NIH Consensus Statement

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Physical Activity and Cardiovascular Health

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This statement reflects the panel's assessment of medical knowledge available at the time the statement was written. Thus, it provides a "snapshot in time" of the state of knowledge on the conference topic. When reading the statement, keep in mind that new knowledge is inevitably accumulating through medical research.

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Abstract

Objective

To provide physicians and the general public with a responsible assessment of the relationship between physical activity and cardiovascular health.

Participants

A non-Federal, nonadvocate, 13-member panel representing the fields of cardiology, psychology, exercise physiology, nutrition, pediatrics, public health, and epidemiology. In addition, 27 experts in cardiology, psychology, epidemiology, exercise physiology, geriatrics, nutrition, pediatrics, public health, and sports medicine presented data to the panel and a conference audience of 600.

Evidence

The literature was searched through Medline and an extensive bibliography of references was provided to the panel and the conference audience. Experts prepared abstracts with relevant citations from the literature. Scientific evidence was given precedence over clinical anecdotal experience.

Consensus Process

The panel, answering predefined questions, developed their conclusions based on the scientific evidence presented in open forum and the scientific literature. The panel composed a draft statement that was read in its entirety and circulated to the experts and the audience for comment. Thereafter, the panel resolved conflicting recommendations and released a revised statement at the end of the conference. The panel finalized the revisions within a few weeks after the conference.

Conclusions

All Americans should engage in regular physical activity at a level appropriate to their capacity, needs, and interest. Children and adults alike should set a goal of accumulating at least 30 minutes of moderate-intensity physical activity on most, and preferably, all days of the week. Most Americans have little or no physical activity in their daily lives, and accumulating evidence indicates that physical inactivity is a major risk factor for cardiovascular disease. However, moderate levels of physical activity confer significant health benefits. Even those who currently meet these daily standards may derive additional health and fitness benefits by becoming more physically active or including more vigorous activity. For those with known cardiovascular disease, cardiac rehabilitation programs that combine physical activity with reduction in other risk factors should be more widely used.

Introduction

Over the past 25 years, the United States has experienced a steady decline in the age-adjusted death toll from cardiovascular disease (CVD), primarily in mortality caused by coronary heart disease and stroke. Despite this decline, coronary heart disease remains the leading cause of death and stroke the third leading cause of death. Lifestyle improvements by the American public and better control of the risk factors for heart disease and stroke have been major factors in this decline.

Coronary heart disease and stroke have many causes. Modifiable risk factors include smoking, high blood pressure, blood lipid levels, obesity, diabetes, and physical inactivity. In contrast to the positive national trends observed with cigarette smoking, high blood pressure, and high blood cholesterol, obesity and physical inactivity in the United States have not improved. Indeed automation and other technologies have contributed greatly to lessening physical activity at work and home.

The purpose of this conference was to examine the accumulating evidence on the role of physical activity in the prevention and treatment of CVD and its risk factors.

Physical activity in this statement is defined as "bodily movement produced by skeletal muscles that requires energy expenditure" and produces overall health benefits. Exercise, a type of physical activity, is defined as "a planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness." Physical inactivity denotes a level of activity less than that needed to maintain good health.

Physical inactivity characterizes most Americans. Exertion has been systematically engineered out of most occupations and lifestyles. In 1991, 54 percent of adults reported little or no regular leisure physical activity. Data from the 1990 Youth Risk Behavior Survey show that most teenagers in grades 9–12 are not performing regular vigorous activity. About 50 percent of high school students reported they are not enrolled in physical education classes.

Physical activity protects against the development of CVD and also favorably modifies other CVD risk factors, including high blood pressure, blood lipid levels, insulin resistance, and obesity. The type, frequency, and intensity of physical activity that are needed to accomplish these goals remain poorly defined and controversial.

Physical activity is also important in the treatment of patients with CVD or those who are at increased risk for developing CVD, including patients who have hypertension, stable angina, or peripheral vascular disease, or who have had a prior myocardial infarction or heart failure. Physical activity is an important component of cardiac rehabilitation, and people with CVD can benefit from participation. However, some questions remain regarding benefits, risks, and costs associated with becoming physically active.

