What difference does trunk postural control make to function?

Clinical tests evaluate the trunk as a single unit

Trunk control is typically assessed by the ability to get in and out of sit and ability to hold sitting position with or without propping on arms.

Functional measures of trunk control do not provide specific information to guide treatment.
Is the trunk a single functional segment?

The one segment trunk - oversimplified?

Does the anatomical level of trunk control affect gross motor function and does it matter?
Clinical measurement of segmental trunk control

Segmental Assessment of Trunk Control (SATCo)

Level of support
- Shoulders
- Axillae
- Inferior Scapula
- Lower Ribs
- Below Ribs
- Pelvis
- No support

Level of trunk control
- Head Control
- Upper Thoracic Control
- Mid Thoracic Control
- Lower Thoracic Control
- Upper Lumbar Control
- Lower Lumbar Control
- Full Spinal Control

At each level, 3 aspects of control are measured

- Static (steady state)
  Align and maintain 5 seconds
- Active
  Hold alignment while turning head or reaching
- Reactive
  Maintain or quickly return to upright when perturbed

The Central role of trunk control in gross motor function and activity in children with cerebral palsy – a retrospective cross-sectional study

- Retrospective cross-sectional study
- 92 consecutive referrals of children (October 2004 – April 2014)
- mean age 5 (range 1 to 14) years
- 53 female
- 3,13, 23, 30, 23 in GMFCS level I-V respectively
- 77, 12 and 3 with spastic, dyskinetic and ataxic CP
Results

- Linear regression model showed SATCo level and age to be significant predictors for GMFM
- Neuromotor abnormality was not a significant predictor

Related research using the segmental approach to postural analysis

This segmental approach of trunk control and its significance in relation to functional ability has been addressed in three previously published studies.

Evaluates postural control at a simplified task level by measuring head stability during quiet sitting while systematically manipulating the level of trunk support and vision in 15 children with CP (6-16 years), 26 typically developing children (4-14 years), and 11 adults.

A similar analytical approach using kinematics, remote eye tracking and a trunk support device to examine the functional coupling of the eye, head and hand and the extent to which it was constrained by trunk postural control in 10 children with CP (6-16 years).

Investigates the effect of different levels of postural support on the processes of initiation and execution of eye-hand movements in 30 typically developing children between 4 and 15 years of age.

Conclusions from research using the segmental approach to postural analysis

- Postural control of the trunk is a vital component in motor function
- Postural control can be different in different regions of the trunk – worth considering with orthotics and aids
- Postural control develops from the head downwards
- The anatomic level of postural control in the trunk is a significant predictor of gross motor function in CP
- More focus is required on measurement and treatment of trunk postural control pathology in (re)habilitation
Current research

The current research using the segmental approach to quantifying postural control is located in 4 countries and 6 research centres:

1. Manchester Metropolitan University, Manchester, UK
2. The Movement Centre, Oswestry, UK
3. University of Oregon, Eugene, USA
4. University of Hartford, Connecticut, USA
5. Hvidovre University Hospital, Copenhagen, Denmark
6. The Hong Kong Polytechnic University, Hong Kong

Research in progress can be found in a newsletter which is published on the Movement Centre homepage [www.the-movement-centre.co.uk](http://www.the-movement-centre.co.uk) or by subscribing to the newsletter with a request to derek.john.curtis@regionh.dk.

Research in progress

Currently 17 studies in progress

**Method studies**
1. ‘Repeatability of the SATCo test in children with Cerebral Palsy.’ (HH)
2. ‘SALLCo test - Development of test score sheet and instructions.’ (HH)
3. ‘Danish translation of the SATCo test.’ (HH)

**Healthy populations**
1. ‘Normalization of the Segmental Assessment of Trunk Control (SATCo) in Typical Infants.’ (UC)
2. ‘Parental sensitivity and responsiveness to their infant’s segmental level of trunk control.’ (UC)
3. Healthy young adults and trunk support during a reach-to-grasp task. (UC)
4. Longitudinal study during development of motor control of arm, trunk and head in infants. (UC)

**Cerebral palsy**
1. ‘Sensory Contributions to Typical and Atypical Development of Trunk Control.’ (UC)
2. ‘Non-linear analysis of the segmental contributions to trunk control in children with moderate to severe cerebral palsy.’ (UC)
3. ‘Trunk support and motor control of arm, trunk and head in children diagnosed with Cerebral Palsy.’ (UC)
4. ‘Eye tracking system and trunk support.’ (UC)
5. ‘Normative values for posture and sway for typically developing children in unsupported sitting.’ (HH)
6. ‘The effect of trunk control on gait in children with Cerebral Palsy.’ (HH)
7. ‘The Central role of trunk control in gross motor function and activity in children with severe cerebral palsy.’ (HH)

**Scoliosis**
1. ‘Segmental sensorimotor control of trunk posture in adolescent idiopathic scoliosis.’ (UC)
Effect of Targeted Training
1. ‘Effect of Targeted Training on gross motor function in children with CP – an RCT.’ (HH)
2. ‘Effectiveness of segmental training on trunk control in children with moderate-to-severe motor impairment: a case series.’ (UC)

Thank you
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