# Evidence-based classification:
## Testing a Performance Indicator for Para World Sailing.


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**International Classifiers, World Sailing**

# Rio Athletes

# Introduction

- IPC requires development of evidence-based classification systems
- 2.4mR: ‘Minimum Disability’
- Research looks at performance in relation to trunk control

# Background to sailing classification system

- Three boat classes in Rio: 2.4mR, Skud 18 and Sonar
- Classification tests: Functional Anatomical, Functional Dock, Functional Sail
- Athletes rated class FCS 1 (most severely disabled) to FCS 7
- 2.4mR athletes only required to meet ‘Minimum Disability’

# Spectator view - start line 2.4mR race

# 2.4mR

# 2.4mR Racing

- **Hypothesis 1:**

  **Upwind vs downwind proportion is a predictor of winning races**

Figure 2

# Basic Physics of 2.4mR sailing

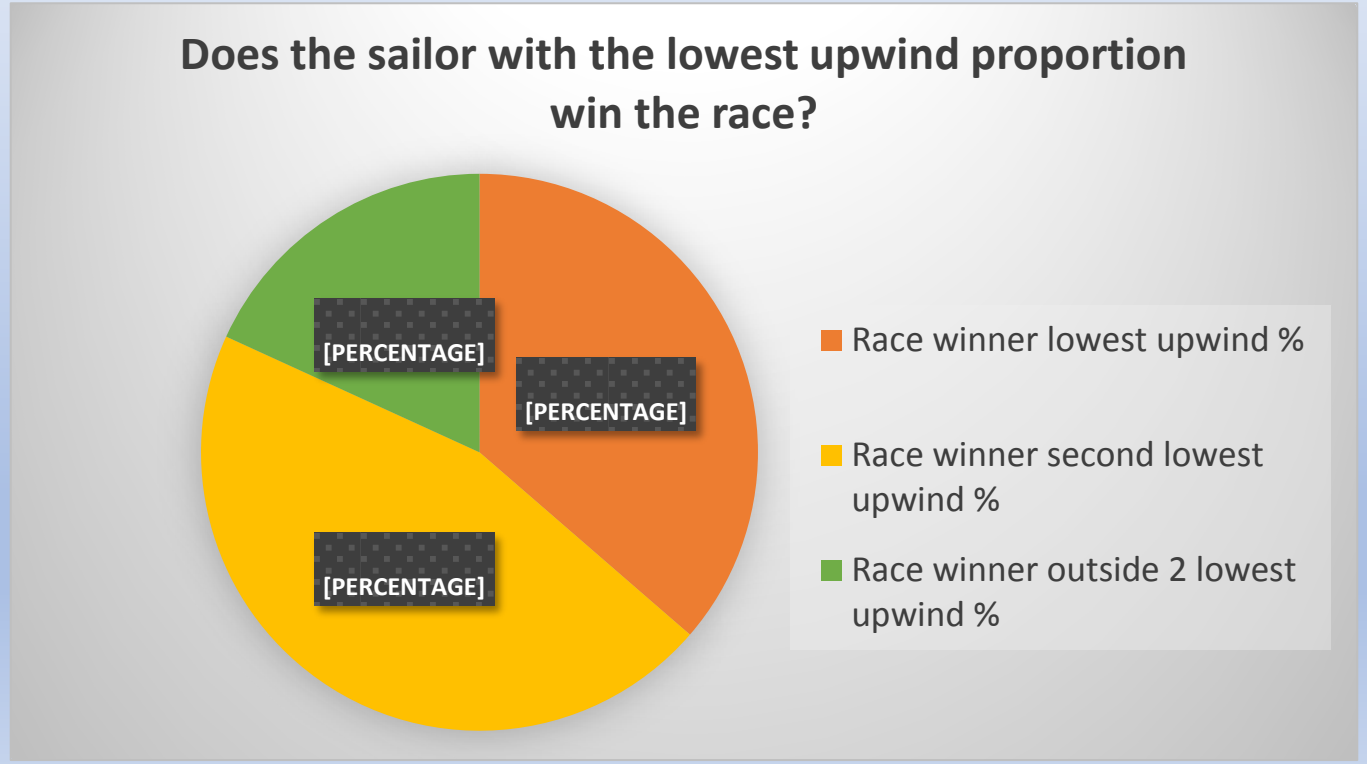
- **Hypothesis 2: Trunk control is a factor in time spent sailing upwind**

