

## **Associations of Muscle Strength and Fitness with Metabolic Syndrome in Men**

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### **Abstract**

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**Purpose:** To examine the associations for muscular strength and cardiorespiratory fitness with the prevalence of metabolic syndrome among men.

**Methods:** Participants were 8570 men (20-75 yr) for whom an age-specific muscular strength score was computed by combining the body weight adjusted one-repetition maximum measures for the leg press and the bench press. Cardiorespiratory fitness was quantified by age-specific maximal treadmill exercise test time.

**Results:** Separate age and smoking adjusted logistic regression models revealed a graded inverse association for metabolic syndrome prevalence with muscular strength ( $\beta = -0.37$ ,  $P < 0.0001$ ) and cardiorespiratory fitness ( $\beta = -1.2$ ,  $P < 0.0001$ ). The association between strength and metabolic syndrome was attenuated ( $\beta = -0.08$ ,  $P < 0.01$ ) when further adjusted for cardiorespiratory fitness. The association between cardiorespiratory fitness and metabolic syndrome was unchanged ( $\beta = -1.2$ ,  $P < 0.0001$ ) after adjusting for strength. Muscular strength added to the protective effect of fitness among men with low ( $P$  trend = 0.0002) and moderate ( $P$  trend < 0.0001) fitness levels. Among normal weight (BMI < 25), overweight (BMI 25-30), and obese (BMI  $\geq$  30) men, respectively, being strong and fit was associated with lower odds (73%, 69%, and 62% respectively,  $P < 0.0001$ ) of having prevalent metabolic syndrome.

**Conclusions:** Muscular strength and cardiorespiratory fitness have independent and joint inverse associations with metabolic syndrome prevalence.