

Efficacy of exercise intervention for weight loss in overweight and obese adolescents: Meta-analysis and implications

The global rise in obesity prevalence among children and adolescents has been linked to modifiable lifestyle factors, including lack of physical activity. However, no known meta-analysis has been conducted on the effects of exercise intervention on body composition and metabolic risk factors in overweight and obese adolescents. Therefore, a meta-analysis was conducted to pool together findings from available studies, and estimate whether exercise intervention meaningfully improves body composition and cardiovascular and metabolic risk factors in overweight and obese adolescents.

Thirteen suitable studies were identified, involving 556 participants (176 male; 193 female; 187 unknown) were extracted for meta-analysis. Meta-analyses were completed on 5 body composition parameters and 10 cardio-metabolic parameters. Effect sizes were calculated as mean differences, as well as standardized mean differences in order to determine effect magnitude.

Findings from the meta-analysis indicate that exercise intervention reduces body mass index (BMI, mean: 2.0 kg/m²), body weight (mean: 3.7 kg), body fat percentage (3.1 %), and waist circumference (mean: 3.0 cm), and increases (improvement) lean mass (mean: 1.6 kg). Further, following exercise intervention children were able to better regulate insulin (mean: 162 uU/ul) and blood glucose (mean: 39 mg/dl) in response to an oral glucose tolerance test, suggesting decreased risk for developing type II diabetes. There were also important improvements in the strongest clinical predictor of cardiovascular disease, systolic blood pressure (mean: 7.1 mm Hg). The effects of exercise on total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, fasting insulin and fasting blood glucose were inconclusive.

The current evidence suggests that exercise intervention in overweight and obese adolescents improves body composition, particularly by lowering body fat. The limited available evidence further indicates that exercise intervention may improve some cardiovascular and metabolic risk factors. These findings have implications for (i) primary health care providers, and (ii) public health policy. In terms of primary healthcare providers, BMI may be unsuitable for assessing the efficacy of certain forms of exercise prescription, particularly those with a strength training component. In addition, simple measures of cardiovascular and metabolic health may aid in interpreting the efficacy of exercise intervention. In terms of public health policy, obesity should not be considered in isolation, i.e., exercise intervention results in important improvements in health above and beyond body fatness.

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Publication

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Stoner L, Rowlands D, Morrison A, Credeur D, Hamlin M, Gaffney K, Lambrick D, Matheson A
Sports Med. 2016 May 2