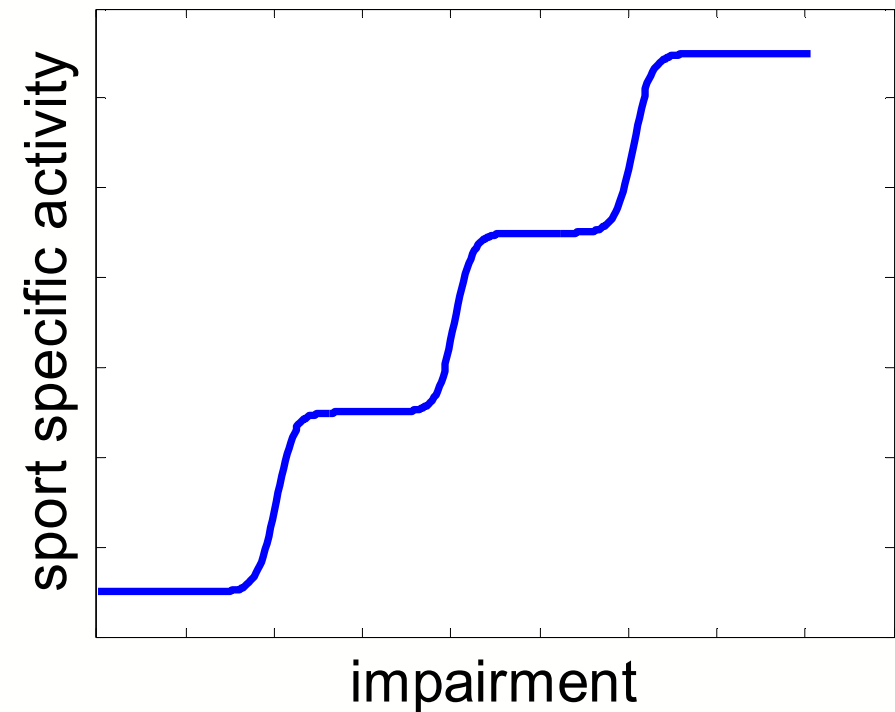
Isolate the relation between trunk strength and sprint performance