Many factors are associated with adopting and maintaining a physically active lifestyle, such as socioeconomic status, cultural influences, age, and health status. Understanding is needed on how such variables influence the adoption of this behavior at the individual level. Intervention strategies for encouraging individuals from different backgrounds to adopt and adhere to a physically active lifestyle need to be developed and tested. Different environments such as schools, worksites, health care settings, and the home can play a role in promoting physical activity. These community-level factors also need to be better understood.

To address these and related issues, the National Heart, Lung, and Blood Institute and the NIH Office of Medical Applications of Research convened a Consensus Development Conference on Physical Activity and Cardiovascular Health. The conference was cosponsored by the National Institute of Child Health and Human Development, the National Institute on Aging, the National Institute of Arthritis and Musculoskeletal and Skin Diseases, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Nursing Research, and the Office of Research on Women's Health and the Office of Disease Prevention of the NIH; the Centers for Disease Control and Prevention; and the President's Council on Physical Fitness and Sports.

The conference brought together specialists in medicine, exercise physiology, health behavior, epidemiology, nutrition, physical therapy, and nursing as well as representatives from the public. After $1^1/_2$ days of presentations and audience discussion, an independent, non-Federal consensus panel weighed the scientific evidence and developed a draft statement that addressed the following five questions.

- What is the health burden of a sedentary lifestyle on the population?
- What type, what intensity, and what quantity of physical activity are important to prevent cardiovascular disease?
- What are the benefits and risks of different types of physical activity for people with cardiovascular disease?
- What are the successful approaches to adopting and maintaining a physically active lifestyle?
- What are the important questions for future research?

What Is the Health Burden of a Sedentary Lifestyle on the Population?

Physical inactivity among the U.S. population is now widespread. National surveillance programs have documented that about one in four adults (more women than men) currently have sedentary lifestyles with no leisure time physical activity. An additional one-third of adults are insufficiently active to achieve health benefits. The prevalence of inactivity varies by gender, age, ethnicity, health status, and geographic region but is common to all demographic groups. Change in physical exertion associated with occupation has declined markedly in this century.

Girls become less active than do boys as they grow older. Children become far less active as they move through adolescence. Obesity is increasing among children. It is related to an energy imbalance (i.e., calories consumed in excess of calorie expenditure [physical activity]). Data indicate that obese children and adolescents have a high risk of becoming obese adults, and obesity in adulthood is related to coronary artery disease, hypertension, and diabetes. Thus, the prevention of childhood obesity has the potential of preventing CVD in adults. At age 12, 70 percent of children report participation in vigorous physical activity; by age 21 this activity falls to 42 percent for men and 30 percent for women. Furthermore, as adults age, their physical activity levels continue to decline.

Although knowledge about physical inactivity as a risk factor for CVD has come mainly from investigations of middle-aged, white men, more limited evidence from studies in women minority groups and the elderly suggests that the findings are similar in these groups. On the basis of current knowledge, we must note that physical inactivity occurs disproportionately among Americans who are not well educated and who are socially or economically disadvantaged.

Physical activity is directly related to physical fitness. Although the means of measuring physical activity and physical fitness have varied between studies (i.e., there is no standardization of measures), evidence indicates that physical inactivity and

lack of physical fitness are directly associated with increased mortality from CVD. The increase in mortality is not entirely explained by the association with elevated blood pressure, smoking, and blood lipid levels.

There is an inverse relationship between measures of physical activity and indices of obesity in most U.S. population studies. Only a few studies have examined the relationship between physical activity and body fat distribution, and these suggest an inverse relationship between levels of physical activity and visceral fat. There is evidence that increased physical activity facilitates weight loss and that the addition of physical activity to dietary energy restriction can increase and help to maintain loss of body weight and body fat mass.

Middle-aged and older men and women who engage in regular physical activity have significantly higher high-density lipoprotein (HDL) cholesterol levels than do those who are sedentary. When exercise training is performed to at least 12 weeks, beneficial HDL cholesterol level changes have been reported.

