

# Biomechanics of the Paediatric Foot and Lower Limb during Gait: Associations with Obesity

## Introduction

Childhood obesity is associated with altered gait characteristics. However, little is understood about the impact of obesity on three-dimensional biomechanics of the paediatric foot and lower limb. The aim of this study was to examine the associations between foot and lower limb biomechanics and obesity in boys aged 7 to 11 years.

## Methods

Fifty five boys (mean age  $9.56 \pm 1.13$  years) were recruited. Each participant was measured for percentage body fat (%BF) by air displacement plethysmography (mean %BF  $23.78 \pm 9.33\%$ , range 9.57 - 42.06%). Three-dimensional foot and lower limb motion was measured by an 8-camera motion capture system. Following reduction by principle component analysis, multilevel linear regression determined the association between biomechanical variables and body fat.

## Results

Participants with higher %BF demonstrated greater hip, knee, ankle and midfoot flexion; ankle and midfoot eversion; ankle and rearfoot external rotation. Participants with higher %FM also demonstrated greater hip flexion and external rotation moments and, greater knee adduction moments.

## Conclusion

Findings from this study support the view that obesity is associated with altered biomechanics of the foot and lower limbs during gait. Data from this study suggests obese children have a pronated foot type, a possible precursor to altered function and pathology in later years. Further work is required to understand the long term impact of altered foot motion during gait associated with childhood obesity.