



Oral Abstract

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Measures of childhood fitness are associated with calcaneal quantitative ultrasound in adulthood: a 20 year prospective study

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Aim: To describe the associations between childhood fitness measures and calcaneal quantitative ultrasound (QUS) parameters in adulthood.

Methods: A representative longitudinal sample of 1299 children (mean age 11yrs, range 7-15) was measured in the Australian Schools Health and Fitness Survey in 1985 and approximately 20 years later (mean age 32). Fitness measures in childhood included 1.6km run, 50m sprint, physical work capacity at 170 beats/min (PWC₁₇₀), lower limb muscle strength and standing long jump. We measured qualitative ultrasound index (QUI), broadband ultrasound attenuation (BUA), speed of sound (SOS), and estimated bone mineral density (eBMD) using a Sahara bone densitometer.

Results: In females, PWC₁₇₀ in childhood was positively associated with all four QUS parameters ($p < 0.001-0.005$). 1.6km run time was inversely associated with QUI ($p = 0.029$), SOS ($p = 0.030$) and eBMD ($p = 0.029$). Standing long jump was positively associated with QUI ($p = 0.016$), SOS ($p = 0.004$) and eBMD ($p = 0.016$). In males, 50m sprint time was positively associated with QUI, SOS and eBMD (all $p < 0.05$). There was an interaction between age as a child and PWC₁₇₀, and all QUS parameters ($p < 0.01$) with PWC₁₇₀ measured in younger years having a greater influence on adult bone mass (7-10yr olds, $r = 0.20-0.25$, all $p < 0.05$; 11-15yr olds, all $r = 0.06$, all $p > 0.05$).

Conclusion: This is the first prospective study to demonstrate that childhood fitness levels, particularly in females and in the prepubertal years, are predictive of adult skeletal status as measured by QUS. These results suggest that interventions aimed at increasing fitness in early childhood may lead to an increase in peak bone mass.