

## Improving effect of enhanced axial rehabilitation on trunk control deficit in children with cerebral palsy

Jonathan Pierret, Sébastien Caudron, Jean Paysant, Christian Beyaert

► **To cite this version:**

Jonathan Pierret, Sébastien Caudron, Jean Paysant, Christian Beyaert. Improving effect of enhanced axial rehabilitation on trunk control deficit in children with cerebral palsy. European Society for Movement Analysis in Adults and Children, Sep 2018, Prague, Czech Republic. hal-01951031

**HAL Id: hal-01951031**

**<https://hal.univ-lorraine.fr/hal-01951031>**

Submitted on 25 Jun 2019

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Improving effect of enhanced axial rehabilitation on trunk control deficit in children with cerebral palsy

Jonathan Pierret<sup>1</sup>, Sébastien Caudron<sup>1</sup>, Jean Paysant<sup>1,2</sup>, Christian Beyaert<sup>1,2</sup>

<sup>1</sup> EA3450 Développement Adaptation et Handicap, Université de Lorraine, Nancy

<sup>2</sup> Laboratoire d'analyse du mouvement, Centre de Réadaptation Pierquin, Institut Régional de Médecine Physique et de Réadaptation (IRR), Nancy.

## Introduction

Recently, several studies have shown that children with cerebral palsy (CP) have trunk control disorders both while sitting [1] and walking [2]. If most therapeutics focus on lower limb and gait disorders, trunk control deficit can roughly affect daily life. Lately, new tools to evaluate trunk control have appeared.

The Trunk Control Measurement scale [3] is a clinical scale developed to assess trunk control in children with CP in several ways such as static sitting balance, selective movement control and equilibrium reaction.

Another tool is the unstable sitting device (Fig 1) that allows static and dynamic posturography of the trunk. Moreover, it can be calibrated in order to homogenize the difficulty between the subjects according to their anthropometric characteristics, during unstable posturography [4].

The aim of our study was to test the effects of enhanced axial rehabilitation (EAR) on trunk control during seated posture in CP children.

## Method

| Groups | CP Childrens | TD Childrens  |
|--------|--------------|---------------|
| N      | 13           | 13            |
| Age    | 8 (+/-2,5)   | 8,4 (+/- 1,8) |

CP and TD childrens were first compared on the TCMS and unstable sitting posturography.

Then, the performances of CP childrens were compared before and after an enhanced axial rehabilitation (EAR) of 3 months.

The EAR led by a physiotherapist was based on exercises in different postures performed by the child each day that strongly involve the trunk to cope with balance. Exercises included unusual movements such as lumbar delordosis and scapular and pelvis belt dissociation.

