

# How does strapping affect trunk range of motion in people with and without neuromusculoskeletal impairment?

Johanna Rosén<sup>1</sup>, Marie Ohlsson<sup>1,2</sup>, Yves Vanlandewijck<sup>1,3</sup>, Luc Janssens<sup>1</sup>, Helena Westerlund<sup>1</sup>, William Jenkins<sup>3</sup>, Desponia Toilo<sup>3</sup> & Anna Bjerkefors<sup>1,4</sup>

<sup>1</sup> Department of Physiology, Nutrition and Biomechanics, The Swedish School of Sport and Health Sciences, Stockholm, Sweden

<sup>2</sup> Swedish Winter Sports Research Centre, Mid Sweden University, Östersund, Sweden

<sup>3</sup> Department of Rehabilitation Sciences, Katholieke Universiteit (KU) Leuven, Leuven, Belgium

<sup>4</sup> Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden

Email: [johanna.rosen@gih.se](mailto:johanna.rosen@gih.se)

## Summary

Para athletes may be able to perform trunk tasks better if they are supported by strapping and/or a backrest. This study examined if there is a difference in trunk range of motion (ROM) when able-bodied participants (AB) and participants with neuromusculoskeletal impairment (NMSI) performed seated trunk tasks during three different strapping conditions. The fully strapped condition demonstrated significantly smaller ROM values in trunk flexion and rotation compared to the other strapping conditions. Additionally, the no strapping condition demonstrated significantly smaller ROM values in trunk extension and lateral flexion compared to the other strapping conditions. It is therefore important to consider the effect of strapping during classification of para athletes.

## Introduction

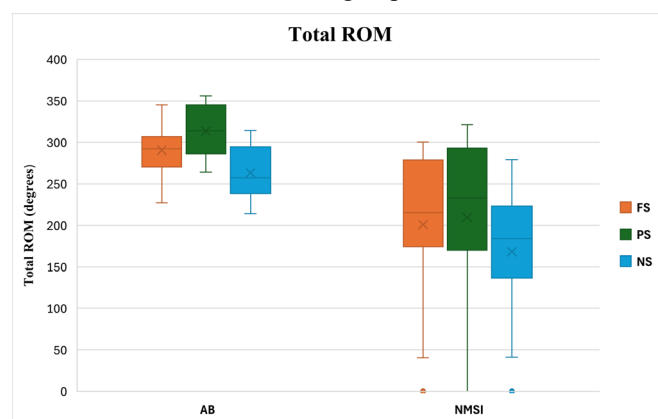
Classification is a vital part of para sports. Classification in para sports refers to dividing athletes into different classes depending on how their impairment impacts performance [1]. Impairments affecting the trunk are common in para sports and therefore, sports need to have a valid and reliable test of trunk function [2]. Commonly, tests of trunk function are unconcealed, i.e. they do not consider sport specific adaptations such as strapping and special seats, to optimise function. Para athletes may be able to improve trunk function through strapping and/or the use of a backrest. The purpose of this study was therefore to investigate the effect of three different strapping conditions on maximal dynamic trunk ROM in three directions in people with and without NMSI.

## Methods

Twenty manual wheelchair users with NMSI and 20 AB participants were recruited. Trunk anthropometrics were measured using a dual energy X-ray Absorptiometry (DXA). Trunk ROM during three different trunk tasks, flexion/extension, lateral flexion and rotation was measured using a 12-camera optoelectronic analysis system (Qualisys AB). Each task was completed in a standardised seated position (hips, knees and ankles in 90°) in three different strapping conditions 1) full strapping (FS) condition using a low backrest, a footrest and strapping around pelvis, thighs and feet, 2) partial strapping (PS) condition using a footrest and strapping over thighs and feet and 3) no strapping (NS) condition without any backrest, footrest or strapping.

## Results and Discussion

The NMSI group exhibited significantly less ROM in all directions compared to the AB group ( $p < 0.05$ ). The AB group demonstrated the highest ROM values in the PS condition for all trunk tasks. The FS condition demonstrated significantly smaller ROM values in trunk flexion and rotation compared to PS and NS for both AB and NMSI groups. In addition, the NS condition demonstrated significantly smaller trunk extension and lateral flexion values compared to FS and PS for both the AB and NMSI groups.



**Figure 1:** The sum of range of motion (ROM) values from flexion, extension, lateral flexion and rotation for able-bodied (AB) participants and participants with neuromusculoskeletal impairment (NMSI) for each strapping condition; full strap (FS), partial strap (PS) and no strap (NS).

## Conclusions

Individualised and optimised strapping has significant effects on dynamic trunk ROM, which may increase sport-specific performance in people with NMSI. It is therefore important to consider the effect of strapping during classification of para athletes.

## Acknowledgments

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## References

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