

# The relationship between postural stability and Boccia performance in individuals with neuromusculoskeletal impairments

Strengthening evidenced-based classification



**VISTA**  
CONFERENCE

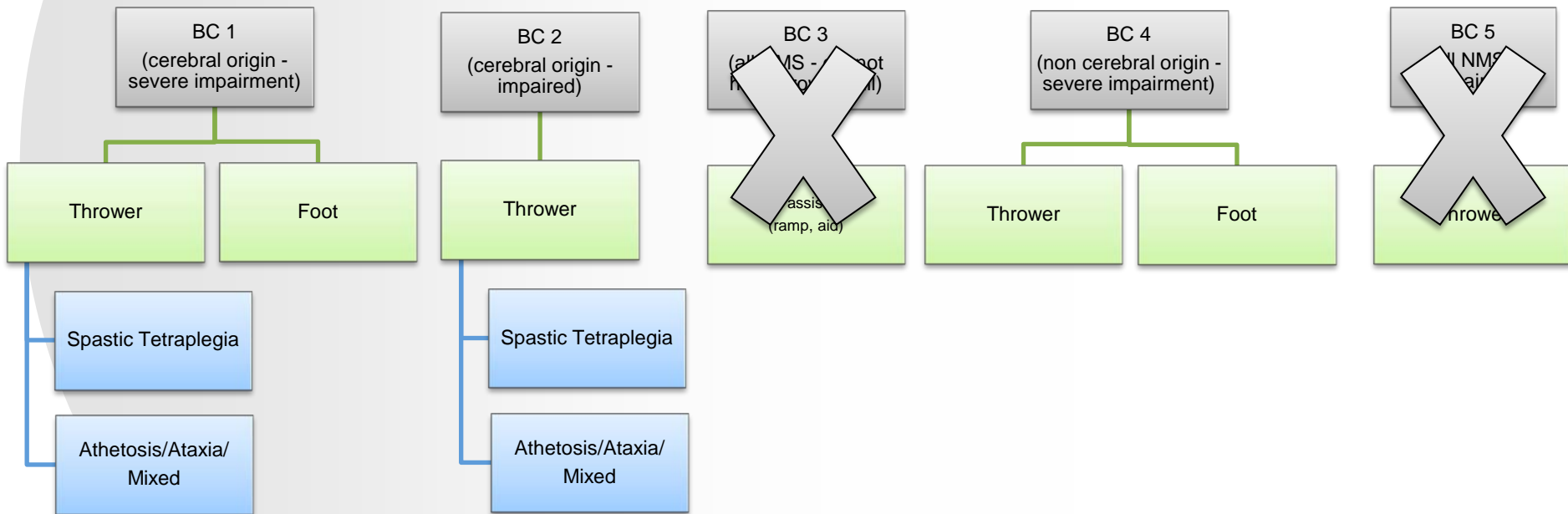


R, Reina., K, McCulloch., D, Barbado.,  
A, Roldan., M, Campayo., S, Tweedy.,  
Y, Vanlandewijck.

[Katina.mcculloch.ep@gmail.com](mailto:Katina.mcculloch.ep@gmail.com)



## 1.1 Boccia Profiles





## 1.2 Current Classification

- How is trunk impairment currently classified?
  - Required restraint to prevent from falling out of chair
  - Uses head to centre after throw or disturbance
  - Uses arms/hands to centre after throw or disturbance
  - Can return to upright without head/hands after throw or disturbance
  - Good/fair trunk rotation