Theoretically: All athletes are optimal trained

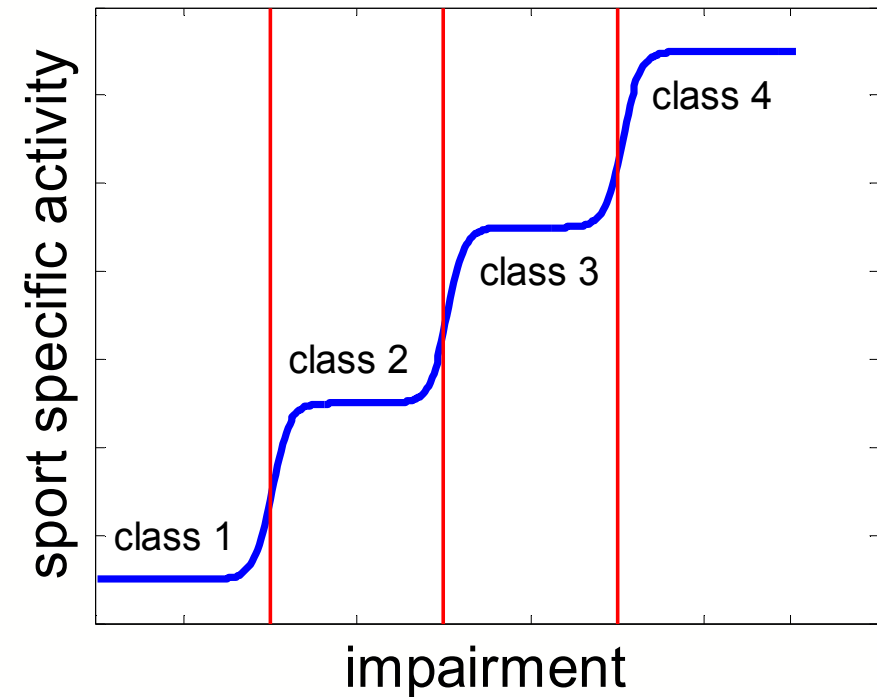
- Steps in relation





## Theoretically

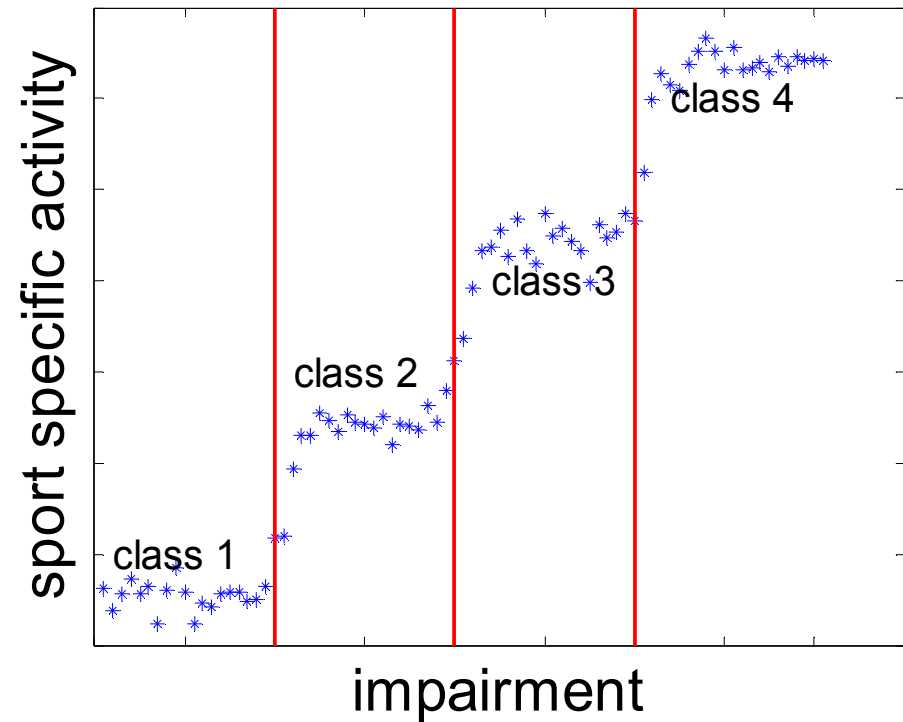
- Steps in relation
- Clear classes





Theoretically:

- Steps in relation
- Clear classes
- Even introducing little variation there are clear classes







# Purpose

Study the association between a 10m sprint (sport specific activity) and trunk muscle strength (impairment) and their relation with trunk score in the new trunk classification system for wheelchair rugby.

- Differences in strength and sprint between classes?
- Stepwise relation between strength and sprint?





# Methods (Participants)

- 25 wheelchair athletes from the Netherlands and Belgium (Rugby and basketball).
- At least 1 year of experience
- Classified according to the new trunk classification.



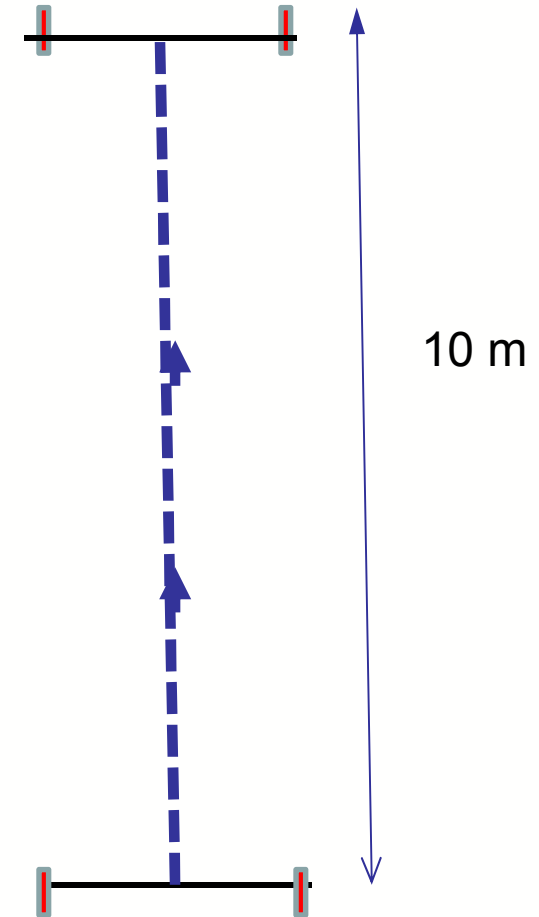
# Methods (tests)