Variables

Trunk Control Measurement Scale

- Score on 68

Unstable Sitting Posturography

- COP Sway Area
- RMS Instant Speed COP

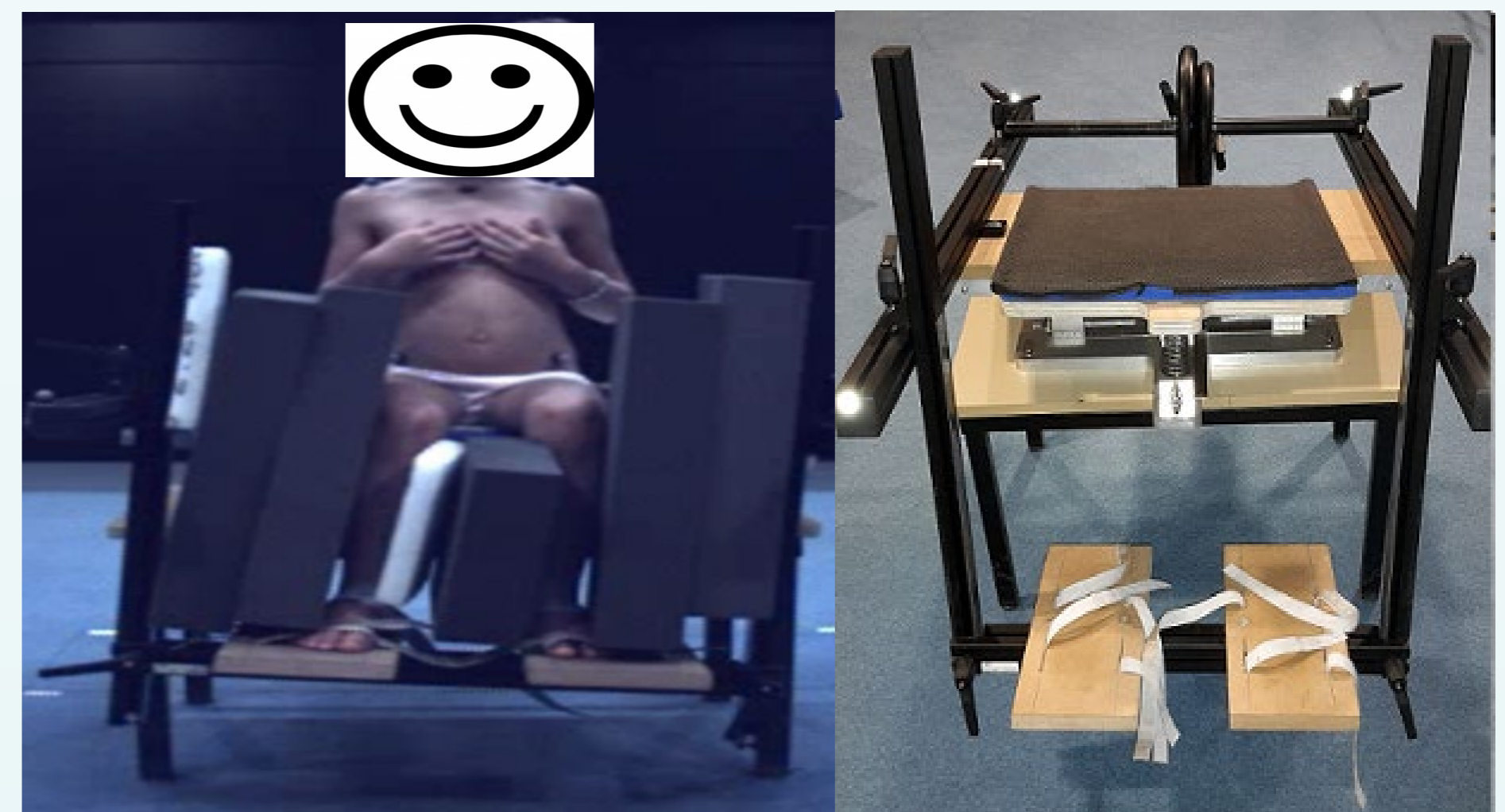