Most studies of endurance exercise training of individuals with normal blood pressure and those with hypertension have shown decreases in systolic and diastolic blood pressure. Insulin sensitivity is also improved with endurance exercise.

A number of factors that affect thrombotic function—including hematocrit, fibrinogen, platelet function, and fibrinolysis—are related to the risk of CVD. Regular endurance exercise lowers the risk related to these factors.

The burden of CVD rests most heavily on the least active. In addition to its powerful impact on the cardiovascular system, physical inactivity is also associated with other adverse health effects, including osteoporosis, diabetes, and some cancers.

What Type, What Intensity, and What Quantity of Physical Activity Are Important To Prevent Cardiovascular Disease?

Activity that reduces CVD risk factors and confers many other health benefits does not require a structured or vigorous exercise program. The majority of benefits of physical activity can be gained by performing moderate-intensity activities. The amount or type of physical activity needed for health benefits or optimal health is a concern due to limited time and competing activities for most Americans. The amount and types of physical activity that are needed to prevent disease and promote health must, therefore, be clearly communicated, and effective strategies must be developed to promote physical activity to the public.

The quantitative relationship between level of activity or fitness and magnitude of cardiovascular benefit may extend across the full range of activity. A moderate level of physical activity confers health benefits. However, physical activity must be performed frequently to maintain these effects. Moderate-intensity activity performed by previously sedentary individuals results in significant improvement in many health-related outcomes. These moderate-intensity activities are more likely to be continued than are high-intensity activities.

We recommend that all people in the United States increase their regular physical activity to a level appropriate to their capacities, needs, and interest. We recommend that all children and adults should set a long-term goal to accumulate at least 30 minutes or more of moderate-intensity physical activity on most, or preferably all, days of the week. Intermittent or shorter bouts of activity (at least 10 minutes), including occupational, nonoccupational, or tasks of daily living, also have similar cardiovascular and health benefits if performed at a level of moderate intensity (such as brisk walking, cycling, swimming, home repair, and yardwork) with an accumulated duration of at least 30 minutes per day. People who currently meet the recommended minimal standards may derive additional health and fitness benefits from becoming more physically active or including more vigorous activity.

Some evidence suggests lowered mortality with more vigorous activity, but further research is needed to more specifically define safe and effective levels. The most active individuals have lower cardiovascular morbidity and mortality rates than do those who are least active; however, much of the benefit appears to be accounted for by comparing the least active individuals to those who are moderately active. Further increases in the intensity or amount of activity produce further benefits in some, but not all, parameters of risk. High-intensity activity is also associated with an increased risk of injury, discontinuation of activity, or acute cardiac events during the activity. Current low rates of regular activity in Americans may be partially due to the misperception of many that vigorous, continuous exercise is necessary to reap health benefits. Many people, for example, fail to appreciate walking as "exercise" or to recognize the substantial benefits of short bouts (at least 10 minutes) of moderate-level activity.

The frequency, intensity, and duration of activity are interrelated. The number of episodes of activity recommended for health depends on the intensity and/or duration of the activity. Higher intensity or longer duration activity could be performed approximately three times weekly, but low-intensity or shorter duration activities should be performed more often to achieve cardiovascular benefits.

The appropriate type of activity is best determined by the individual's preferences and what will be sustained. Exercise, or a structured program of activity, is a subset of activity that may encourage interest and allow for more vigorous activity. People who perform more formal exercise (i.e., structured or planned exercise programs) can accumulate this daily total through a variety of recreational or sports activities. People who are currently sedentary or minimally active should gradually build up to the recommended goal of 30 minutes of moderate activity daily by adding a few minutes each day until reaching their personal goal to reduce the risk associated with suddenly increasing the amount or intensity of exercise. (The defined levels of effort depend on individual characteristics such as baseline fitness and health status.)