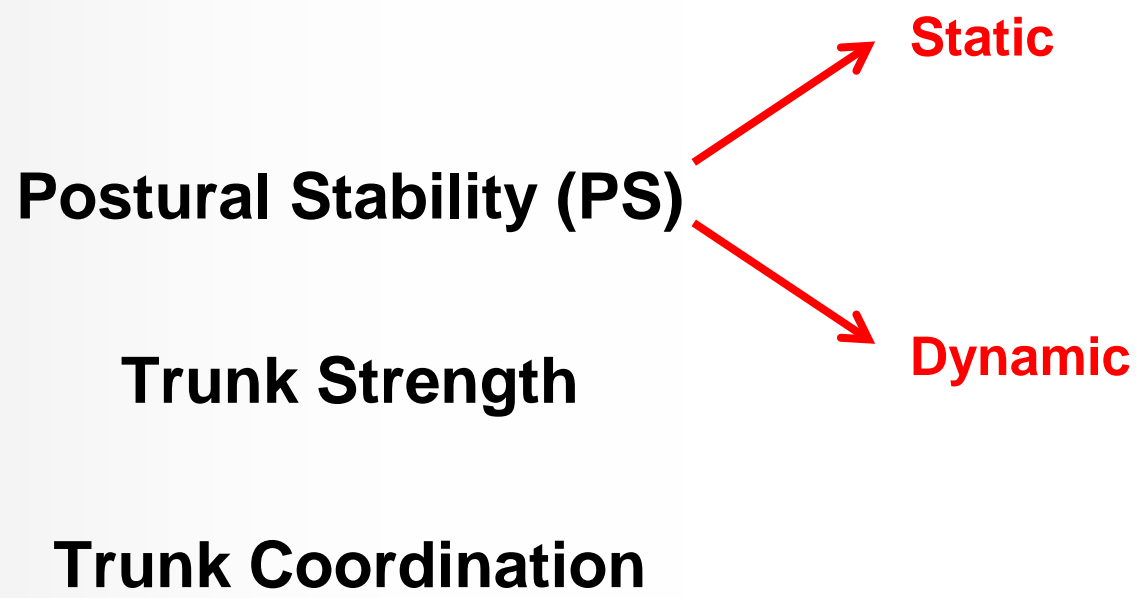
Boccia Classification Rules, 2013





# 1.3 Trunk Impairment

What is trunk impairment?





## 1.4 Research Question

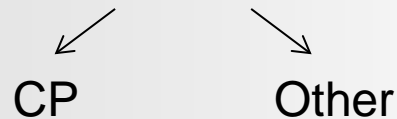
Is postural stability  
a fundamental activity for Boccia  
performance?



## 2.1 Participants

### 2 groups

- Control (CN)
- Boccia athletes (TN)



### N = 44

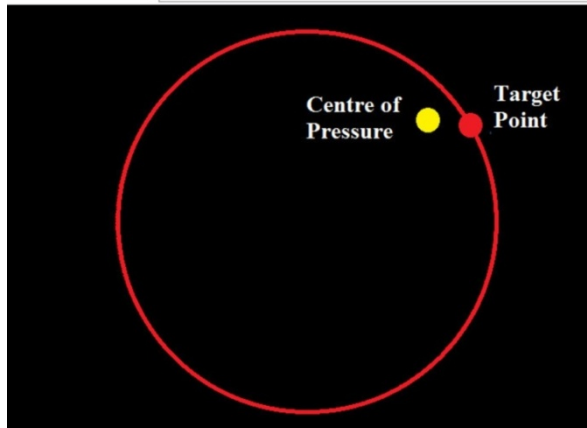
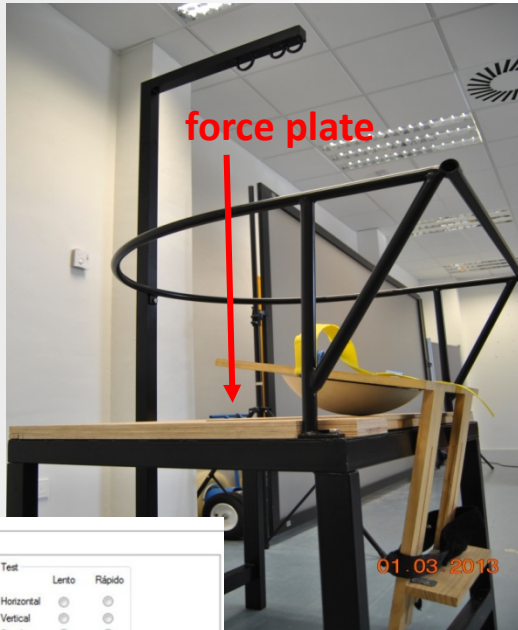
- CN = 19
- TN = 25

