Para Athletes: Spatial and Temporal Sprint Performance Measures in Athletes Competing in Classes T53 and T54

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BACKGROUND

Athletes with impaired muscle power, impaired passive range of motion or limb deficiency who compete in a racing chair are typically placed in classes T51 to T54. For athletes in the T53 and T54 classes, the main difference in impairment level is most often related to trunk control. More research is needed to determine the impact of trunk impairment on racing and to provide guidance for classifiers on the aspects to observe during technical and observational assessment (Yang et al., 2006; Howarth et al., 2010; Vanlandewijck et al., 2011). While the classification process used in para-sports is not performance-based, assessment of differing parameters in performance between classes can help guide classifier observations and direct future research.

PURPOSE

The purpose of this study was to determine if there are measurable differences in spatial-temporal parameters during 100-meter races for athletes competing in T53 and T54.
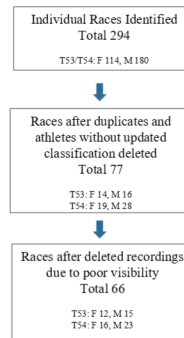
METHODS

This study was a retrospective study design involving pre-recorded video footage of 100 meter international para-athletic competitions for athletes classified as T53 and T54.

Inclusion/Exclusion Criteria:

Para athletes who were given an international classification of T53 and T54 and who competed in a 100M race for their assigned class between 2015-2019 that was recorded and made available on YouTube were included in the study.

Para athletes were excluded from the study if
- They were not visible on the recording during entire race
- They competed in a class other than the class assigned
- They were given a Sport Class Status of Review
- There was a recording of a 100M race with a faster time available for analysis (duplicates were deleted)

Individual Races Identified
Total 294
T53/T54: F 114, M 180

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Races after duplicates and athletes without updated classification deleted
Total 77
T53: F 14, M 16
T54: F 19, M 28

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Races after deleted recordings due to poor visibility
Total 66
T53: F 12, M 15
T54: F 16, M 23

Qualifying videos were selected via YouTube and uploaded to Coach's Eye for analysis.

Data Analysis:

➢ Each athlete's race performance was analyzed by two separate researchers to determine:
- Total race time (determined by reported race outcomes)
- Time for the first 13 meters
- Number of pushes (from start to 13m line, 13m line to finish, and total number of pushes)

➢ If there was greater than 10% disagreement on values between 2 researchers, a 3rd researcher independently analyzed the video and the median was used.

➢ From this data, additional performance parameters were calculated:
- Average push length (100m / number of pushes)
- Average push frequency (number of pushes / race time)

➢ Data were analyzed using a Mann-Whitney U Test (p<.05)

RESULTS

Males

Classification	# Total Pushes	Race Time (secs)	Push Frequency	Push Length	Time to 13 m (secs)*	# Pushes to 13 m*	# Pushes 13 m to Final*
T53	34.38 (3.05)	15.41 (.82)	2.23 (.15)	2.93 (.25)	3.79 (.20)	7.53 (.83)	26.40 (2.06)
T54	32.93 (2.36)	14.89 (.51)	2.21 (.13)	3.05 (.23)	3.66 (.17)	7.70 (.73)	24.83 (2.19)
p-value	0.223	0.064	0.751	0.228	0.034**	0.391	0.048**

**Significant at 0.05 level

* For males, there was significant differences in time to 13 m and #pushes from 13 m to final parameters between T53 and T54 classes.

Females

Classification	# Total Pushes	Race Time (secs)	Push Frequency	Push Length	Time to 13 m (secs)*	# Pushes to 13 m*	# Pushes 13 m to Final*
T53	38.93 (3.29)	17.84 (1.35)	2.18 (.12)	2.58 (.20)	4.25 (.25)	8.00 (.85)	29.92 (1.62)
T54	38.63 (2.31)	17.53 (1.22)	2.21 (.16)	2.60 (.16)	4.23 (.28)	8.31 (.79)	30.00 (2.00)
p-value	0.928	0.506	0.900	0.928	0.945	0.423	0.909

* For females, there were no significant differences between T53 and T54 classes in the spatial temporal parameters.

DISCUSSION

The significant difference in time at the start may suggest a difference in the ability to accelerate in T54 athletes, but the similar race times and total number of pushes overall for both classes warrants further investigation.

These results suggest that further research is needed to determine the appropriate criteria for differentiation of athletes in classes T53 and T54. Specifically, the role of abdominal and spinal extensor muscle activity in the performance of elite level pushing and how this relates to objective classification measures and spatial-temporal performance measures needs further exploration.

Limitations of study included limited number of subjects, poor video footage quality, limited parameters that could be measured retrospectively, and racing tracks without a 13 m line for consistent measurement. Future research should include a larger sample size and filming procedures to allow for full visibility to account for all parameters to be accurately assessed.

CONCLUSIONS

- Overall performance in both male and female groups was similar between T53 and T54 classes. suggesting that the current classification system is not leading to noticeable changes in performance during competition of the 100m sprint for T53 and T54 athletes.

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