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## Sprint tests

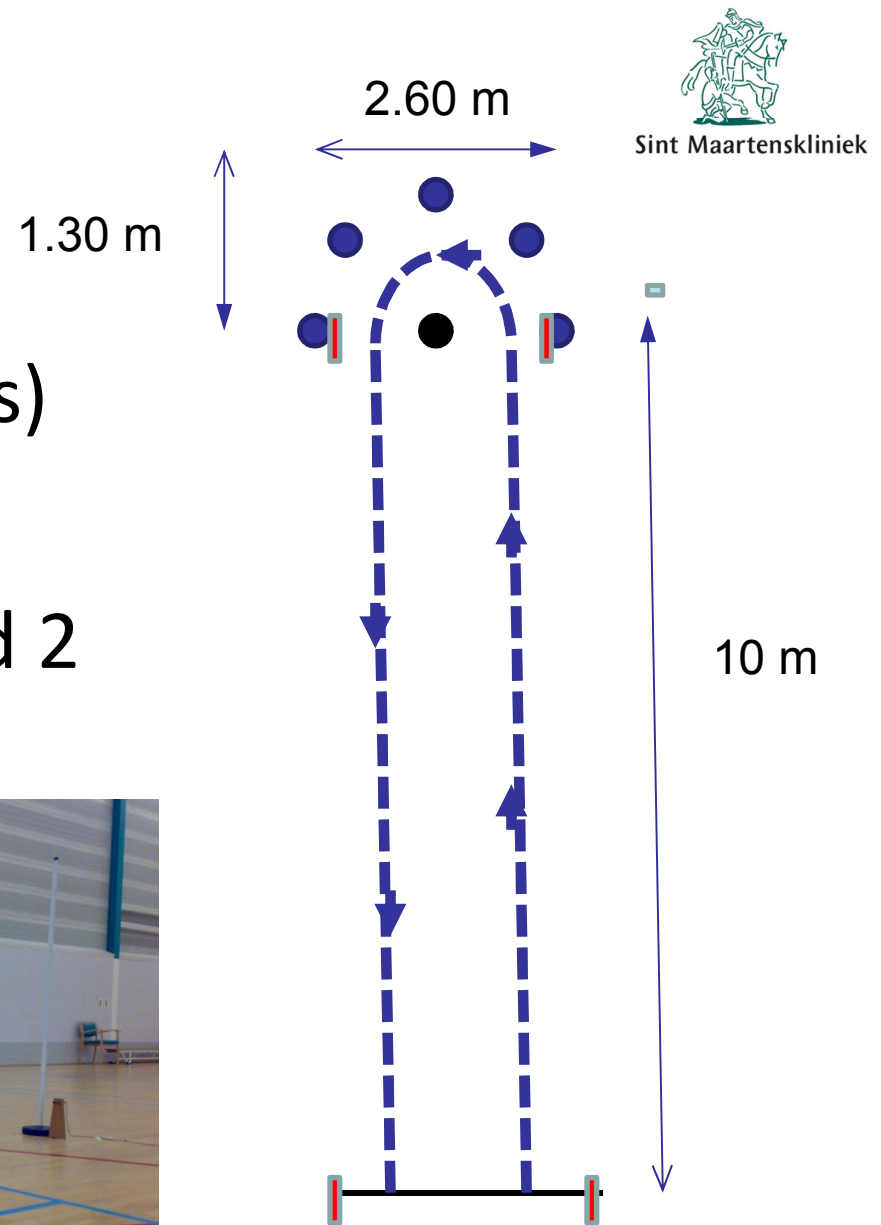
- 10m sprint test (3 times)



# Methods (tests)

## Sprint tests

- 10m sprint test (3 times)
- 10m – turn – 10m test  
(2 correct left turns and 2 correct right turns)



# Methods (tests)



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## Muscle strength

- Maximal isometric in 4 directions (maximal value):
  - Forward / Backward
  - Left / Right
- All tests were performed 3 times.