Developing muscular strength and joint flexibility is also important for an overall activity program to improve one's ability to

perform tasks and to reduce the potential for injury. Upper extremity and resistance (or strength) training can improve muscular function, and evidence suggests that there may be cardiovascular benefits, especially in older patients or those with underlying CVD, but further research and guidelines are needed. Older people or those who have been deconditioned from recent inactivity or illness may particularly benefit from resistance training due to improved ability in accomplishing tasks of daily living. Resistance training may contribute to better balance, coordination, and agility that may help prevent falls in the elderly. These abilities facilitate physical activity important for cardiovascular health.

Physical activity carries risks as well as benefits. The most common adverse effects of activity relate to musculoskeletal injury and are usually mild and self-limited. The risk of injury increases with increased intensity, frequency, and duration of activity and also depends on the type of activity. Exercise-related injuries can be reduced by moderating these parameters. A more serious but rare complication of activity is myocardial infarction or sudden cardiac death. Although persons who engage in vigorous physical activity have a slight increase in risk of sudden cardiac death during activity, the health benefits outweigh this risk because of the large overall risk reduction.

In children and young adults, exertion-related deaths are uncommon and are generally related to congenital heart defects (e.g., hypertrophic cardiomyopathy, Marfan's syndrome, severe aortic valve stenosis, prolonged QT syndromes, cardiac conduction abnormalities) or to acquired myocarditis. It is recommended that patients with those conditions remain active but not participate in vigorous or competitive athletics.

Because the risks of physical activity are very low compared with the health benefits, most adults do not need medical consultation or pretesting before starting a moderate-intensity physical activity program. However, those with known CVD and men over age 40 and women over age 50 with multiple cardiovascular risk factors who contemplate a program of vigorous activity should have a medical evaluation prior to initiating such a program.

What Are the Benefits and Risks of Different Types of Physical Activity for People With Cardiovascular Disease?

More than 10 million Americans are afflicted with clinically significant CVD, including myocardial infarction, angina pectoris, peripheral vascular disease, and congestive heart failure. In addition, more than 300,000 patients per year are currently subjected to coronary artery bypass surgery and a similar number to percutaneous transluminal coronary angioplasty. Increased physical activity appears to benefit each of these groups. Benefits include reduction in cardiovascular mortality, reduction of symptoms, improvement in exercise tolerance and functional capacity, and improvement in psychological well-being and quality of life.

Several studies have shown that exercise training programs significantly reduce overall mortality, as well as death caused by myocardial infarction. The reported reductions in mortality have been highest—approximately 25 percent—in cardiac rehabilitation programs that have included control of other cardiovascular risk factors. Rehabilitation programs using both moderate and vigorous physical activity have been associated with reductions in fatal cardiac events, although the minimal or optimal level and duration of exercise required to achieve beneficial effects remain uncertain. Data are inadequate to determine whether stroke incidence is affected by physical activity or exercise training.

The risk of death during medically supervised cardiac exercise training programs is very low. However, those who exercise infrequently and have poor functional capacity at baseline may be at somewhat higher risk during exercise training. All patients with CVD should have a medical evaluation prior to participation in a vigorous exercise program.

Appropriately prescribed and conducted exercise training programs improve exercise tolerance and physical fitness in patients with coronary heart disease. Moderate as well as vigorous exercise training regimens are of value. Patients with low basal levels of exercise capacity experience the most functional benefits, even at relatively modest levels

of physical activity. Patients with angina pectoris typically experience improvement in angina in association with a reduction in effort-induced myocardial ischemia, presumably as a result of decreased myocardial oxygen demand and increased work capacity.

Patients with congestive heart failure also appear to show improvement in symptoms, exercise capacity, and functional well-being in response to exercise training, even though left ventricular systolic function appears to be unaffected. The exercise program should be tailored to the needs of these patients and supervised closely in view of the marked predisposition of these patients to ischemic events and arrhythmias.

Cardiac rehabilitation exercise training often improves skeletal muscle strength and oxidative capacity and, when combined with appropriate nutritional changes, may result in weight loss. In addition, such training generally results in improvement in measures of psychological status, social adjustment, and functional capacity. However, cardiac rehabilitation exercise training has less influence on rates of return to work than many nonexercise variables, including employer attitudes, prior employment status, and economic incentives. Multifactorial intervention programs—including nutritional changes and medication plus exercise—are needed to improve health status and reduce cardiovascular disease risk.

