The influence of trunkfunctionality on the classification system in PCH

Dominique van Zaanen
Oscar Bliek
Docent: R.M.A van der Slikke
Research initiator: Kees van Breukelen, Head of Classification Powerchair Hockey
Human & Technic | Movementtechnologie, University of applied science The Hague.
13/11/2017.

Summary

PCH is a Hockey variant played in electric wheelchairs. In order to have a fair competition, a classification system is used based on the severity of the impairments of the players. The less the motoric capacity, the lower the final PCH class. When players do have antigravity posture of the Trunk or limited Trunk mobility this is scored (0.5), but this score is actually not taken into account in the outcome of the class.

Purpose of the research is to investigate the influence of this trunk antigravity posture and mobility on the wheelchairperformance. The following research question is therefor formulated: what is the influence of different trunk functionalities on the rotational speed (as important parameter of wheelchairperformance) and trunk sideway movement during that wheelchairrotation in PCH. The different trunk functionalities are described in 4 athlete groups: (1) players with no trunk function at all, (2) players with trunk antigravity capability, (3) players with limited trunk mobility and (4) players with full trunk mobility. Expectation was that players with antigravity posture and players with (limited) mobility will show a higher rotational speed/wheelchairperformance in comparison with players without any trunk functionality.

To get an answer on this research question the wheelchairperformance of 25 PCH athletes was investigated.

The group of athletes without trunk function consisted of 7 players, the group of athletes with trunk antigravity capability consisted of 10 players, the group of athletes with limited mobility consisted of 8 players. Players with full trunk mobility were not selected for the research.
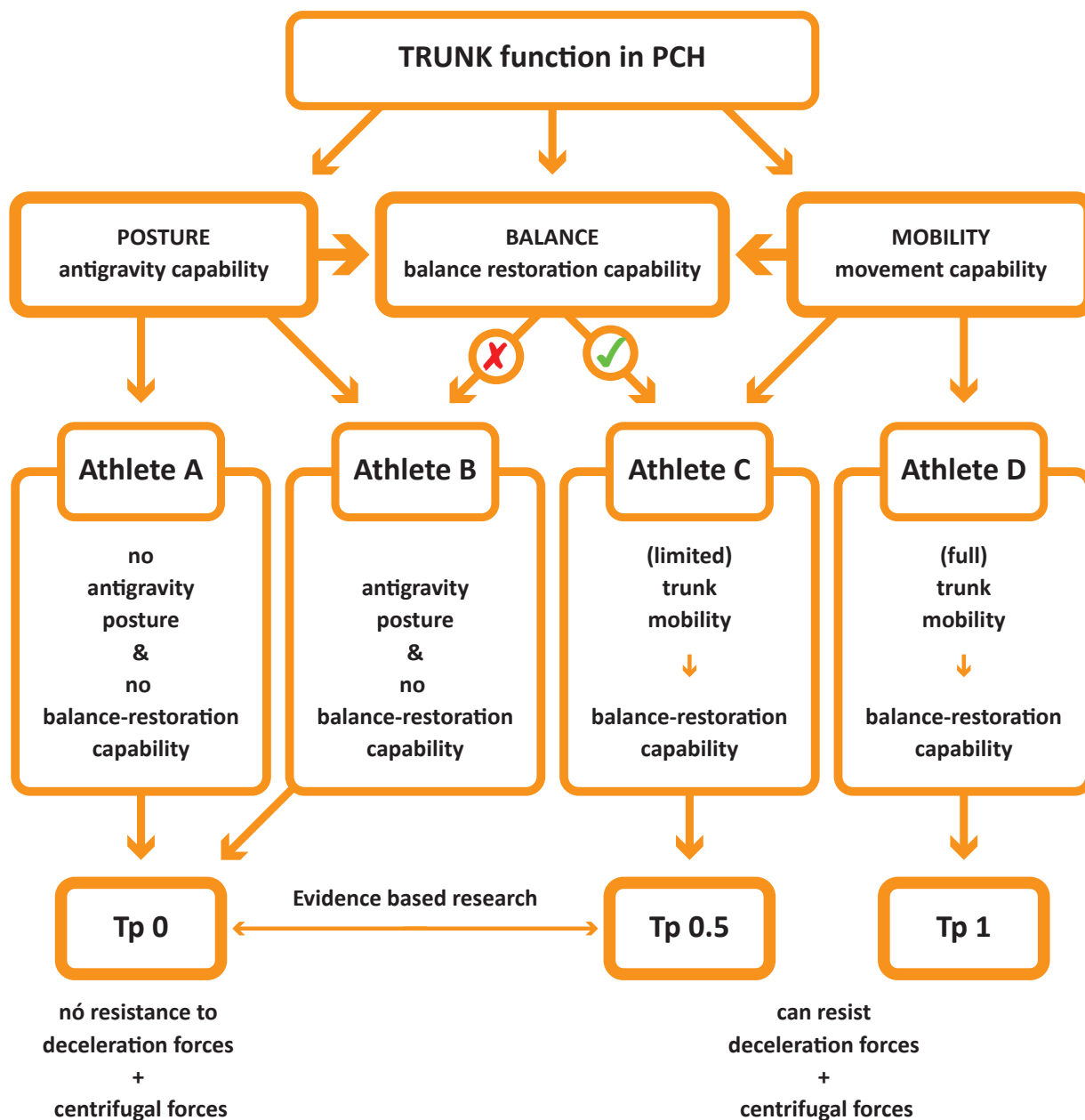
In the research, consisting of three wheelchair tests, the rotational speed and sideway movement of the trunk was investigated in (a) rotation with a variable radius, (b) in rotation with handling the stick with a ball and (c) in rotation in a slalom parcours. The rotational speed and the (sideways) movement of the trunk was measured with four Shimmer sensors: three on the chair and one on the trunk of the athlete.