# Methods (statistics)

- Intraclass correlation coefficient (ICC) was used to indicate the reliability of the measurements (sprint and force tests)
- The best sprint tests and strength tests were used in the analysis
- Kruskal-Wallis test to indicate differences in sprint and strength between trunk classes.
- Association between sprint and strength tests was explored (correlation coefficient or clusters)





# Results (sprint tests)

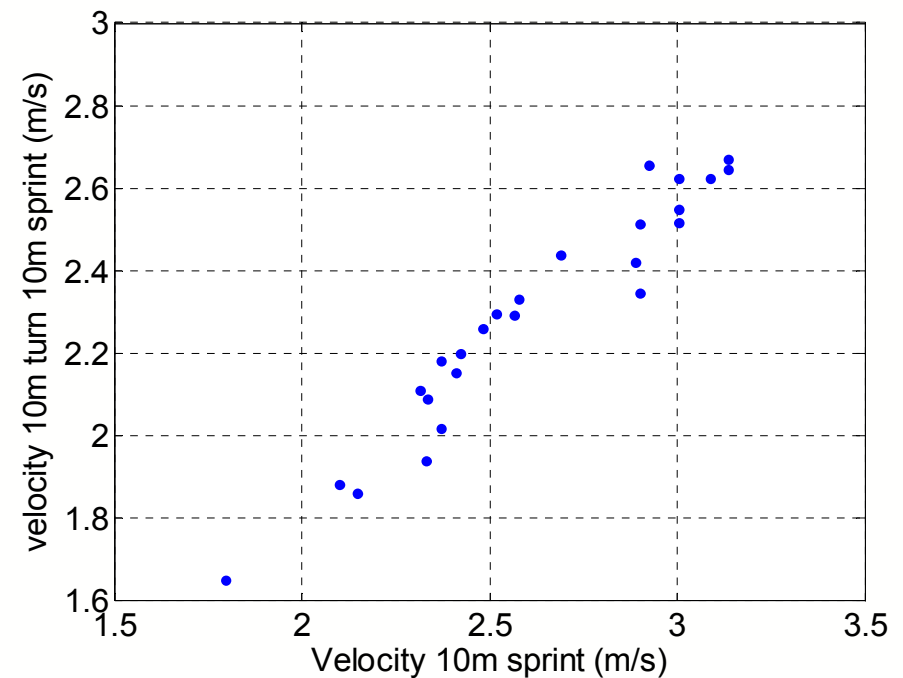
## ICC

10m: 0.98

Turn test: 0.98

## 10m versus turn test

- $R^2 = 0.94$
- $V_{10m} = V_{turn} * 0.75 + 0.34$

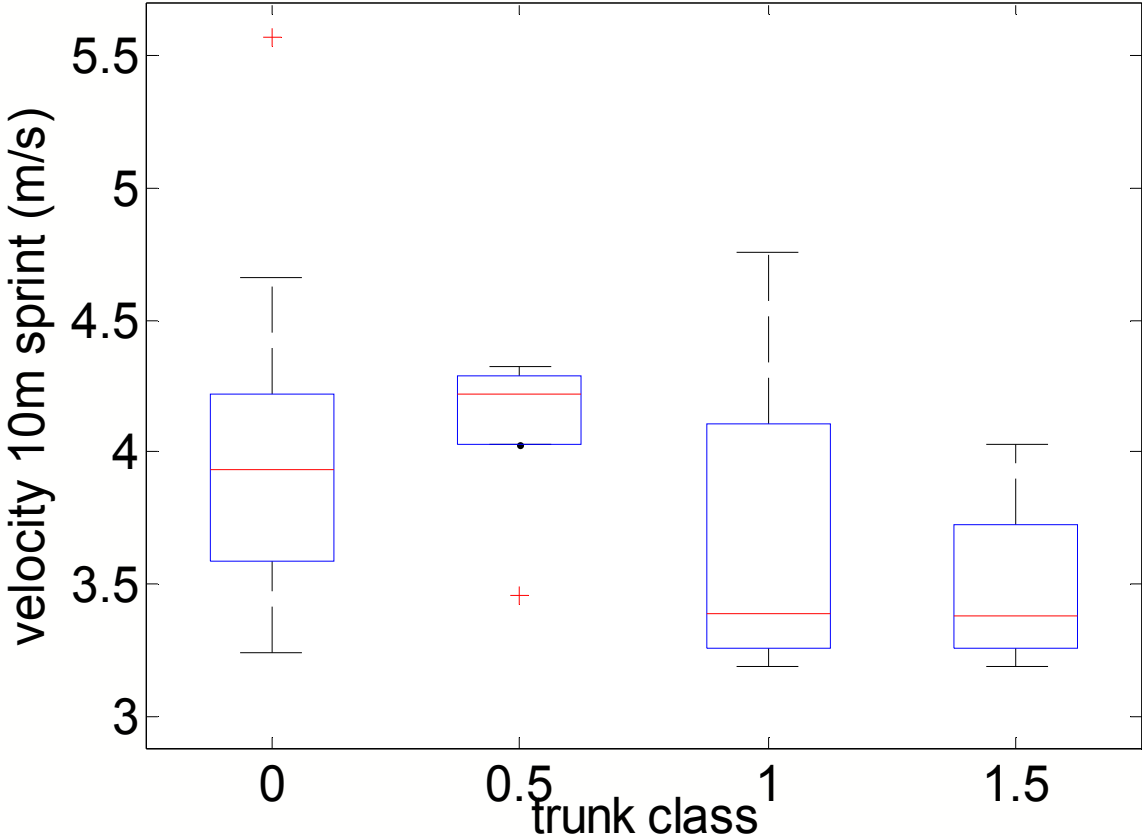