Cardiac rehabilitation programs have traditionally been institutional-based and group-centered (e.g., hospitals, clinics, community centers). Referral and enrollment rates have been relatively low, generally ranging from 10 to 25 percent of patients with CHD. Referral rates are lower for women than for men and lower for non-whites than for whites. Home-based programs have the potential to provide rehabilitative services to a wider population. Home-based programs incorporating limited hospital visits with regular mail or telephone followup by a nurse case manager have demonstrated significant increases in functional capacity, smoking cessation, and improvement in blood lipid levels. A range of options exists in cardiac rehabilitation including site, number of visits, monitoring, and other services.

There are clear medical and economic reasons for carrying out cardiac rehabilitation programs. Optimal outcomes are achieved when exercise training is combined with educational messages and feedback about changing lifestyle. Patients who participate in cardiac rehabilitation programs show a lower incidence of rehospitalization and lower charges per hospitalization. Cardiac rehabilitation is a cost-efficient therapeutic modality that should be used more frequently.

What Are the Successful Approaches to Adopting and Maintaining a Physically Active Lifestyle?

The cardiovascular benefits from and physiological reactions to physical activity appear to be similar among diverse population subgroups defined by age, gender, income, region of residence, ethnic background, and health status. However, the behavioral and attitudinal factors that influence the motivation for and ability to sustain physical activity are strongly determined by social experiences, cultural background, and physical disability and health status. For example, perceptions of appropriate physical activity differ by gender, age, weight, marital status, family roles and responsibilities, disability, and social class. Thus, the following general guidelines will need to be further refined when one is planning with or prescribing for specific individuals and population groups, but generally physical activity is more likely to be initiated and maintained if the individual

- Perceives a net benefit.
- Chooses an enjoyable activity.
- Feels competent doing the activity.
- Feels safe doing the activity.
- Can easily access the activity on a regular basis.
- Can fit the activity into the daily schedule.
- Feels that the activity does not generate financial or social costs that he or she is unwilling to bear.
- Experiences a minimum of negative consequences such as injury, loss of time, negative peer pressure, and problems with self-identity.
- Is able to successfully address issues of competing time demands.

- Recognizes the need to balance the use of labor-saving devices (e.g., power lawn mowers, golf carts, automobiles) and sedentary activities (e.g., watching television, use of computers) with activities that involve a higher level of physical exertion.

Other people in the individual's social environment can influence the adoption and maintenance of physical activity. Health care providers have a key role in promoting smoking cessation and other risk-reduction behaviors. Preliminary evidence suggests that this also applies to physical activity. It is highly probable that people will be more likely to increase their physical activity if their health care provider counsels them to do so. Providers can do this effectively by learning to recognize stages of behavior change, to communicate the need for increased activity, to assist the patient in initiating activity, and by following up appropriately.

Family and friends can also be important sources of support for behavior change. For example, spouses or friends can serve as "buddies," joining in the physical activity; or a spouse could offer to take on a household task, giving his or her mate time to engage in physical activity. Parents can support their children's activity by providing transportation, praise, and encouragement, and by participating in activities with their children.

Worksites have the potential to encourage increased physical activity by offering opportunities, reminders, and rewards for doing so. For example, an appropriate indoor area can be set aside to enable walking during lunch hours. Signs placed near elevators can encourage the use of the stairs instead. Discounts on parking fees can be offered to employees who elect to park in remote lots and walk.

Schools are a major community resource for increasing physical activity, particularly given the urgent need to develop strategies that affect children and adolescents. As noted previously, there is now clear evidence that U.S. children and adolescents have become more obese. There is also evidence

that obese children and adolescents exercise less than their leaner peers. All schools should provide opportunities for physical activities that

- Are appropriate and enjoyable for children of all skill levels and are not limited to competitive sports or physical education classes.
- Appeal to girls as well as to boys, and to children from diverse backgrounds.
- Can serve as a foundation for activities throughout life.
- Are offered on a daily basis.