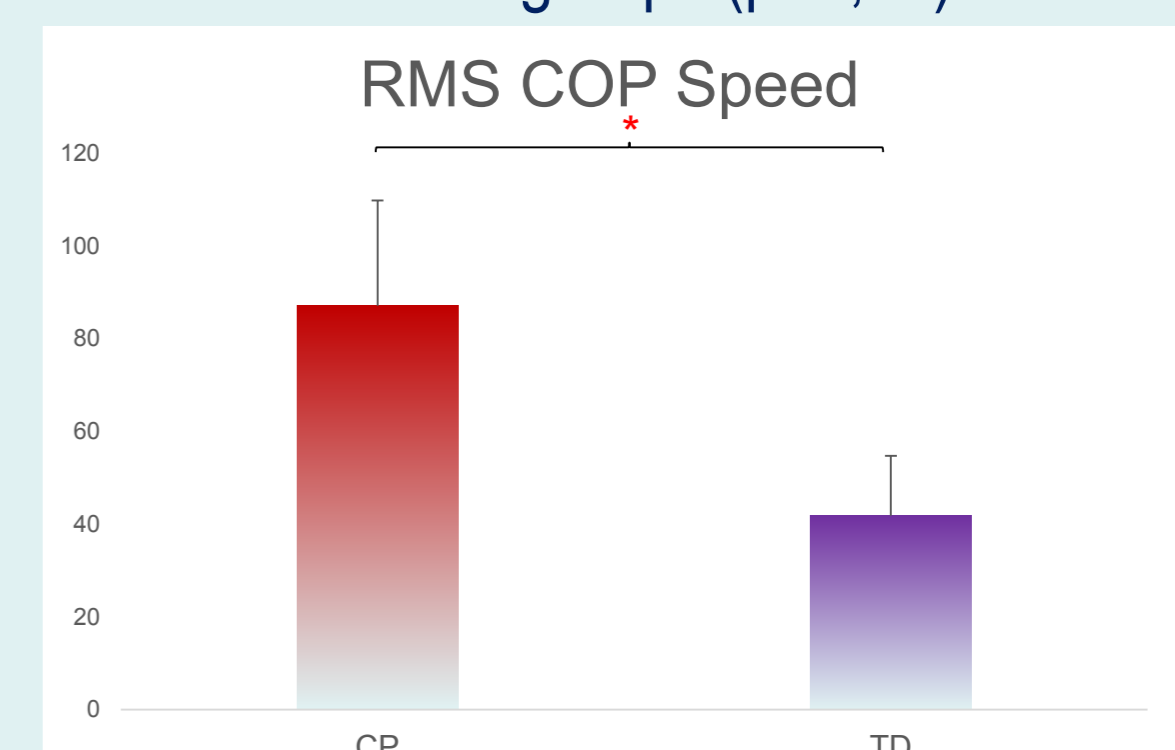
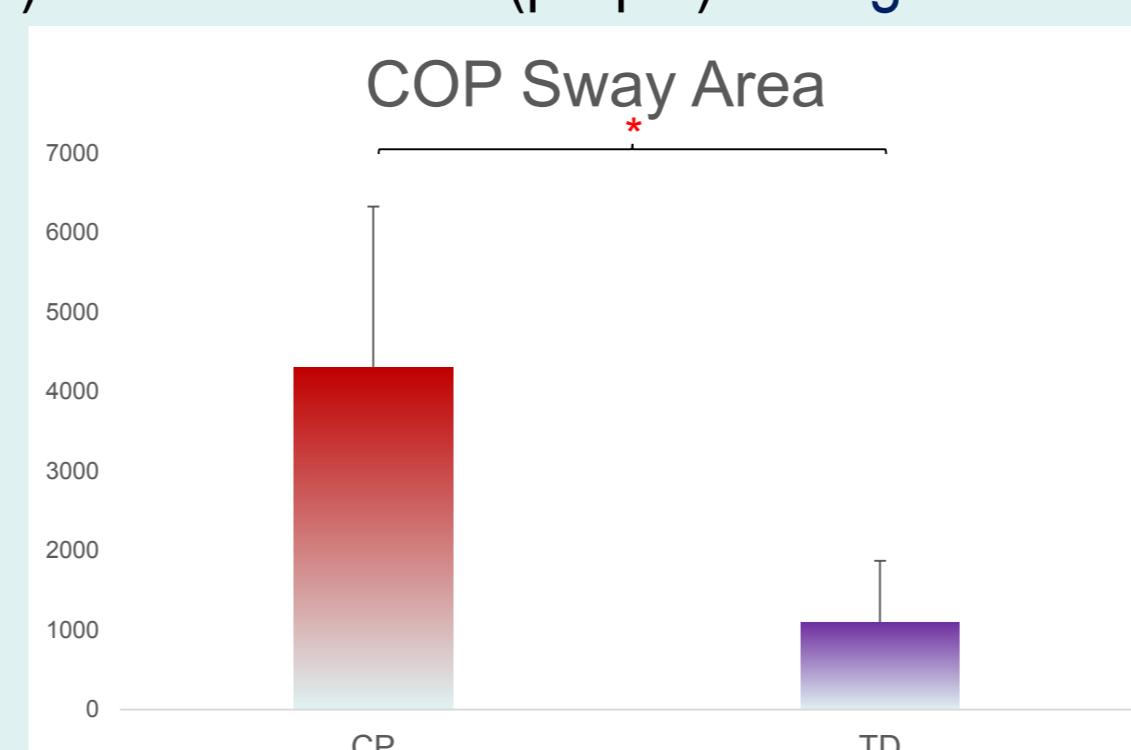
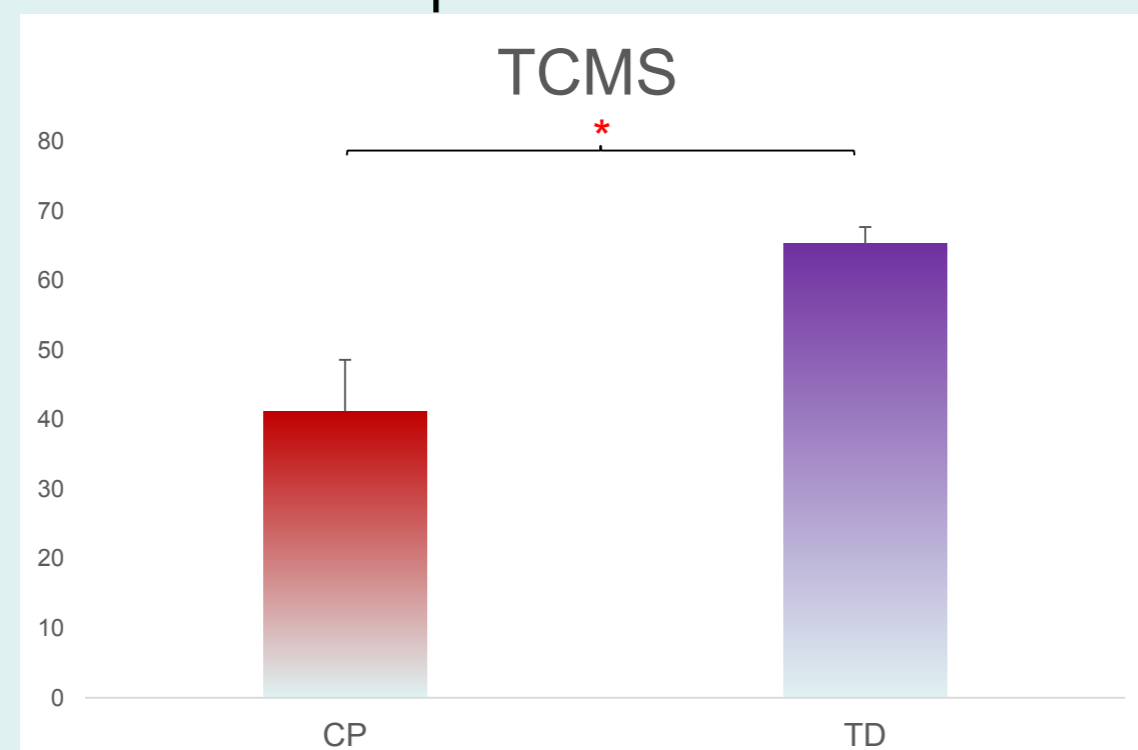
Fig 1 : unstable sitting device on a 3D forceplate for sitting posturography