# Results (10m sprint test)

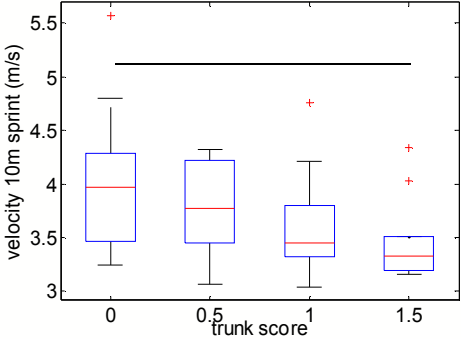


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No significant differences between classes



Larger group of 43





# Results (strength tests)



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ICC

Forward	Backward	Left	Right
0.98	0.85	0.98	0.89



# Results (strength tests)



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ICC

Forward	Backward	Left	Right
0.98	0.85	0.98	0.89

Correlation coefficient

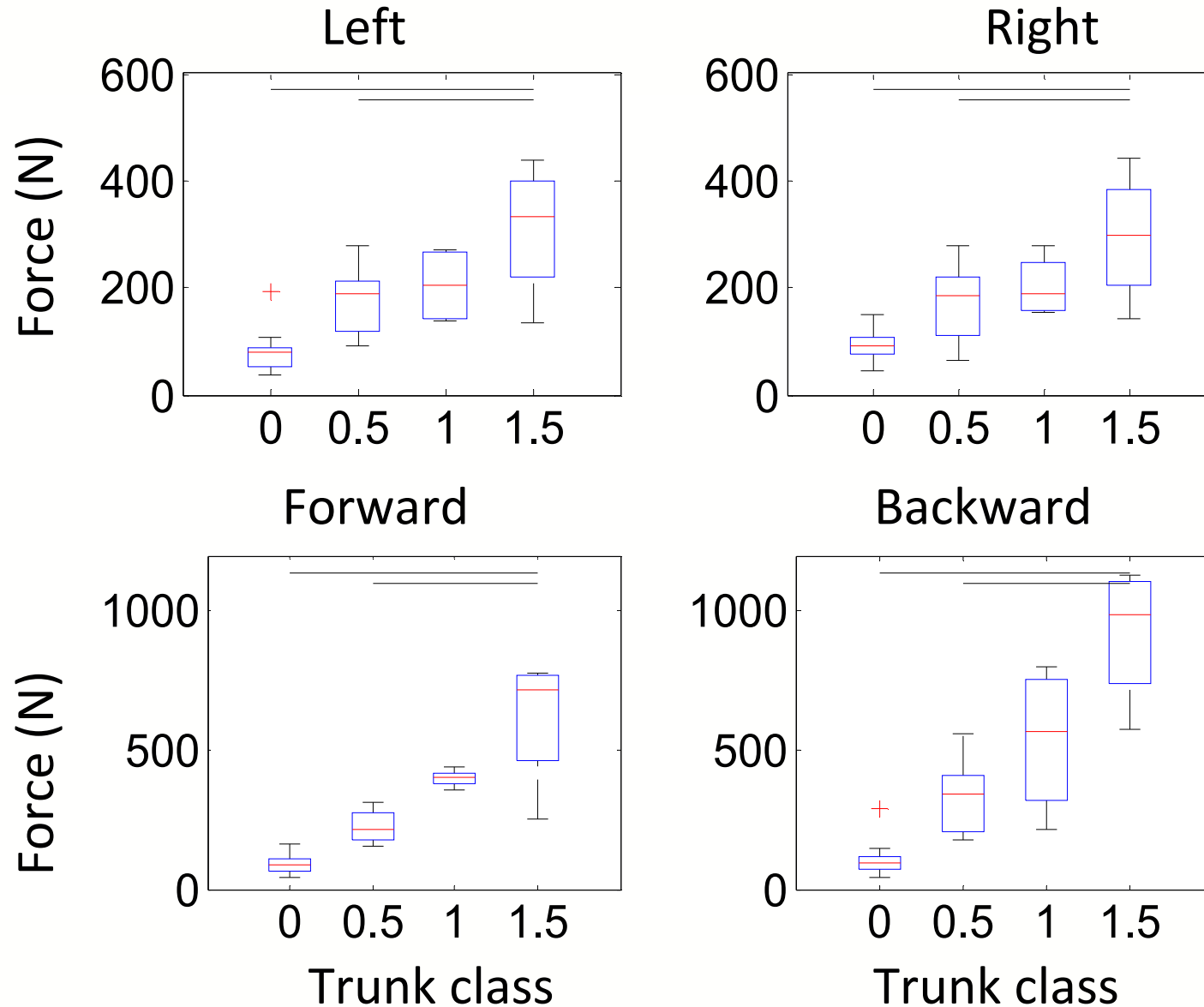
	Backward	Left	Right
Forward	0.96	0.78	0.78
Backward		0.82	0.80
Left			0.98



