The relationship between peak power and leg size in mountain bike cyclists

BULLAS, Alice, HELLER, Ben <http://orcid.org/0000-0003-0805-8170>, CHOPPIN, Simon <http://orcid.org/0000-0003-2111-7710> and WHEAT, Jonathan <http://orcid.org/0000-0002-1107-6452>

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Title: THE RELATIONSHIP BETWEEN PEAK POWER AND LEG SIZE IN MOUNTAIN BIKE CYCLISTS.

Authors: Bullas A M, Heller B, Choppin C, Wheat J.

Affiliation: Centre for Sports Engineering Research, Sheffield Hallam University, Sheffield, UK

Introduction: Recent literature has suggested that complex anthropometrics, such as area and volume are better predictors of sporting performance, than traditional anthropometrics of length, breadth and girth. The aim of this study was to determine the relationship between peak power and leg size, both girth and volume, in mountain bike cyclists.

Method: This study was an observational, cross sectional investigation of 13 recreationally competitive mountain bike cyclists (age 33 ± 6 years; stature 1.83 ± 0.10 m; body mass 80.28 ± 3.16 kg). In accordance with the International Society for the Advancement of Kinanthropometry (ISAK) five anatomical locations on each leg were manually palpated and marked. Three-dimensional (3D) images of the lower body were captured using a high precision commercially available surface imaging system, 3dMD (3dMD Inc., Atlanta, GA, USA). The 3D images were manually digitised using bespoke software developed in-house (KinAnthroScan). ISAK Girth anthropometrics; thigh girth and calf girth, and volume anthropometrics; lower leg volume and upper leg volume, for each leg were exported. To acquire peak power, participants completed four, six second all out sprints against randomly assigned loads (7.5 % BW, 9% BW, 10.5% BW, 12% BW) from a seated stationary start on an electromagnetically braked cycle ergometer (Lode Excalibur Sport with Pedal Force Measurement, Groningen, Netherlands). Each sprint was separated by 5 minutes rest (4 minute active recovery + 1 min rest). These data were collated and the relationship between leg size and peak power explored using linear regression analysis.

Results: All anthropometrics demonstrated a significant (p<0.05) and strong positive correlation (r>.50) with peak power. Volume anthropometrics demonstrated a greater contribution to the variance in peak power ($R^2 = 0.66$, p=0.05) compared to girth anthropometrics ($R^2 = 0.57$, p=0.11).

Conclusions: This study suggests that volume anthropometrics provide a better predictor of peak power than girth anthropometrics, in mountain bike cyclists. Future kinanthropometry studies on mountain bike cyclists should consider the use of volume anthropometrics.

References:

Keywords: 3D Body Scanning, Cycling, Kinanthropometry, Surface Imaging.