### Assessments

- PS
- Boccia performance
  - Throw accuracy

TN Description		
CP	Hypertonia	9
	Ataxia	1
	Athetosis	2
	Mixed	5
	<u>Total</u>	<u>17</u>
Other	Acquired Brain Injury	2
	Muscular Dystrophy	2
	Friedman's Ataxia	1
	Arthrogryposis	2
	Neuroposis Congenital	1
	<u>Total</u>	<u>8</u>
Boccia Class	BC1	4
	BC2	15
	BC4	6
	<u>Total</u>	<u>25</u>
Level of competition	Regional	9
	National	12
	International	4

## 2.2 Postural Stability (PS)



### Protocol

2 surfaces

Static



VFB

Dynamic

Sagittal

Coronal

Circular

70sec with 60sec rest

Variable

Mean Radial Error (MRE) in mm

Hancock et al, 1995



## 2.3 Boccia Performance

### Throw Accuracy

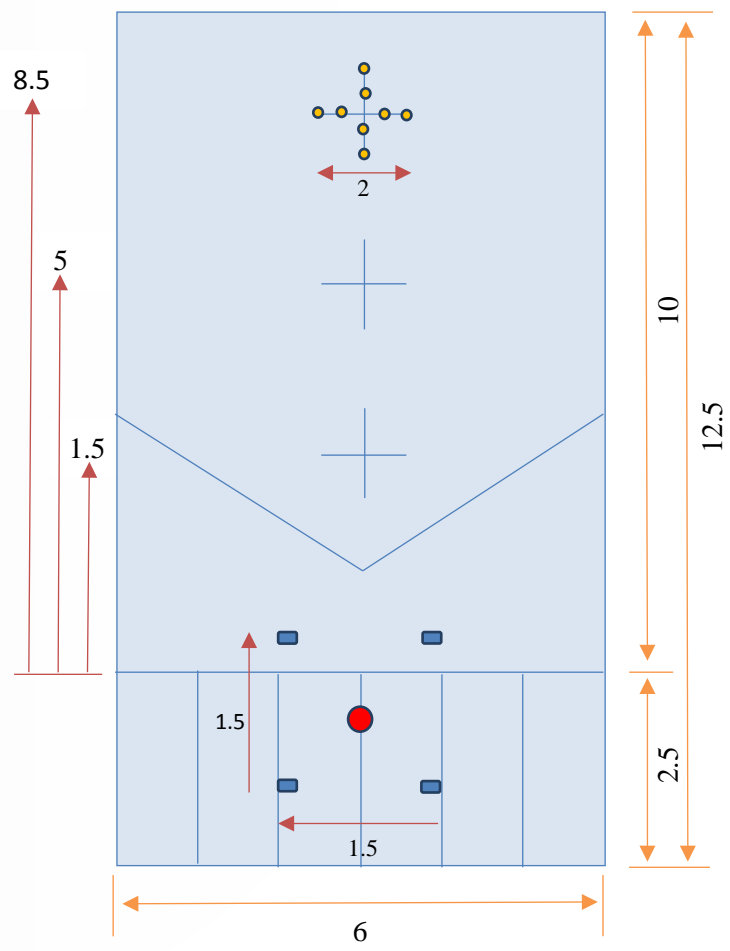
● 3 distances

- 1.5m
- 5m
- 8.5m

● 10 throws

### Variables

● MRE (m)







# 3.1 Hypothesis 1

## The relationship between stable, unstable, static and dynamic PS

		SS		SD		US		UD		
		r	R <sup>2</sup>	r	R <sup>2</sup>	r	R <sup>2</sup>	r	R <sup>2</sup>	
SS	TN			.456	.208	.030	.001	<b>.760</b>	.578	
	CN			.295	.087	<b>.580*</b>	.336	<b>.466*</b>	.217	
SD	TN					.517	.267	<b>.742</b>	.551	
	CN					.280	.078	<b>.501*</b>	.251	
US	TN							<b>.936**</b>	.876	
	CN							<b>.766**</b>	.587	
UD	TN									
	CN									