# Results (strength tests)

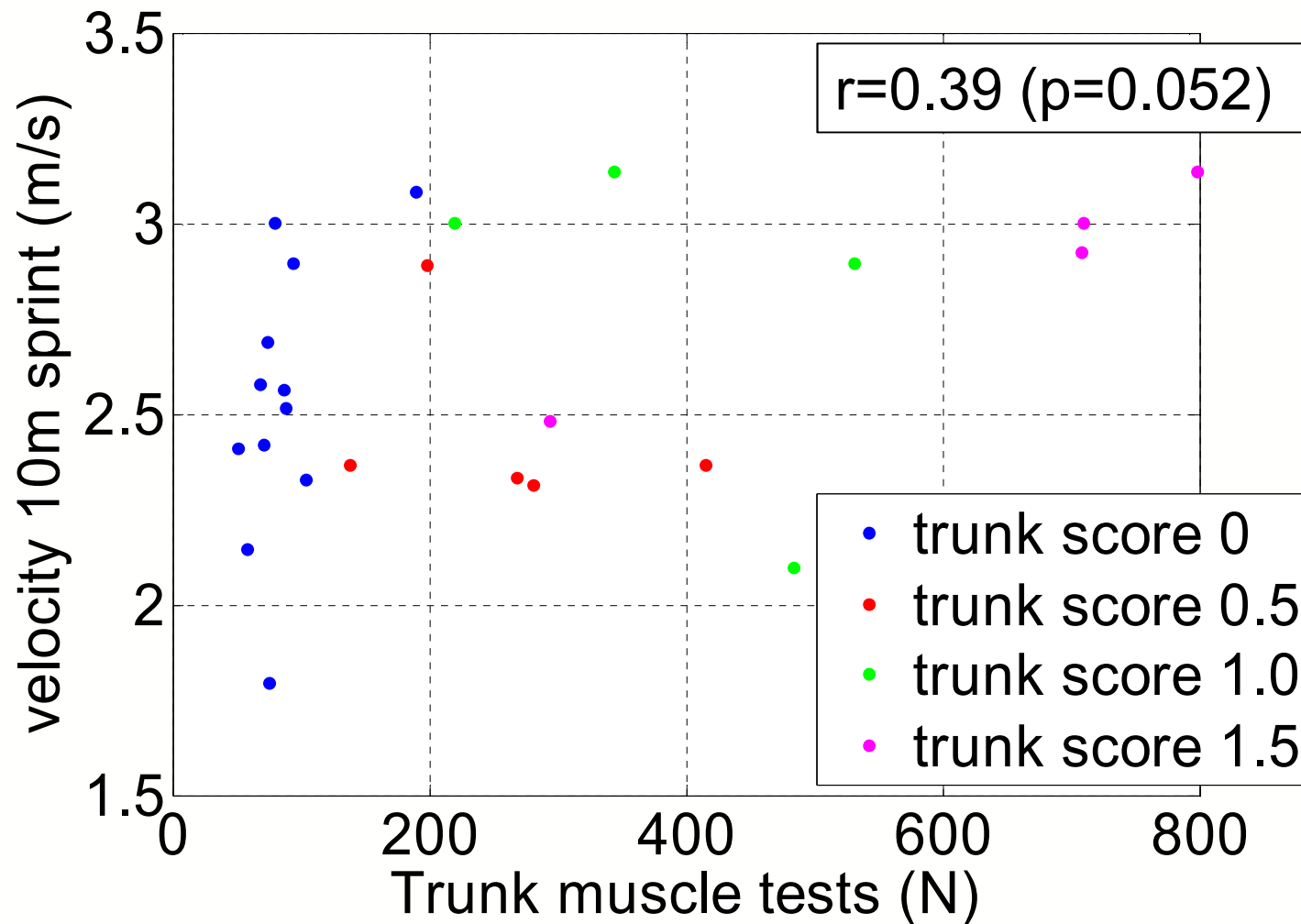


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# Trunk strength – 10m sprint





# Conclusions

- Sprint tests and strength tests had a high reliability.
- Differences in trunk muscle strength between trunk classes.
- No clear association between sprint performance and trunk muscle strength.