# Method

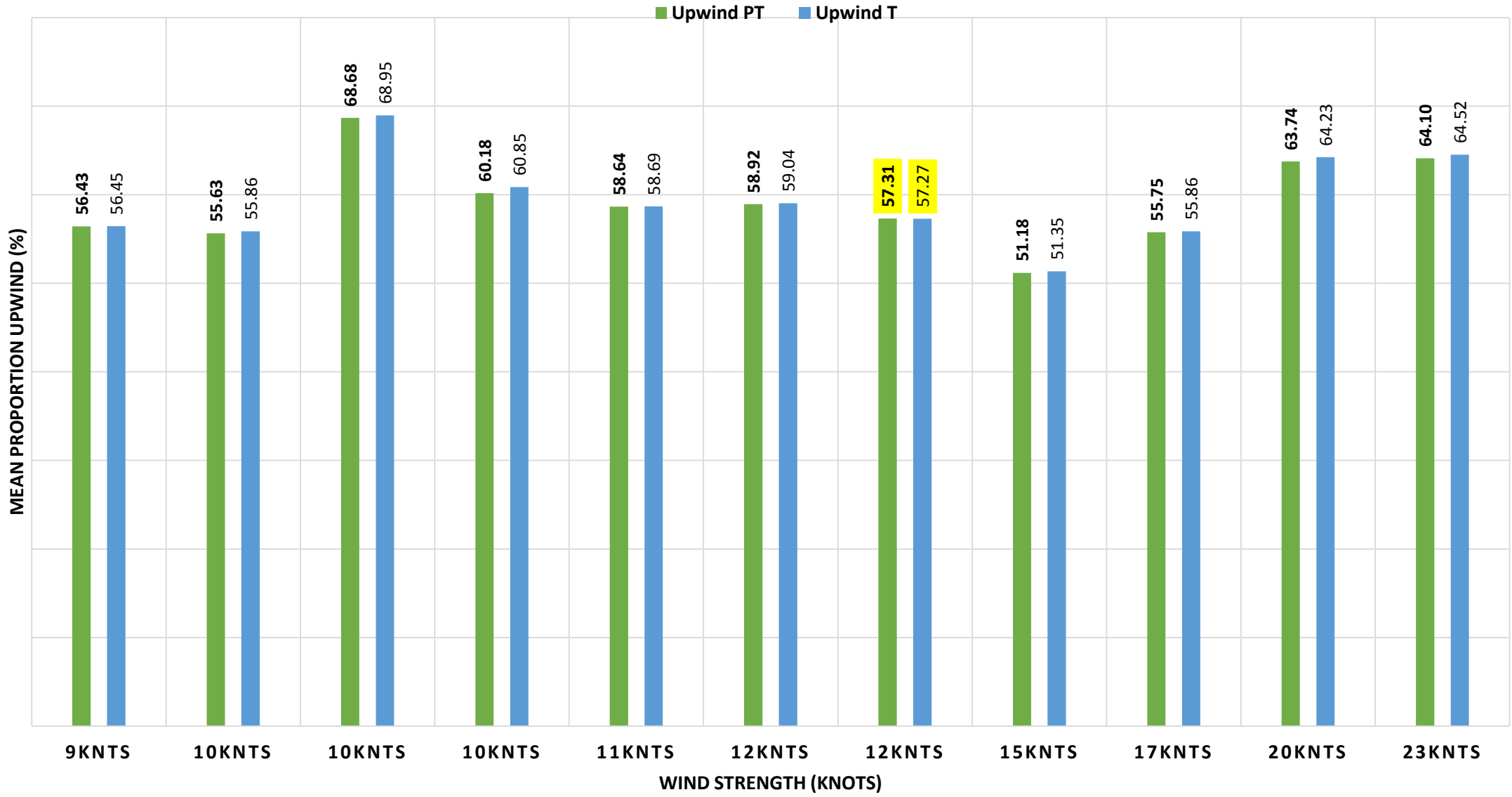
- Rio tracker timings: 11 races, 916 mark roundings
- Compared upwind to downwind times for each sailor
- Partial trunk control 4 sailors (226 mark roundings)
- Full trunk control 12 sailors  (690 mark roundings)

