

1000 Norms Project

Catalogue of plantar pressure and musculoskeletal measures across the lifespan



THE UNIVERSITY OF
SYDNEY

Marnee McKay,¹ Jennifer Baldwin,¹ Claire Hiller,¹ Elizabeth J Nightingale,¹ Niamh Moloney,¹ Natalie Vanicek,¹ Paulo Ferreira,¹ Milena Simic,¹ Kathryn Refshauge,¹ and Joshua Burns^{1,2}

¹Arthritis and Musculoskeletal Research Group, Faculty of Health Sciences, The University of Sydney, Australia
²Paediatric Gait Analysis Service of New South Wales, Sydney Children's Hospitals Network, Australia

Introduction

Diagnosis of disease or impairment is often made by comparing results from clinical and biomechanical measures with healthy or 'normal' values. To make these decisions, researchers and clinicians need access to scientifically robust outcome measures and knowledge of appropriate reference values.

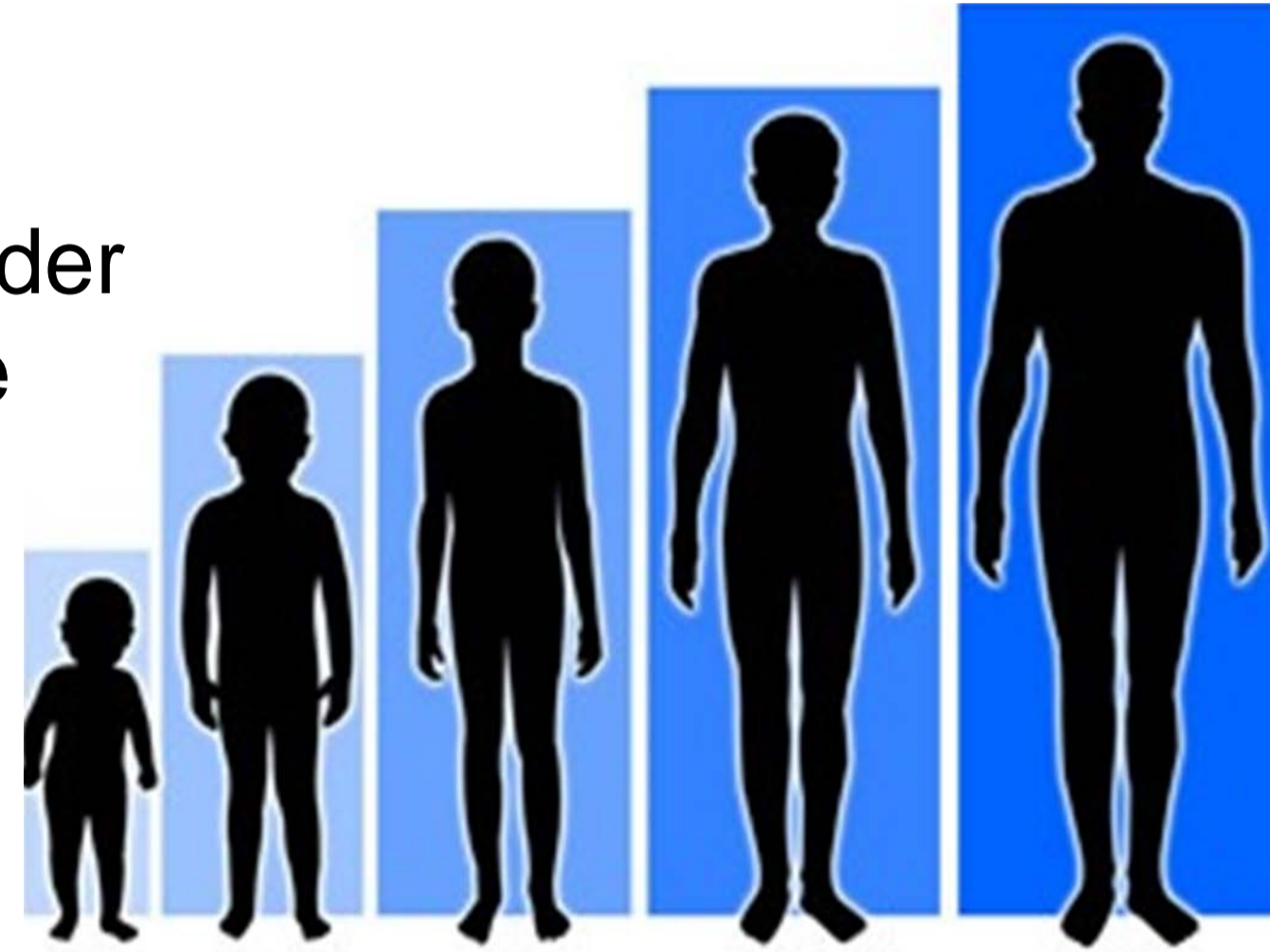
Aim

To generate normative reference data of the healthy population for widely-used clinical and plantar pressure measures.

Recruitment

1000 healthy individuals aged 3-100 yrs, stratified for age and gender

- Inclusion: individuals who consider themselves healthy for their age
- Exclusion: diabetes, neuromuscular disorders or conditions affecting physical performance.



