

Men who maintained or improved physical fitness had reduced risk for all-cause and CVD mortality

Blair SN, Kohl HW 3d, Barlow CE, et al. *Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men.* JAMA. 1995 Apr 12;273:1093-8.

Objective

To determine whether an association exists between change in physical fitness and risk for mortality in men.

Design

Cohort analytic study of participants in the Aerobics Center Longitudinal Study with a mean follow-up of 5.1 years.

Setting

Preventive medicine clinic in Texas.

Participants

9777 men (age range, 20 to 82 y) who completed at least 2 preventive medical examinations and who achieved at least 85% of their age-predicted maximal heart rate during 2 treadmill tests.

Assessment of Risk Factors

At baseline and at a mean of 4.9 years later, an examination was done that

included a self-administered personal and family medical history, a physical examination by a physician, anthropometry, blood pressure measurement, blood chemistry analyses for lipids and glucose, and a maximal treadmill exercise test.

Main Outcome Measures

All-cause and cardiovascular disease (CVD) mortality identified by surveillance of the National Death Index.

Main Results

At a mean follow-up of 5.1 years, 223 deaths had occurred, 87 of which had been caused by CVD. Men who were unfit at both examinations had the highest death rate (used as the reference category), and men who were fit at both visits had the lowest death rate (relative risk [RR], 0.33; 95% CI, 0.23 to 0.47). Overall, men who were initially unfit but improved to being fit at the second examination had a 44% lower age-adjusted risk for all-cause mortality (RR, 0.56; CI, 0.41 to 0.75) and a 52% lower age-adjusted risk for CVD mortality (RR, 0.48; CI, 0.31 to 0.74) than those who remained unfit.

Men who were initially moderately fit and who further improved their fitness level had a 15% lower risk for death from all causes and a 28% lower risk for CVD mortality than those who remained at a stable moderate fitness level at both examinations. Improvement in fitness was associated with lower death rates after adjusting for age, health status, weight, resting systolic blood pressure, smoking habit, and family history of heart disease.

Conclusion

Men who maintained or improved adequate physical fitness had a reduced risk for all-cause and cardiovascular disease mortality compared with persistently unfit men.

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For article reprint: Dr. S.N. Blair, Division of Epidemiology, Cooper Institute for Aerobics Research, 12330 Preston Road, Dallas, TX 75230. FAX 214-458-1675.

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Commentary

Does physical activity reduce the risk for CVD and all-cause mortality? The articles by Blair and colleagues and Lee and colleagues approach this important question from different perspectives. Blair and colleagues have evaluated whether a change in physical fitness would alter CVD and all-cause mortality in men who presented for 2 preventive health examinations separated by a mean of 4.9 years. More than 30% of their participants had chronic health conditions. The fitness marker was endurance time on 2 age-adjusted treadmill tests (e.g., > 14 min for men aged 20 to 39 y) done 5 years apart. Outcome was examined by referring to the National Death Index in the 5 years after the second examination. Blair and colleagues found that men who were fit at both evaluations

or, better still, who increased their fitness level from the first to the second test had appreciably reduced CVD and all-cause mortality.

Lee and colleagues looked at the association between all-cause mortality and increased daily energy expenditure (self-reported) by doing vigorous (≥ 6 METs) or nonvigorous (< 6 METs) physical activity. A MET is the oxygen uptake at rest (in a normal person, about 250 mL/min). A 6-fold increase in the metabolic rate would correspond to walking at a brisk rate (> 4 mph). The participants were Harvard alumni men enrolled from 1916 to 1950 who returned a questionnaire. Attempts were made to exclude men with chronic medical conditions. Lee and colleagues found that increased levels of total

energy expenditure and energy expenditure from vigorous (but not nonvigorous) activities were associated with reductions in all-cause mortality.

Physical activity (of which regular aerobic exercise is a subset) results in physical fitness (1). One way to measure fitness and to identify a training response from physical activity is to quantify maximal oxygen uptake during exercise. Aerobic fitness was quantified by Blair and colleagues using the proxy variable of exercise treadmill time, but the amount and type of exercise done to achieve that fitness level were not reported. In contrast, Lee and colleagues recorded historically the amount, type, and frequency of exercise, but not the result of this activity (i.e., the
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