Physical Activity Throughout Adolescence Is An Important Determinant Of VO2Max In Early Adulthood

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PURPOSE: Low cardiorespiratory fitness (CRF) predicts future morbidity in adults. Participation in moderate to vigorous physical activity (MVPA) can improve CRF but the impact of MVPA throughout adolescence on CRF in adult life has not previously been quantified in men and women. We investigate sex-differences in the impact of MVPA throughout adolescence on early adult CRF.

METHODS: Participants enrolled in a UK birth cohort undertook measures of physical activity at 11, 13, 15 and 24 years (y) old using a hip-worn accelerometer, MVPA (average minutes/day) was derived from accelerometer data at each time. CRF (VO2max) was estimated from a Tecumseh step test at age 24. Structural equation modelling was used to compare associations between MVPA participation at each time and VO2max at age 24 within the same model and cumulative MVPA participation (average across all time points) and VO2max. The full information maximum likelihood method was used to account for missingness under the assumption of missing at random. Maternal socioeconomic group was included in models as a predictor of missing observations. Skewed data were log transformed. Analysis was sex-stratified.

RESULTS: Participants who undertook the step test at 24 were included in this analysis (n=1623; 580 male). Cumulative MVPA was positively associated with VO2max, the association was stronger for women versus men (β-coefficient(95%CI) 1.05(0.56,1.55), p<0.001 versus 0.83(0.16,1.51), p=0.016). In women, we observed strong positive associations between MVPA (age 13 and 24) and CRF (age 24) (β-coefficient(95%CI) 11y: 0.29(-0.25,0.83), p=0.289; 13y: 0.58(0.07,1.09), p=0.025; 15y: -0.13(-0.71,0.45), p=0.658; 24y: 1.19(0.36,2.03), p=0.005). In men, MVPA (age 13 and 24) was positively associated with CRF although statistical significance could not be assigned to these effects (β-coefficient(95%CI) 11y: -0.02(-0.67,0.63), p=0.995; 13y: 0.68(-0.09,1.44), p=0.084; 15y: 0.53(-0.20,1.25), p=0.158; 24y: 0.87(-0.07,1.80), p=0.068).

CONCLUSIONS: Cumulative MVPA participation throughout adolescence is an important determinant of CRF in early adulthood, particularly for women. These data also suggest that MVPA in early adolescence is an important determinant of early adult CRF in women independent from MVPA participation in early adulthood.