Procedure

Participants complete a single assessment consisting of a battery of physical measures and questionnaires (Table 1)

Table 1: Selection of items collected in the 1000 Norms Project

Item	Protocol
Plantar Pressure	Two-step protocol ¹ using the Emed pressure platform (Novel, GmbH, Germany). Analysed using 3 regions (masks): rearfoot 31%, midfoot 19% and forefoot 50% ²
Active Range of Motion	Goniometry measures of shoulder, elbow, hip, knee and ankle range as well as cervical and lumbar spine range
Strength	Isometric strength assessed using handheld and fixed dynamometry of ankle plantar/dorsiflexors, knee flexors/extensors, hip rotators, elbow flexors/extensors and shoulder rotators.
Toe Strength	Paper Grip Test ³ (1 and 2) assessing toe flexor strength
Gait	Spatio-temporal aspects of gait measured using Zeno walkway ⁴
Foot Alignment	Foot Posture Index ⁵ assessing 6 elements of foot alignment
Lower Limb Alignment	Static ⁶ and dynamic lower limb alignment assessed using Siliconcoach movement analysis system
Balance	Balance assessed using the Star Excursion Balance ⁷ Test and Bruininks Oseretsky Test of Motor Proficiency (BOT-2) ⁸
Motor Planning	Choice Stepping Reaction Time ⁹

Preliminary results

Total peak pressure and total contact area for the first 248 participants (Mean age 32.9 ± 18.5, male female ratio, 29:33) shown in Figures 2a and 2b.

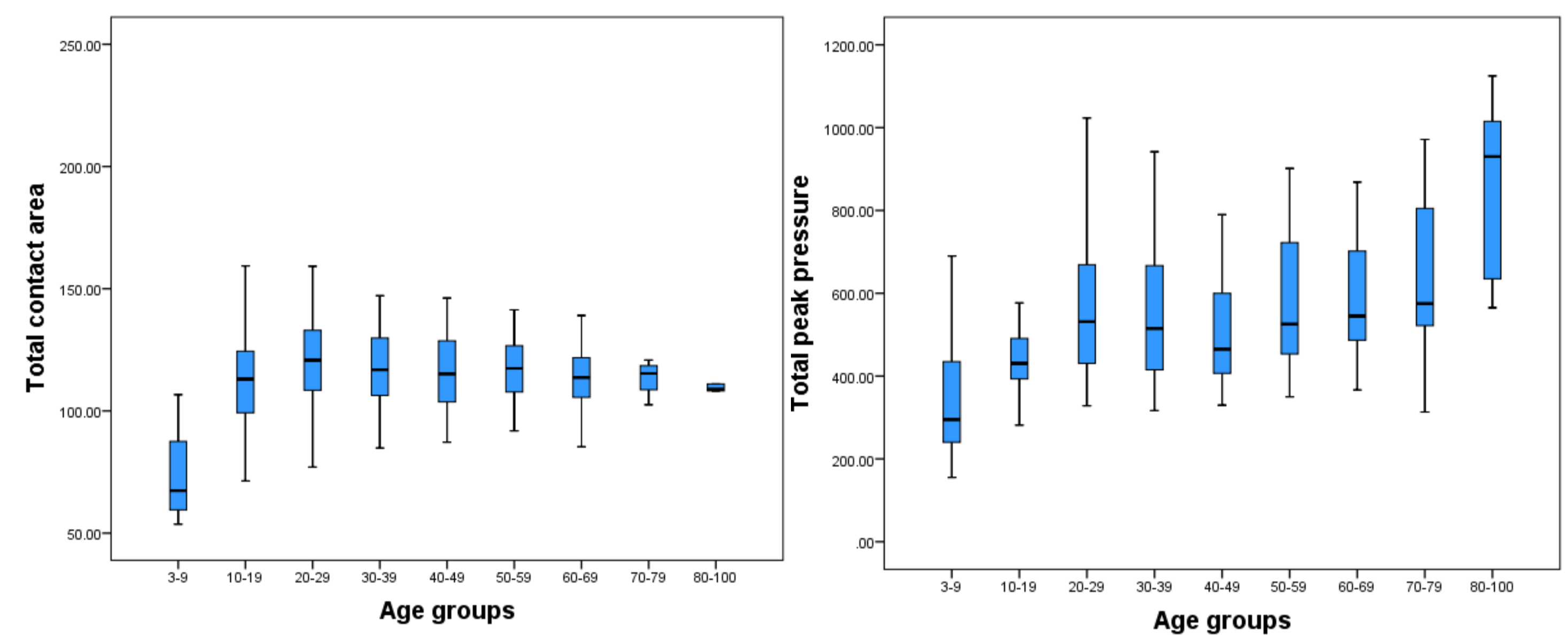


Figure 2a: Total contact area per decade

Figure 2b: Total peak pressure per decade

- There were significant differences in contact area (cm²) between age groups (3-9y, 10-19y, 20-29y, 30-39y, 40-49y, 50-59y, 60-69y, 70-79y, 80-100y) (F [8, 247] = 11.084, P<0.0001). Mean contact area was lower for children aged 3-9y (73.4, SD 16.7 cm²), compared to every other age group (P<0.01, Tukeys post hoc)
- There were significant differences in peak pressure (kPa) between age groups (F [8, 247] = 8.168; P<0.0001). Mean peak pressure was lower for children aged 3-9yrs, than those >20yrs (P<0.03, Tukeys post hoc), and higher for people aged 80-100yrs than those aged <60y (P<0.03).

Significance

The 1000 Norms database will be freely available via a secure online portal by March 2016.

The Project will offer researchers the opportunity to explore relationships between plantar pressure and a wide range of demographic, musculoskeletal and biomechanical measures.

Disclosure

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Contact the author:

marnee.mckay@sydney.edu.au