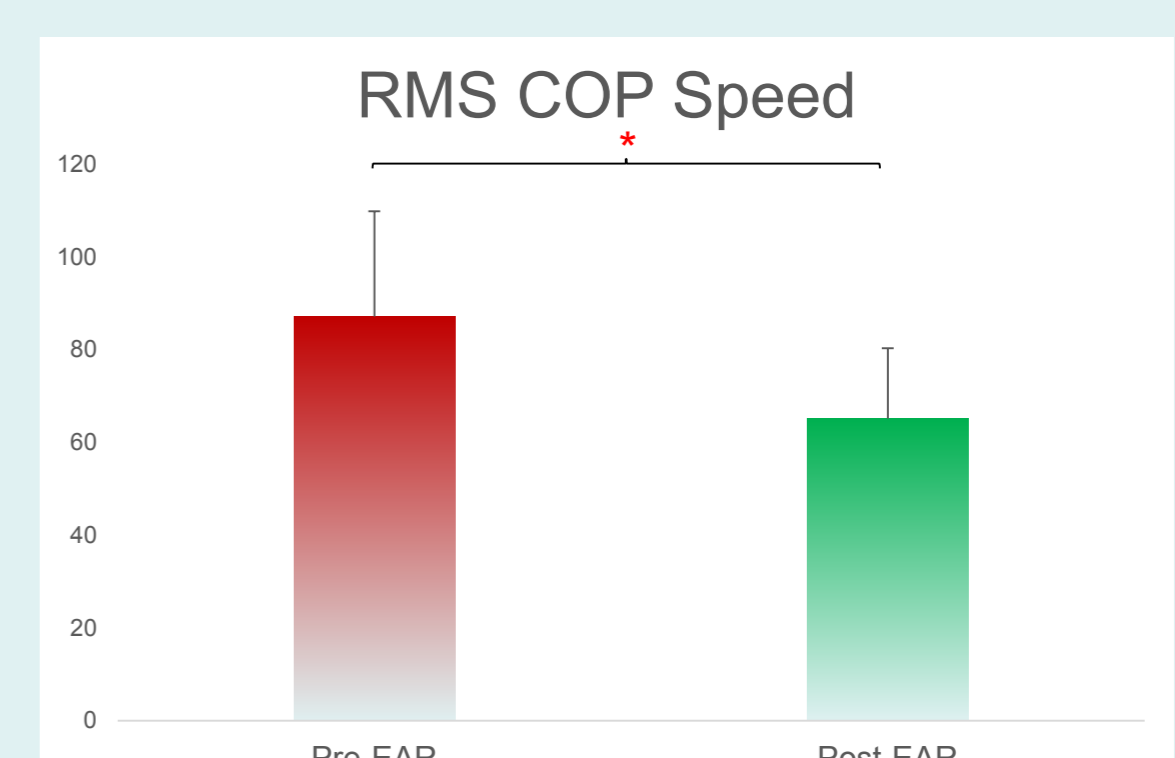
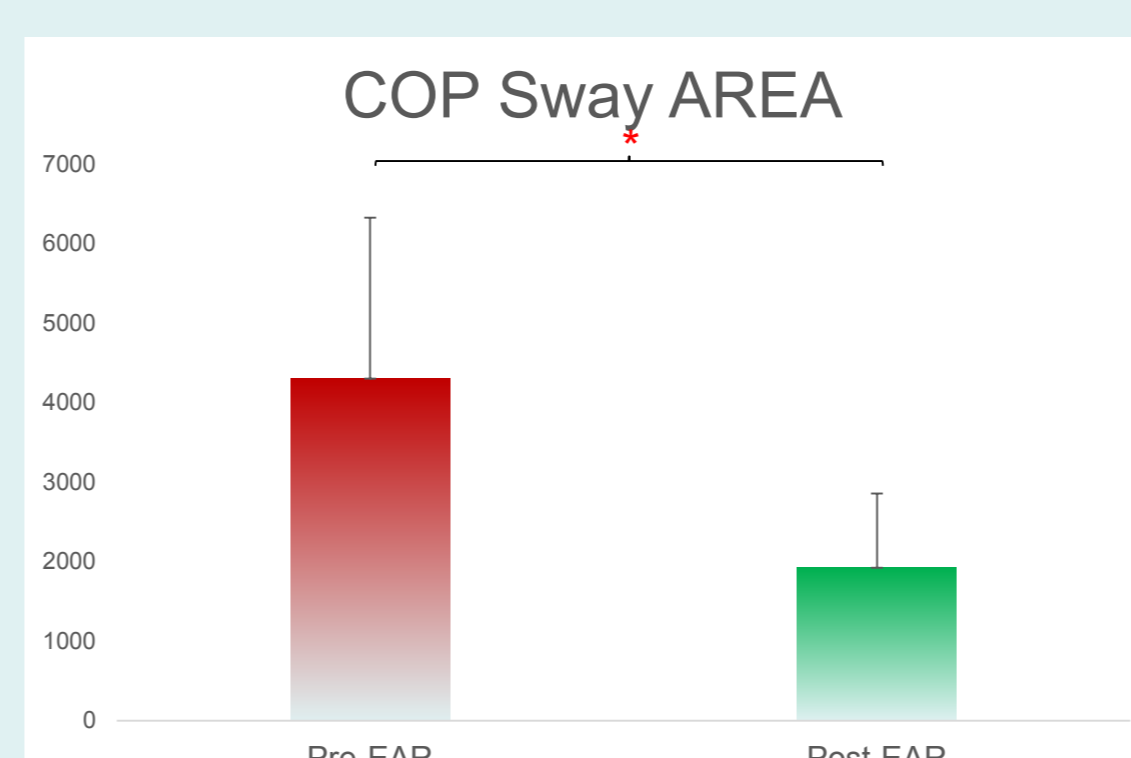