# Discussion

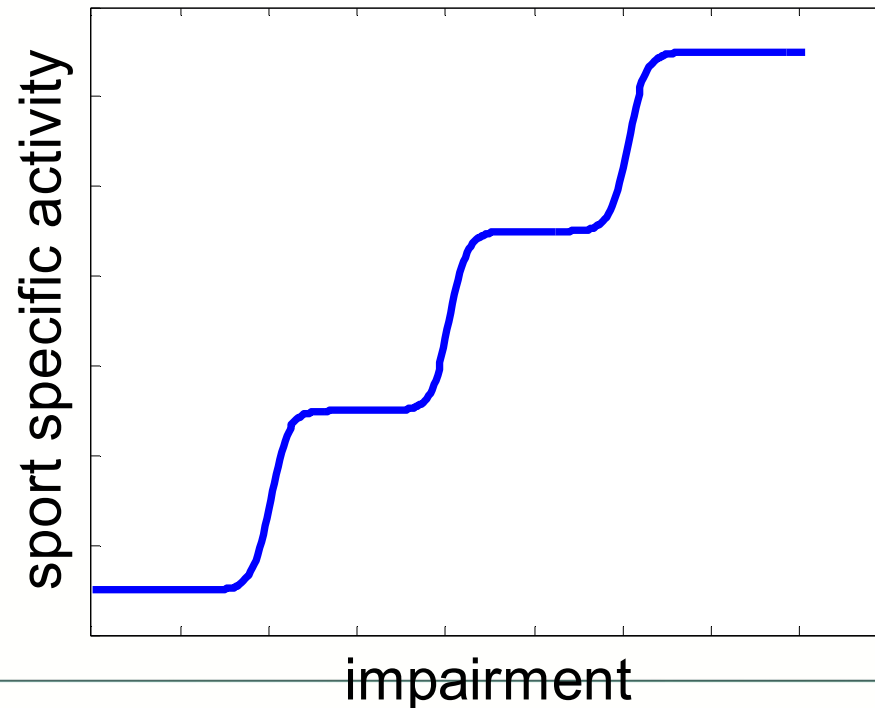
- Other impairment factors (arms, strapping) play a more important role.
- Strapping reduces the effect of impairment.
- Wheelchair rugby athletes have different impairment types (CP, SCI, etc).
- Not all athletes were optimal trained.





# Discussion

However, could we expect steps in the relation between isolated impairment and sport specific activity?





