

# Effect of Pelvis Bone Geometry Personalization on Hip Kinematics and Moment Arms during Walking



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## Objectives

Comparison of prediction in kinematics and muscle geometry between an image-based personalized model and a generic scaled model

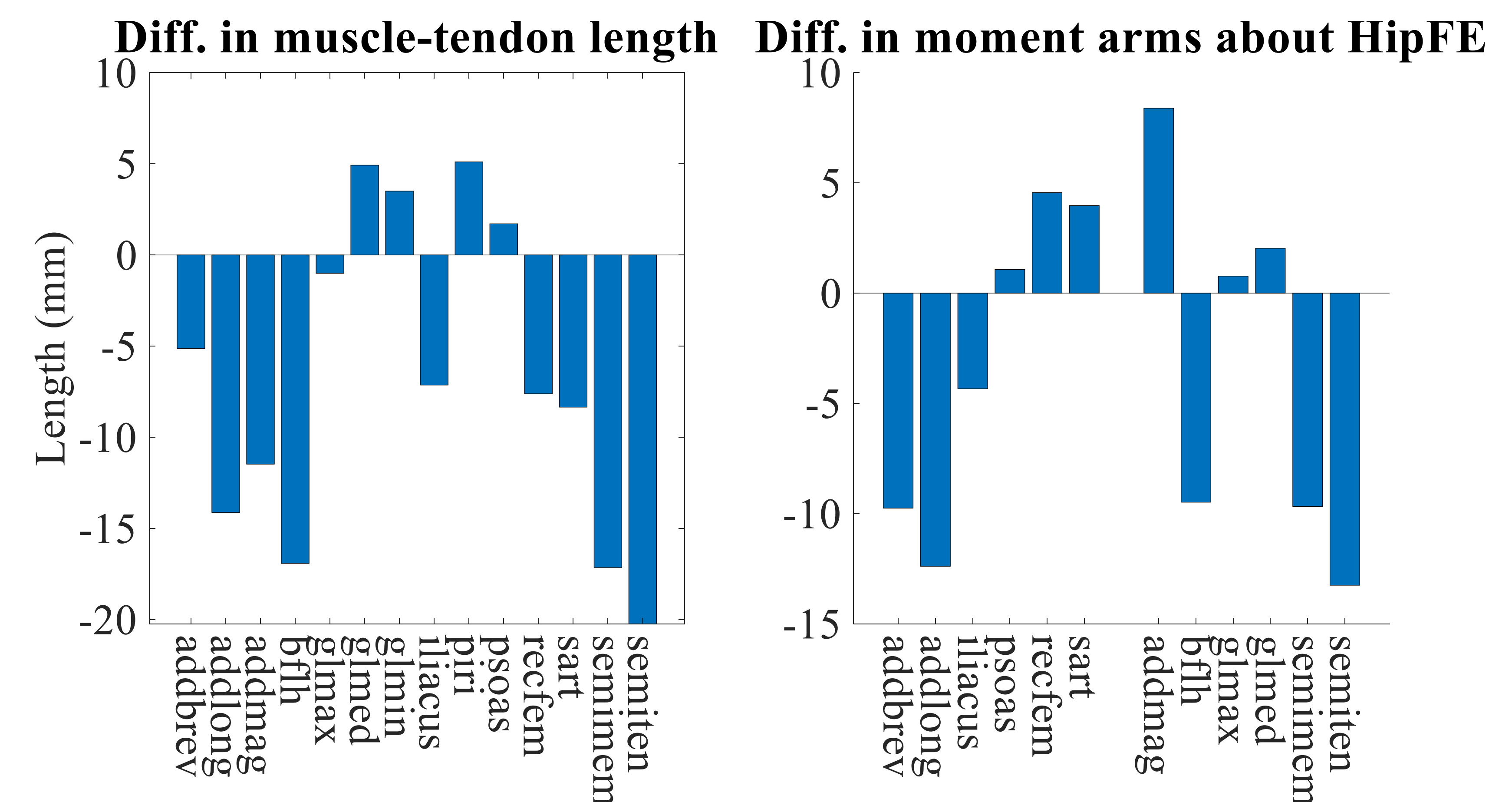
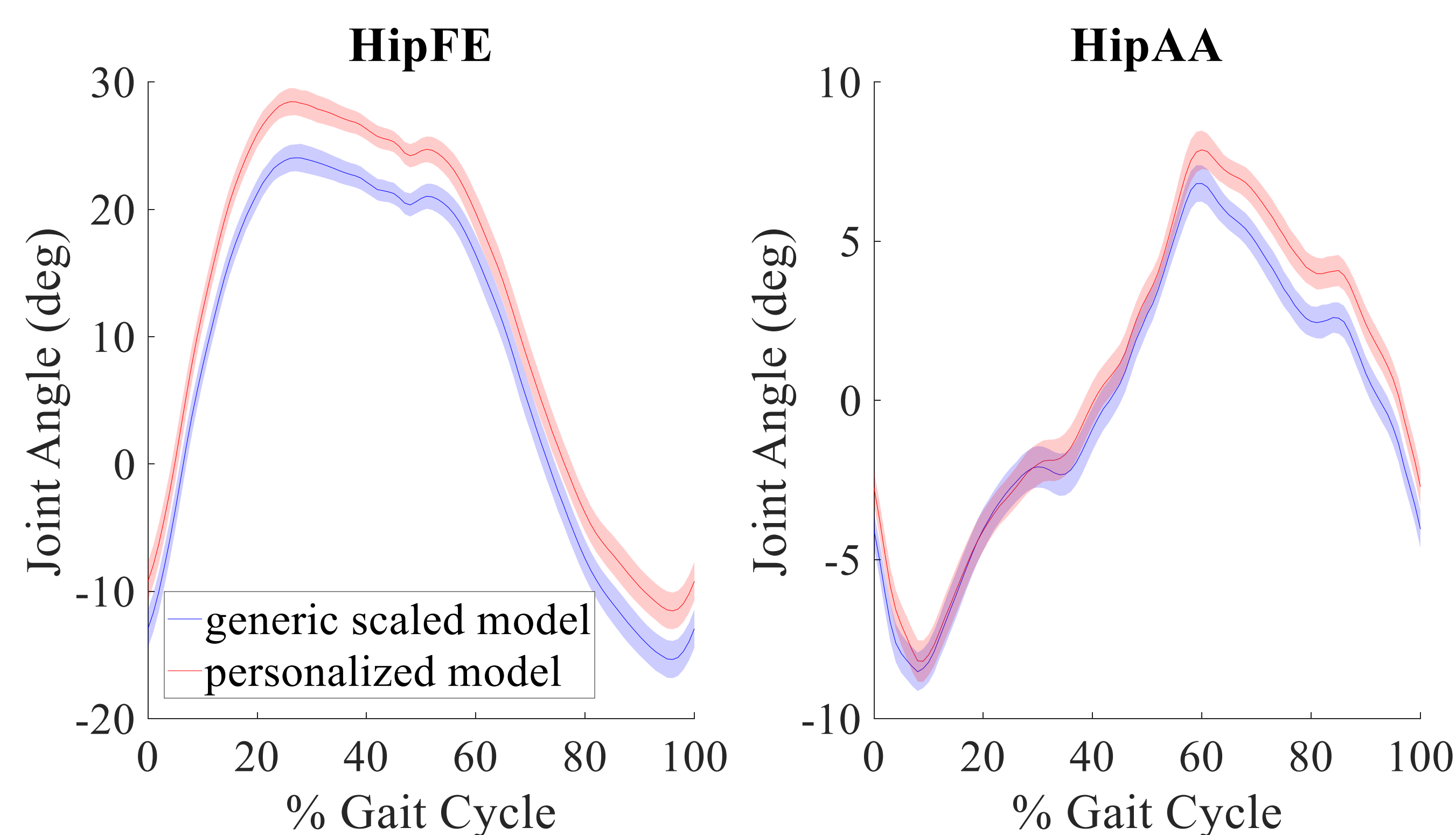
## Introduction

- Personalized models can represent musculoskeletal systems more accurately than generic models.
- Hip joint kinematics and hip muscle length and moment arms are important in generation of force and joint torque.
- This study compared a generic scaled model and a model with personalization in pelvis bone and hip muscles.

## Methods

- A generic scaled model was created using OpenSim scaling tool
- A personalized model pelvic bone model was segmented from CT images (ITK-SNAP) Muscle attachments were updated using affine transformation (NMSBuilder) Hip joint centers were updated by shape-fitting acetabular cups
- Model comparison – kinematics, muscle length and moment arm around hip joints

## Results



## Discussion

- The generic scaled model underestimated hip flexion, adduction and external rotation by 4, 1 and 3 degrees.
- The personalized model predicted lower muscle-tendon length for adductor and hamstring muscles
- Moment arm about HipFE for adductors and hamstring muscles were 10 mm shorter in the personalized model

## Significance

- The need of model personalization for more accurate prediction of joint kinematics and muscle geometry was highlighted.
- The effect of model personalization on prediction of dynamics will be investigated in future works.

## References

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