The data from the research do show a significant difference between athletes with trunk antigravity capability and athletes with limited trunk mobility, $p > 0.05$. Players with trunk mobility do reach a higher rotational speed and can resist the rotational forces on the trunk significantly better.

Based on the results of this research recommendations were made to change the current classification practice: (1) players with (only) trunk antigravity capability should nót been given the same trunk profile score as players with limited trunk mobility (currently this is however the classification practice: they do get both the 0.5 trunk profile score). (2) Players with limited trunk mobility (trunk profile score 0.5) should not be placed in the same class as players without trunk mobility (trunk profile score 0). In the current practice the 0.5 trunk score is ignored/does not lead to a different class for the player.

Future research should investigate the interesting question hów precicely the player with limited trunk mobility create that advantage over the player without trunk function or player with only antigravity capability.

Trunk function in PCH
Relation between 4 Athlete-types and 3 Trunk profiles

TRUNK function in PCH

POSTURE	BALANCE	MOBILITY
antigravity capability	balance restoration capability	movement capability

❌ ✅

Athlete A

no
antigravity
posture
&
no
balance-restoration
capability

Athlete B

antigravity
posture
&
no
balance-restoration
capability

Athlete C

(limited)
trunk
mobility
↓
balance-restoration
capability

Athlete D

(full)
trunk
mobility
↓
balance-restoration
capability

Tp 0 ←— Evidence based research —→ **Tp 0.5**   **Tp 1**

nó resistance to
deceleration forces
+
centrifugal forces

can resist
deceleration forces
+
centrifugal forces

Anti-gravity posture alóne (Athlete B), cannot counter the deceleration + centrifugal forces of the wheelchair. To counter these forces, there must be Balance-restoration capability (Athlete C + D).
What is needed for that Balance-restoration capability? The answer to that question is: Movement capability: limited (Athlete C) or full (Athlete D) movement capability.

Kees van Breukelen MSc
January 2018