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Authors: B. Horsak, B. Pobatschnig, C. Schwab, A. Baca, A. Kranzl, H. Kainz



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Reliability of joint kinematic calculations based on direct kinematic and inverse kinematic models in obese children

B. Horsak^{a*}, B. Pobatschnig^b, C. Schwab^a, A. Baca^c, A. Kranzl^b, H. Kainz^d

^a St. Pölten University of Applied Sciences, Department of Physiotherapy, St. Pölten, Austria

^b Orthopaedic Hospital Vienna-Speising, Laboratory of Gait and Movement Analysis, Vienna, Austria

^c University of Vienna, Department of Biomechanics, Kinesiology and Applied Computer Science, Vienna, Austria

^d Human Movement Biomechanics Research Group, Department of Kinesiology, KU Leuven, Leuven, Belgium

***Corresponding author:** Dr. Brian Horsak, Department of Physiotherapy, Institute for Health Sciences, St. Pölten University of Applied Sciences, A-3100 St. Pölten, Matthias Corvinus-Straße 15
brian.horsak@fhstp.ac.at

Research Highlights:

- Reliability values indicate clinical acceptable error-margins for both approaches
- Results warrant the careful use of inverse kinematics in obese populations
- Differences are to be expected between outputs from inverse and direct kinematic models

Abstract:

Background: In recent years, the reliability of inverse (IK) and direct kinematic (DK) models in gait analysis have been assessed intensively, but mainly for lean populations. However, obesity is a growing issue. So far, the sparse results available for the reliability of clinical gait analysis in obese populations are limited to direct kinematic models. Reliability error-margins for inverse kinematic models in obese populations have not been reported yet.

Research questions: Is there a difference in the reliability of IK models compared with a DK model in obese children? Are there any differences in the joint kinematic output between IK and DK models?

Methods: A test-retest study was conducted using three-dimensional gait analysis data from two obese female and eight obese male participants from an earlier study. Data were analyzed using a DK model and two OpenSim-based IK models. Test-retest reliability was compared by calculating the Standard Error of Measurement (SEM) along with similar absolute reliability

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