

Validity of Cardiorespiratory Fitness Assessment in Adolescents Using the Non-Exercise Test, PACER, and the K4b² Portable Metabolic System

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ABSTRACT

Cardiorespiratory fitness (CRF) is an important indicator of adolescent cardiovascular and future cardiometabolic health. The PACER test is often used to measure CRF in adolescents but is not feasible with pediatric populations unable to perform physical testing secondary to physical impairments. The non-exercise test (NET) has been recommended as a proxy for estimating VO_2 in individuals not able to perform physical tests by using variables such as gender, age, body mass index, resting HR, and self-reported habitual physical activity levels. **PURPOSE:** The purpose of this study was estimate the concurrent validity of the NET for adolescents against the PACER test and objective measures of VO_2 , and examine the cross correlations of the PACER, NET with the Cosmed K4b² portable metabolic system. **METHODS:** Adolescents ages 12-17 (n=37) completed the NET and then performed the PACER test while wearing the K4b² to directly measure $\text{VO}_{2\text{max}}$. $\text{VO}_{2\text{max}}$ values from the NET, PACER and K4b² were compared using a linear regression with Pearson correlations. **RESULTS:** The $\text{VO}_{2\text{max}}$ acquired directly from the K4b² was significantly related to the $\text{VO}_{2\text{max}}$ indirectly estimated from the PACER ($r = 0.87$, $p < 0.001$, $r^2 = 0.76$) and the NET ($r = 0.73$, $p < 0.001$, $r^2 = 0.54$). The $\text{VO}_{2\text{max}}$ acquired indirectly from the PACER was significantly related to the $\text{VO}_{2\text{max}}$ indirectly estimated from the NET ($r = 0.78$, $p < 0.001$, $r^2 = 0.62$). **CONCLUSION:** The present study confirms that the NET is a valid measure of CRF in adolescents and can be used as an indirect measure of CRF when an exercise test is not feasible. The study also confirmed a strong concurrent validity between the K4b² and PACER test as measures of $\text{VO}_{2\text{max}}$.