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

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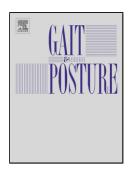
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### ACCEPTED MANUSCRIPT

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

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#### **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 analy—sis 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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