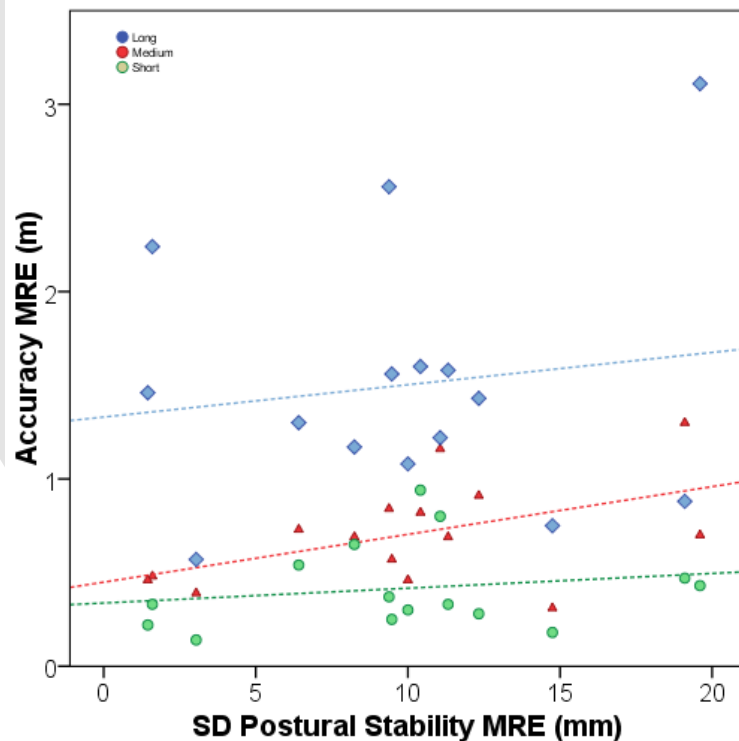
TN = Trained NMS Group; CN = Control Group; SS = Static Stable; SD = Static Dynamic; US = Unstable Static; UD = Unstable Dynamic; r = Pearson's correlation coefficient; R<sup>2</sup> = Regression R-Squared; \* (p<0.05) and \*\* (p<0.01) indicated significant correlation.