# Results

- **Hypothesis 1: Relationship IS established between proportion of time spent upwind and winning races**
- 82% races saw sailors with lowest upwind proportion finish in top 2



# MEAN PROPORTION UPWIND PARTIAL TRUNK (PT) VS FULL TRUNK (T)



# Discussion

- Results contradict findings of Wilson and Vardy (2005). Why? Further research required

- Sports-specific measure with regards to trunk control
- Database of 916 mark roundings for future comparison
- Scientific evidence to support athlete selection based on skill not disability level
- Compliance with the IPC Classification Code

# Conclusions

- NO evidence that trunk control is a factor in upwind speed

- “Minimum Disability” classification in the 2.4mR IS fair with regards to trunk control

- Rio podium shows the outcomes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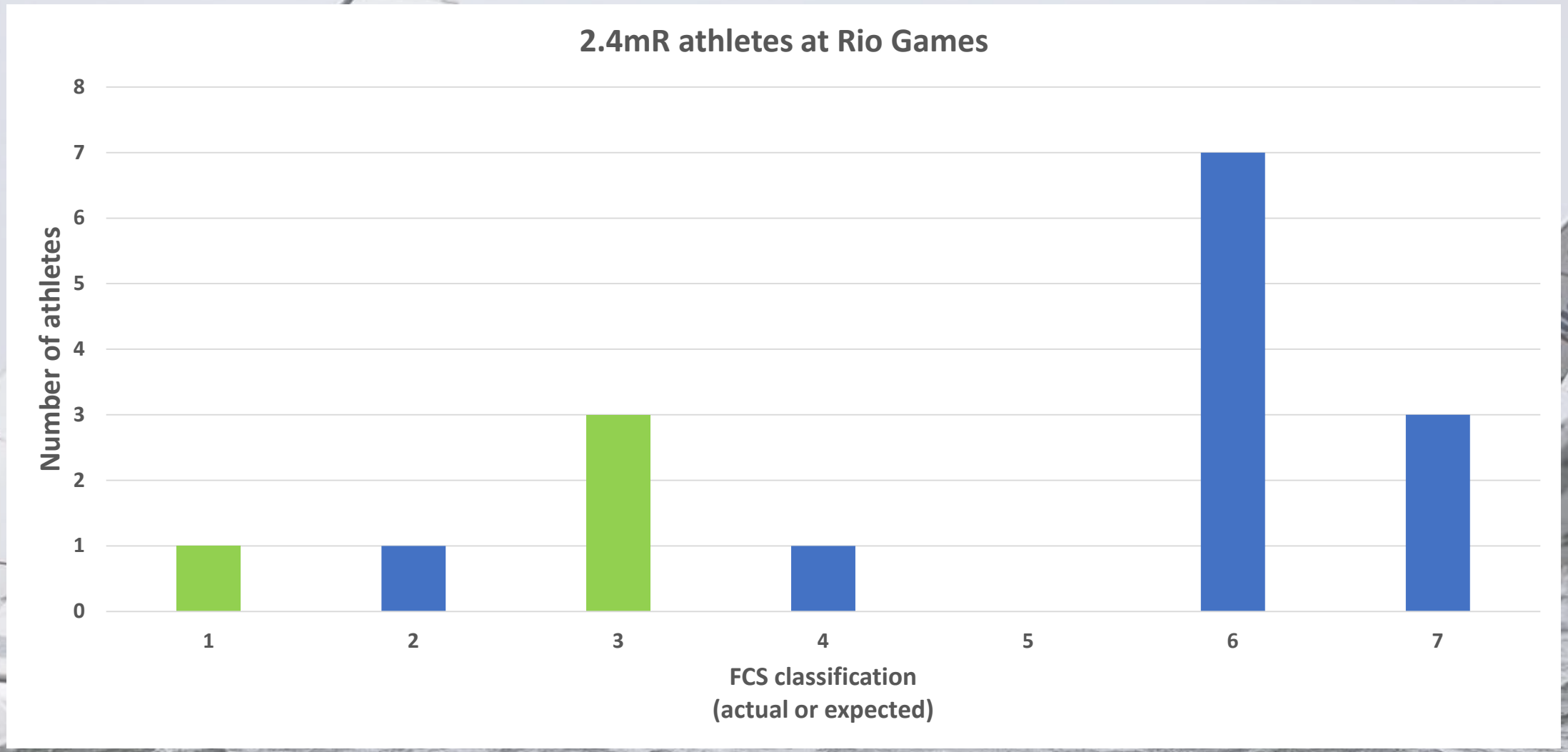
# Further Research

