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Primary Prevention of CVD: Physical Activity

DAVID STENSEL, *Loughborough University, Loughborough, United Kingdom*

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Increasing physical activity has been associated with reduced risk of mortality and cardiovascular disease (CVD).

- The proportion of persons doing no physical activity in a week varies among countries, but can reach nearly 25 percent in Europe and the Americas.

In this review, we looked at healthy persons older than 18 years who have no evidence of existing CVD.

Counseling persons to increase physical activity may increase their activity levels over three to 12 months, particularly if accompanied by written materials and telephone follow-up. However, the nature of the counseling interventions varied widely among randomized controlled trials, and results varied by the exact counseling intervention employed.

- Counseling persons to perform higher-intensity exercise may increase activity levels more than counseling them to perform lower-intensity exercise.
- Persons counseled to perform a higher-intensity exercise program were also found to have better adherence than those given a more moderate-intensity program.

We do not know whether counseling persons to increase physical activity reduces CVD compared with no counseling, or whether counseling persons to perform higher-intensity exercise reduces CVD compared with counseling them to perform lower-intensity exercise, because we found insufficient evidence.

Definition

There are no universal definitions of physical activity. It has been defined as "any bodily movement produced by contraction of skeletal muscle that substantially increases energy expenditure." Activities include formal exercise programs, as well as walking, hiking, gardening, sports, and dance. The common element is that these activities result in substantial energy expenditure, although the intensity and duration can vary considerably.

Exercise is considered a subcategory of physical activity and may be defined as planned, structured, and repetitive bodily movements performed to improve or maintain one or more components of physical fitness. Low level of physical activity is important in the causes of many chronic diseases. Individual change in behavior has the potential to decrease the burden of

Clinical Questions

Does counseling to increase physical activity lead to increased physical activity in healthy persons without existing CVD?

Likely to be beneficial	Counseling to increase physical activity vs. no advice
	Counseling to perform higher- vs. lower-intensity exercise programs

What are the health benefits of increasing physical activity in relation to cardiovascular outcomes in healthy persons without existing CVD?

Unknown effectiveness	Counseling to increase physical activity vs. no advice
	Counseling to perform higher- vs. lower-intensity exercise programs

CVD = cardiovascular disease.

chronic disease, particularly CVD. This review focuses on the evidence that specific interventions may lead to increases in physical activity, and that these changes may prevent CVD.

The relationship between physical activity and physical fitness is complex. There is consensus that increasing levels of both activity and fitness may reduce CVD. However, it is unclear whether activity or fitness is more important for health. There are many types of physical fitness—cardiovascular fitness, muscular strength and endurance, flexibility, coordination, speed, and power. The most common descriptor of physical fitness is cardiovascular fitness, which is usually determined using prediction or direct measurement of maximum oxygen uptake. It is important to note that moderate-intensity physical activity may not necessarily lead to an increase in physical fitness (as defined by maximum oxygen uptake), but studies suggest that there are still benefits from such activity in terms of lowering disease risk.

Therefore, in this review we have assessed outcomes of increases in intensity, frequency, and duration of physical activity, and increases in physical fitness. Primary prevention in this context is the long-term management of persons at increased risk of CVD, but with no evidence of overt ischemic CVD. We have only included studies in adults 18 years or older who are free-living and healthy, and excluded studies if more than 10 percent of participants had a reported diagnosis such as obesity, diabetes mellitus, or hypertension. Prevention of cerebrovascular events is discussed in detail elsewhere in *Clinical Evidence* (see review on stroke prevention). In this review, we have included interventions involving counseling or advising persons to increase physical activity however given (e.g., from a physician or exercise therapist; whether administered directly, by telephone, or through media [e.g., videos, television programs]). We have excluded interventions in which counseling did not form the major part of the intervention, that involved intensive monitoring, or in which incentives to change behavior were a major focus of the intervention.