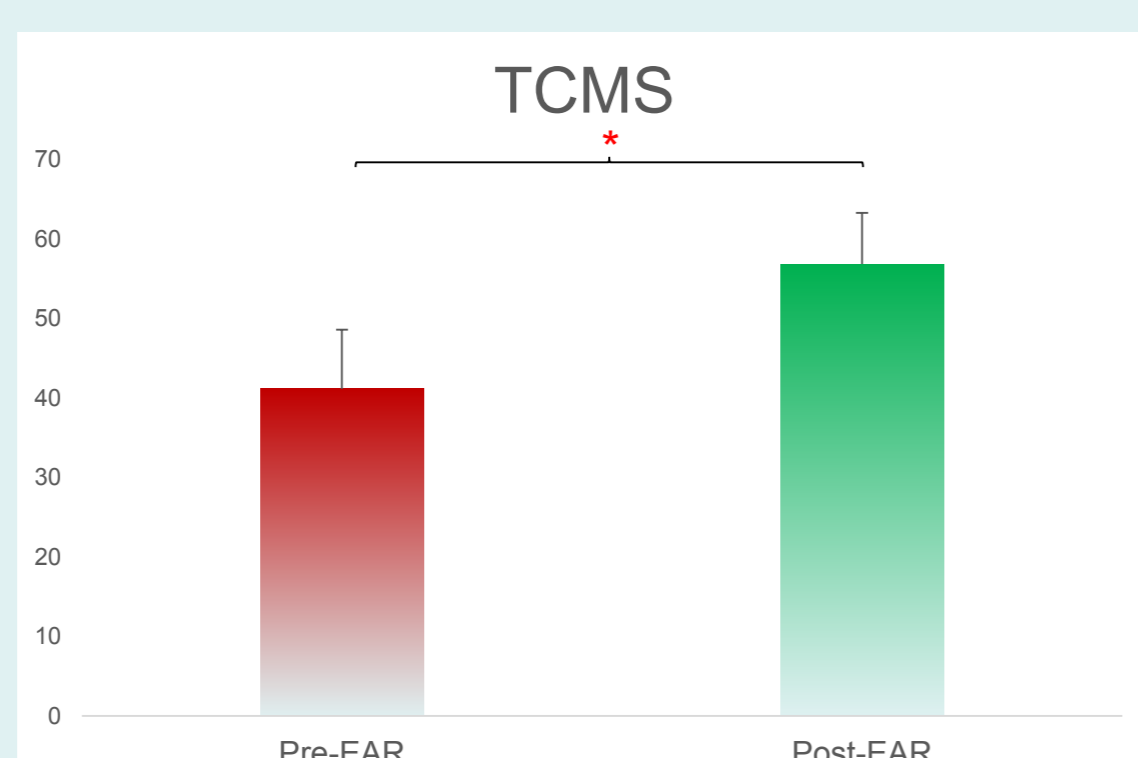
Fig 2 : exemples of enhanced axial rehabilitation exercises