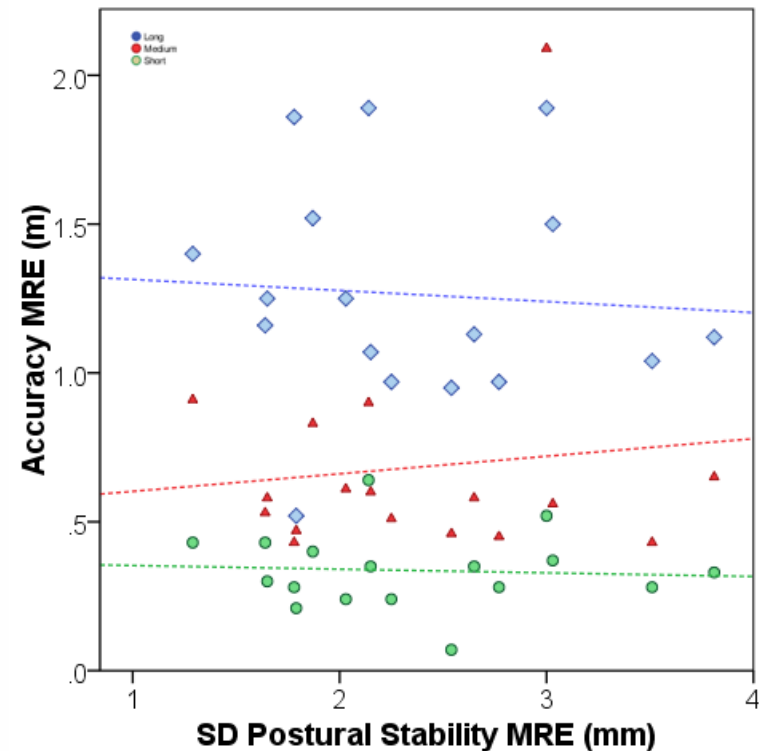
## 3.2 Hypothesis 2

### The relationship between PS and Boccia performance

Accuracy vs. Postural Stability in TN



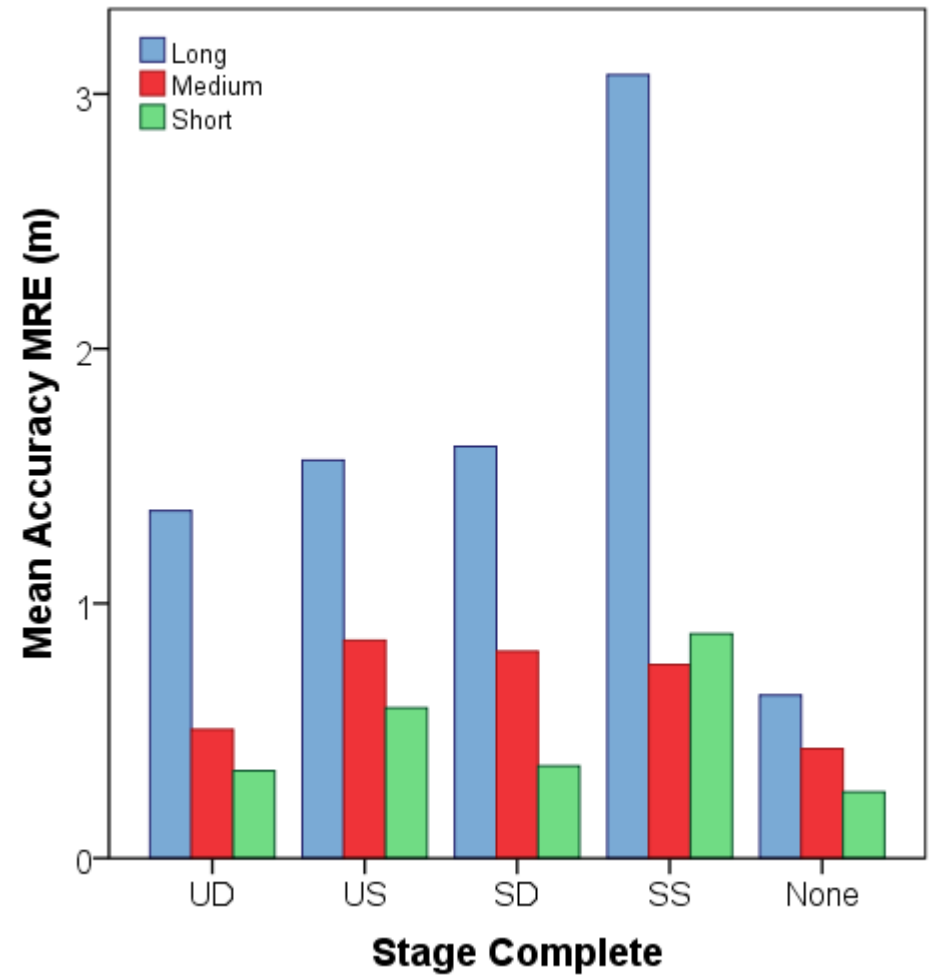
Accuracy vs. Postural Stability in CN





# 3.2 Hypothesis 2

Stage Complete vs. Accuracy in TN



Completion Stage	N	%
UD	11	44
US	15	60
SD	21	84
SS	23	92
None	2	8
Total	25	100

No significant correlations

No significant difference



## 4.1 Discussion

- There are some relationships between PS stages in CN and TN
  - Particularly UD
  
- Some relationship between PS and accuracy
  - TN between US and MCT
  - CN between US and LCT
  - Other analysis = no significant correlations
  
- Tsai et al, 2014
  - Variance tilt positions = different PS results, however no sig. change in Boccia performance
  
- More analysis required
  - Limitations
  - Future direction



## 4.2 Conclusion

Postural stability may have a relationship with Boccia performance, however to what extent is unclear

The importance of trunk impairment in the current classification system should be questioned

Further analysis with an increased sample size, an activity matched control group, with trunk strength and coordination included is required

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