Successful approaches may involve mass education strategies or changes in institutional policies or community variables. In some environments (e.g., schools, worksites, community centers), policy-level interventions may be necessary to enable people to achieve and maintain an adequate level of activity. Policy changes that increase opportunities for physical activity can facilitate activity maintenance for motivated individuals and increase readiness to change among the less motivated. As in other areas of health promotion, mass communication strategies should be used to promote physical activity. These strategies should include a variety of mainstream channels and techniques to reach diverse audiences that acquire information through different media (e.g., TV, newspaper, radio, Internet).

What Are the Important Considerations for Future Research?

While much has been learned about the role of physical activity in cardiovascular health, there are many unanswered questions.

- Maintain surveillance of physical activity levels in the U.S. population by age, gender, geographic, and socio-economic measures.
- Develop better methods for analysis and quantification of activity. These methods should be applicable to both work and leisure time measurements and provide direct quantitative estimates of activity.
- Conduct physiologic, biochemical, and genetic research necessary to define the mechanisms by which activity affects CVD including changes in metabolism as well as cardiac and vascular effects. This will provide new insights into cardiovascular biology that may have broader implications than for other clinical outcomes.
- Examine the effects of physical activity and cardiac rehabilitation programs on morbidity and mortality in elderly individuals.
- Conduct research on the social and psychological factors that influence adoption of a more active lifestyle and the maintenance of that behavior change throughout life.
- Carry out controlled randomized clinical trials among children and adolescents to test the effects of increased physical activity on CVD risk factor levels including obesity. The effects of intensity, frequency, and duration of increased physical activity should be examined in such studies.

Conclusions

Accumulating scientific evidence indicates that physical inactivity is a major risk factor for CVD. Moderate levels of regular physical activity confer significant health benefits. Unfortunately, most Americans have little or no physical activity in their daily lives.

All Americans should engage in regular physical activity at a level appropriate to their capacities, needs, and interests. All children and adults should set and reach a goal of accumulating at least 30 minutes of moderate-intensity physical activity on most, and preferably all, days of the week. Those who currently meet these standards may derive additional health and fitness benefits by becoming more physically active or including more vigorous activity.

Cardiac rehabilitation programs that combine physical activity with reduction in other risk factors should be more widely applied to those with known CVD. Well-designed rehabilitation programs have benefits that are lost because of these programs' limited use.

Individuals with CVD and men over 40 or women over 50 years of age with multiple cardiovascular risk factors should have a medical evaluation prior to embarking on a vigorous exercise program.

Recognizing the importance of individual and societal factors in initiating and sustaining regular physical activity, the panel recommends the following:

- Development of programs for health care providers to communicate to patients the importance of regular physical activity.
- Increased community support of regular physical activity with environmental and policy changes at schools, worksites, community centers, and other sites.

- Initiation of a coordinated national campaign involving a consortium of collaborating health organizations to encourage regular physical activity.

The implementation of the recommendations in this statement has considerable potential to improve the health and well-being of American citizens.

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PHYSICAL ACTIVITY AND CARDIOVASCULAR HEALTH

A Continuing Medical Education Activity Sponsored by the National Institutes of Health

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The objective of this NIH Consensus Statement is to inform the biomedical research and clinical practice communities of the results of the NIH Consensus Development Conference on Physical Activity and Cardiovascular Health. The statement provides state-of-the-art information regarding the role, benefits, and risks of physical activity in the prevention of cardiovascular disease, and presents the conclusions and recommendations of the consensus panel regarding these issues. In addition, the statement identifies those areas of study that deserve further investigation. Upon completing this educational activity, the reader should possess a clear working clinical knowledge of the state-of-the-art regarding this topic.

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National Institutes of Health
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1. Which of the following statements best defines physical activity?
   a. Physical activity is any type of bodily motion.
   b. Physical activity is a structured and repetitive bodily motion done to improve physical fitness.
   c. Physical activity is bodily motion produced by skeletal muscles that results in energy expenditure and health benefits.
   d. Physical activity is not related to physical fitness.