## Results

Comparisons between CP children (red) and TD children (purple). \* : significant difference between the two groups ( $p < 0,05$ )



Comparisons for CP children before (red) and after (green) EAR. \* : significant difference between the two groups ( $p < 0,05$ )



## Conclusion

Enhanced axial rehabilitation during 3 months improved trunk control in seated posture for children with CP. These improvements were both on gross and selective trunk control as assessed by the TCMS. COP Sway Area reduction attests a more accurate postural control while reduced RMS COP Instant Speed shows a less energetic expense for postural control of the upper body.

The next step is to show that the improvement of axial segment postural control has a beneficial effect on dynamic balance and lower limb kinetics during gait.

## References:

- [1] : Liao, S. F., Yang, T. F., Hsu, T. C., Chan, R. C., & Wei, T. S. (2003). Differences in seated postural control in children with spastic cerebral palsy and children who are typically developing. *American journal of physical medicine & rehabilitation*, 82(8), 622-626.
- [2] : Attias, M., Bonnefoy-Mazure, A., Lempereur, M., Lascombes, P., De Coulon, G., & Armand, S. (2015). Trunk movements during gait in cerebral palsy. *Clinical Biomechanics*, 30(1), 28-32.
- [3] : Heyrman, L., Molenaers, G., Desloovere, K., Verheyden, G., De Cat, J., Monbaliu, E., & Feys, H. (2011). A clinical tool to measure trunk control in children with cerebral palsy: the Trunk Control Measurement Scale. *Research in developmental disabilities*, 32(6), 2624-2635.
- [4] : Larivière, C., Mecheri, H., Shahvarpour, A., Gagnon, D., & Shirazi-Adl, A. (2013). Criterion validity and between-day reliability of an inertial-sensor-based trunk postural stability test during unstable sitting. *Journal of electromyography and kinesiology*, 23(4), 899-907.