

Role of Physical Activity and Fitness in the Characterization and Prognosis of the Metabolically Healthy Obesity Phenotype: A Systematic Review and Meta-analysis

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The aims of the present article are to systematically review and meta-analyze the existing evidence on: 1) differences in physical activity (PA), sedentary behavior (SB), cardiorespiratory fitness (CRF) and muscular strength (MST) between metabolically healthy obesity (MHO) and metabolically unhealthy obesity (MUO); and 2) the prognosis of all-cause mortality and cardiovascular disease (CVD) mortality/morbidity in MHO individuals, compared with the best scenario possible, i.e., metabolically healthy normal-weight (MHNW), after adjusting for PA, SB, CRF or MST. Our systematic review identified 67 cross-sectional studies to address aim 1, and 11 longitudinal studies to address aim 2. The major findings and conclusions from the current meta-analysis are: 1) MHO individuals are more active, spend less time in SB, and have a higher level of CRF (yet no differences in MST) than MUO individuals, suggesting that their healthier metabolic profile could be at least partially due to these healthier lifestyle factors and attributes. 2) The meta-analysis of cohort studies which accounted for PA (N = 10 unique cohorts, 100% scored as high-quality) support the notion that MHO individuals have a 24-33% higher risk of all-cause mortality and CVD mortality/morbidity compared to MHNW individuals. This risk was borderline

significant/non-significant, independent of the length of the follow-up and lower than that reported in previous meta-analyses in this topic including all type of studies, which could be indicating a modest reduction in the risk estimates as a consequence of accounting for PA. 3) Only one study has examined the role of CRF in the prognosis of MHO individuals. This study suggests that the differences in the risk of all-cause mortality and CVD mortality/morbidity between MHO and MHNW are largely explained by differences in CRF between these two phenotypes. © 2018 Elsevier Inc.

Cardiorespiratory fitness

Cardiovascular disease

Exercise

Metabolically health normal-weight

Metabolically healthy obesity

Metabolically unhealthy obesity

Mortality

Muscular strength

Obesity

Physical activity

Sedentary behaviors

aerobic exercise

all cause mortality

cardiorespiratory fitness

cardiovascular disease

cardiovascular mortality

cardiovascular risk

coronary artery disease

human

hyperlipidemia

ischemic heart disease

meta analysis

muscle strength

obesity

phenotype

physical activity

prognosis

Review

risk reduction

sedentary lifestyle

systematic review

energy metabolism

fitness

health status

healthy lifestyle

metabolically benign obesity

metabolism

pathophysiology

phenotype

risk factor

Cardiorespiratory Fitness

Energy Metabolism

Health Status

Healthy Lifestyle

Humans

Muscle Strength

Obesity, Metabolically Benign

Phenotype

Physical Fitness

Prognosis

Risk Factors