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Letter to the Editor

School-based health interventions should be assessed with measures of fitness and fatness: comment on 'Beyond the randomised controlled trial and BMI – evaluation of effectiveness of through-school nutrition and physical activity programmes'

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Madam

The commentary by Rush *et al.* promotes the time to run 550 m test ($T_{550\,m}$) as an alternative outcome to BMI for assessing the 'progress and effectiveness' of school-based obesity interventions[1]. While the authors assert that a faster $T_{550\,m}$ is 'associated with improved nutrition and body composition', we believe this to be an over-interpretation of the physiological importance of this test. Physiologically, the $T_{550\,m}$ is a measure of 'fitness', whereas BMI is a measure of 'fatness'. In adults, cardiometabolic disorders are more closely associated with fitness than fatness[2]; however, in children the contributions of fatness and fitness to cardiometabolic risk factors are less clear: one study has reported that leanness in children is more important than fitness for predicating cardiometabolic risk profiles[3]. As the authors discuss[1], school-based health intervention research has produced mixed findings when the outcome is BMI. However, prior to dismissing the importance of 'fatness', the rubric used to judge this variable should first be scrutinized. It is well accepted that BMI is particularly poor at discriminating between lean mass and body fat, or type of adipose tissue[4,5]. The mixed findings reported using BMI do not necessarily mean that fatness is an unimportant measurement, but rather that 'fatness' is not being adequately assessed. Indeed, fatness is highly related to cardiometabolic pathology when superior assessments of fatness are collected[6]. While we agree that fitness is an important physiological outcome, fatness is likely associated with different risk factors to fitness and in this regard there remains an ongoing need to implement the use of measures superior to BMI. In particular, consideration should be given to equally simple-to-measure anthropometric indices, including waist circumference, waist-to-height ratio and waist-to-hip ratio, which take into consideration body fat distribution, especially central (abdominal) fat[4,6]. If the $T_{550\,m}$ is to be utilised as a research tool in children, then it should be compared with validated fitness assessment tools, not suggested as a replacement of a tool such as BMI that is used to assess fatness. In terms of cardiometabolic health the question of 'fit' or 'fat' is important, however it has not been well explored in children: school-based interventions should be assessing both physiological parameters to provide a more concise understanding of the nature of these variables in children's cardiometabolic health.

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