Incidence and Prevalence

For general health benefits, government guidelines recommend that adults achieve a minimum of 30 minutes a day of at least moderate-intensity aerobic (endurance) physical activity on five or more days each week, or vigorous-intensity aerobic physical activity for a minimum of 20 minutes on three days each week. Combinations of moderate- and vigorous-intensity activity can be performed to meet this recommendation. The recommended levels of activity can be achieved by doing all of the daily activity in one session, or through several shorter bouts of at least 10 minutes. The activity can be lifestyle activity, structured exercise or sport, or a combination of these. In addition, all adults are advised to perform activities that maintain or increase muscular strength and endurance a minimum of two days each week.

Activity levels in England are low. About 60 percent of men and 70 percent of women report less than 30 minutes of moderate-intensity physical activity a day on at least five days per week. Levels of physical activity in the United Kingdom fall just below the European average. In a survey of 15 European countries, the percentage of adults reporting no moderate physical activity (e.g., carrying light loads, cycling at a normal pace, playing doubles tennis) ranged from 8 to 53 percent. International comparisons of physical activity or inactivity are difficult, because there are no internationally agreed-upon definitions. Some data are available from the World Health Organization, however, and these indicate that the prevalence of complete inactivity ("doing no or very little physical activity at work, home, for transport or in discretionary [leisure] time") is: 11 to 12 percent in Africa; 20 to 23 percent in the Americas; 18 to 19 percent in the Eastern Mediterranean region; 17 to 24 percent in Europe; 15 to 17 percent in Southeast Asia; and 16 to 17 percent in the Western Pacific region.

Etiology

Low levels of physical activity and lack of physical fitness are strong risk factors for CVD. Both confer an increased risk similar to that associated with smoking, hypertension, and high blood cholesterol.

The most commonly cited reasons for inactivity in the general population are increased urbanization and mechanization. Most occupations now involve little physical activity, whereas television viewing and computer use compete with more active pursuits in leisure time. Greater use of cars along with an increase in the use of labor-saving devices has also reduced the need for physical activity. There has been a decline in walking and cycling as modes of transportation—a 2001 survey in the United Kingdom reported that the number of miles traveled by each person a year on foot and on bicycle declined by about one fourth from 1975 to 1976 and 1999 to 2001. One proposed reason for the decline in walking is increased fears over personal safety. Barriers to physical activity include physical barriers, such as an injury; emotional barriers, such as embarrassment; motivational barriers, such as a perceived lack of energy; time barriers; and availability barriers, such as lack of facilities.

Prognosis

Increases in physical activity may lower the risk of CVD by exerting favorable changes on CVD risk factors (lowering

blood pressure, triglyceride concentrations, and blood cholesterol concentrations, and raising high-density lipoprotein cholesterol concentrations) and by exerting direct effects on the heart (reduced heart rate, increased stroke volume) and on blood vessels (improved endothelial function, which increases the ability of blood vessels to vasodilate and enhance blood supply, when necessary). In the Harvard Alumni Health study (10,269 men 45 to 84 years of age), men who reported changing their lifestyles after baseline to include moderately vigorous activity (i.e., at least four metabolic equivalents of the task) had a 23 percent lower risk of all-cause mortality at follow-up after about 20 years compared with men who continued not to engage in such activity (relative risk [RR] = 0.77; 95% confidence interval [CI], 0.58 to 0.96; $P < .02$). The main cause of death was CVD.

In the Aerobics Centre Longitudinal Study (9,777 men 20 to 82 years of age), men classified as unfit on their first examination but fit on their second (mean of 4.9 years between examinations) had a 52 percent lower risk of CVD mortality during follow-up (RR = 0.48; 95% CI, 0.31 to 0.74) than men classified as unfit on both examinations. Fitness was assessed by a treadmill test, and the 20 percent of persons with the lowest treadmill times were classified as unfit.

The Nurses' Health Study (72,488 women 40 to 65 years of age) assessed physical activity using a questionnaire. It found that women reporting higher levels of energy expenditure had lower rates of coronary events over six years. Women who walked the equivalent of three hours or more a week at a brisk pace (i.e., at least 5 km [3 miles] per hour) had significantly lower rates of coronary events compared with women who walked infrequently (RR = 0.65; 95% CI, 0.47 to 0.91). Similar results were found in the Women's Health Initiative prospective cohort study of 73,743 postmenopausal women.

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