- How minimum is Minimum? Upper/lower limits of disability in 2.4mR
- Hand / upper limb function in 2.4mR athletes
- Key performance determinants in new boat classes

| Paralympic Games | Gold medallists | | Silver medallists | | Bronze medallists | |
|---|---|---|---|---|---|---|
| | Name | Disability | Name | Disability | Name | Disability |
| **Sydney 2000** | Heiko Kroeger (GER) | Below elbow amputee | Jens Als Andersen (SWE) | Incomplete paraplegia | Thomas Brown (USA) | Below knee amputee |
| **Athens 2004** | Damian Seguin (FRA) | Below elbow amputee | Thomas Brown (USA) | Below knee amputee | Thierry Schmitter (GER) | Complete T12 paraplegia |
| **Beijing 2008** | Paul Tingley (CAN) | Complete T11/12 paraplegia | Damian Seguin (FRA) | Below elbow amputee | John Ruf (USA) | Complete T4 paraplegia |
| **London 2012** | Helena Lucas (GBR) | Upper limb dysplasia | Heiko Kroeger (GER) | Below elbow amputee | Thierry Schmitter (GER) | Complete T12 paraplegia |
| **Rio 2016** | Damian Seguin (FRA) | Below elbow amputee | Matt Bugg (AUS) | Complete T12 paraplegia | Helena Lucas (GBR) | Upper limb dysplasia |
| | | | | | | |
| **World Championships** | **Gold medallists** | | **Silver medallists** | | **Bronze medallists** | |
| | **Name** | **Disability** | **Name** | **Disability** | **Name** | **Disability** |
| **2013 Poole** | Stellan Berlin (SWE) | Able bodied | Helena Lucas (GBR) | Upper limb dysplasia | Megan Pascoe (GBR) | Cerebral Palsy |
| **2014 Toronto** | Stellan Berlin (SWE) | Able bodied | Bjørnar Erikstad (NOR) | TAR syndrome | Helena Lucas (GBR) | Upper limb dysplasia |
| **2015 Rauma** | Stellan Berlin (SWE) | Able bodied | Bjørnar Erikstad (NOR) | TAR syndrome | Heiko Kröger (GER) | Below elbow amputee |
| **2016 Hobart** | Megan Pascoe (GBR) | Cerebral Palsy | Matt Bugg (AUS) | Complete T12 paraplegia | Paul Francis (NZL) | T6 Incomplete |

# Athlete classifications (actual/expected)



# Proportion of Upwind to Downwind sailing time (Chi square statistic) per race comparing Trunk(T) vs Partial Trunk (PT)

| Race Number | Wind /Knots | Trunk% upwind | Partial Trunk% upwind | P value |
|---|---|---|---|---|
| 1 | 11 | 58.69 | 58.66 | 0.93* |
| 2 | 10 | 55.92 | 55.52 | 0.21* |
| 3 | 20 | 64.26 | 63.80 | 0.39* |
| 4 | 23 | 64.53 | 64.18 | 0.51* |
| 5 | 17 | 55.80 | 55.93 | 0.85* |
| 6 | 10 | 68.98 | 68.66 | 0.48* |
| 7 | 12 | 58.94 | 59.14 | 0.93* |
| 8 | 8 | 51.32 | 51.27 | 0.93* |
| 9 | 10 | 60.84 | 60.34 | 0.27* |
| 10 | 12 | 57.27 | 57.30 | 0.96* |
| 11 | 9 | 56.46 | 56.40 | 0.27 * |

*No significant difference between T and PT results