# Discussion

Important strength parameters for velocity:

- Trunk
- Arms
  - left / Right
    - Lower / Upper / hands

Already results in 7 parameters

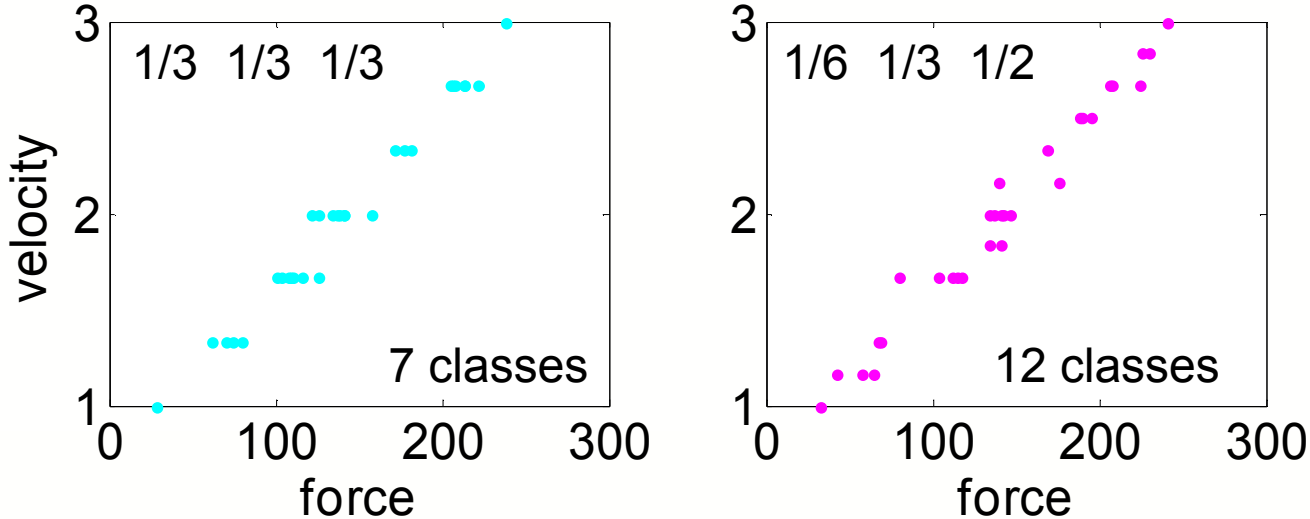
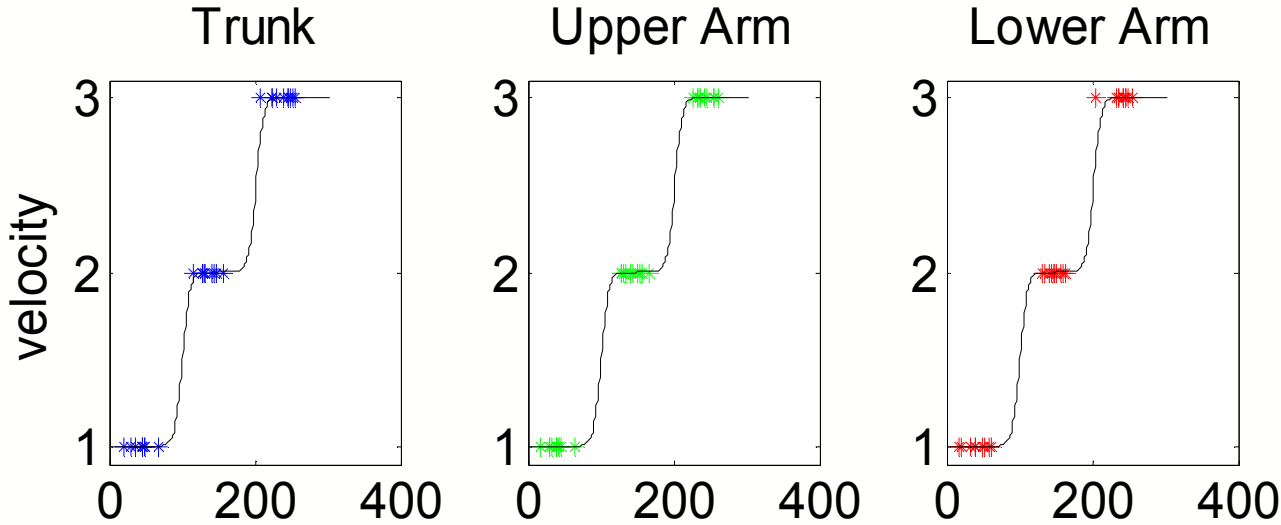




# Discussion



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There are too many factors that play a role to find a stepwise relation between an isolated impairment and sport specific activity in paralympic sports such as wheelchair rugby



Thank you for your attention