   ANSWER _____

2. Physical inactivity is a major risk factor for cardiovascular disease.
   a. true b. false

   ANSWER _____

3. In the U.S., the number of adults reporting no leisure time physical activity is about:
   a. one out of three adults (more men than women)
   b. two out of three adults (more women than men)
   c. one out of four adults (more men than women)
   d. one out of four adults (more women than men)

   ANSWER _____

4. Physical inactivity is associated with the following cardiovascular risks:
   (You must indicate all that are true.)
   a. elevated blood pressure c. elevated high-density cholesterol levels
   b. increase in visceral fat d. diabetes

   ANSWER(S) _____

5. There is no relationship between being obese as a child and obesity as an adult.
   a. true b. false

   ANSWER _____

6. In order to confer health benefits, physical activity must be at a minimum:
   a. vigorous and performed at least 30 minutes 2-3 days/week
   b. moderate-intensity and performed at least 30 minutes daily
   c. moderate-intensity and performed at least 10 minutes daily
   d. vigorous and performed at least 30 minutes daily

   ANSWER _____

7. The risks associated with moderate-intensity physical activity are said to be:
   (You must indicate all that are true.)
   a. low, and, therefore, most adults do not need a medical evaluation before engaging in moderate-intensity physical activity
   b. high, and, therefore, all adult men over 40 and women over 50 should have a medical evaluation
   c. primarily, myocardial infarction or even sudden cardiac death
   d. primarily, musculoskeletal in nature and mild

   ANSWER(S) _____

8. Most young children become more physically active as they become adolescents.

   a. true b. false

   ANSWER _____

9. People who engage in vigorous intensity physical activity: *(You must indicate all that are true.)*

   a. may benefit from additional health and fitness benefits than those who only meet the minimum standard for activity
   b. can achieve cardiovascular benefits if performed even three times per week
   c. are likely to discontinue their activity
   d. run a higher risk of injury

   ANSWER(S) _____

10. Patients with cardiovascular disease who participate in cardiac rehabilitation programs: *(You must indicate all that are true.)*

    a. experience improvements in exercise tolerance and functional capacity
    b. experience reductions in fatal cardiac events
    c. should participate in institutional, not home-based programs
    d. should have a medical evaluation before beginning a vigorous exercise program

    ANSWER(S) _____

11. Cardiac rehabilitation exercise training programs: *(You must indicate all that are true.)*

    a. are not cost-efficient
    b. have a major influence on rates of return to work
    c. should include lifestyle modification counseling
    d. have referral rates of over 25% of patients with CVD

    ANSWER(S) _____

12. In order to help individuals initiate and maintain physical activity in their lifestyle, a number of behavioral and cultural variables need to be considered. These include: *(You must indicate all that are true.)*

    a. a certain level of competition
    b. a feeling of safety and ease of access
    c. a minimum number of negative consequences
    d. an easy fit into a daily schedule

    ANSWER(S) _____

13. Individuals are more likely to increase their physical activity if encouraged by their health care provider.

    a. true b. false

    ANSWER _____

14. Schools should provide opportunities for physical activity that: *(You must indicate all that are true.)*
    a. are available at least three times per week
    b. are competitive in nature and promote a team spirit
    c. are equally relevant to both girls and boys
    d. take into account the students' skill level

    ANSWER(S) _____

15. Encouraging physical activity at schools, worksites, or in communities, etc., is best accomplished if:
    a. mass education and communication strategies are employed
    b. policy level interventions are implemented
    c. community support is secured
    d. all of the above

    ANSWER _____

Your response to the following two questions is optional and will have no effect on the grading results of this test.

Was the objective of this continuing education activity clearly stated?

a. not at all
b. very little
c. somewhat
d. considerably
e. completely

ANSWER

Did the activity planners provide the necessary information to meet the stated goals and objectives?

a. not at all
b. very little
c. somewhat
d. considerably
e. completely

ANSWER _____

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