CHAPTER 1
INTRODUCTION, SUMMARY, AND CHAPTER CONCLUSIONS

Contents

Introduction 3
- Development of the Report 3
- Major Conclusions 4

Summary 4

Chapter Conclusions 6
- Chapter 2: Historical Background and Evolution of Physical Activity Recommendations . . 6
- Chapter 3: Physiologic Responses and Long-Term Adaptations to Exercise 7
- Chapter 4: The Effects of Physical Activity on Health and Disease 7
- Chapter 5: Patterns and Trends in Physical Activity 8
- Chapter 6: Understanding and Promoting Physical Activity 8

CHAPTER 1
INTRODUCTION, SUMMARY, AND CHAPTER CONCLUSIONS

Introduction

This is the first Surgeon General's report to address physical activity and health. The main message of this report is that Americans can substantially improve their health and quality of life by including moderate amounts of physical activity in their daily lives. Health benefits from physical activity are thus achievable for most Americans, including those who may dislike vigorous exercise and those who may have been previously discouraged by the difficulty of adhering to a program of vigorous exercise. For those who are already achieving regular moderate amounts of activity, additional benefits can be gained by further increases in activity level.

This report grew out of an emerging consensus among epidemiologists, experts in exercise science, and health professionals that physical activity need not be of vigorous intensity for it to improve health. Moreover, health benefits appear to be proportional to amount of activity; thus, every increase in activity adds some benefit. Emphasizing the amount rather than the intensity of physical activity offers more options for people to select from in incorporating physical activity into their daily lives. Thus, a moderate amount of activity can be obtained in a 30-minute brisk walk, 30 minutes of lawn mowing or raking leaves, a 15-minute run, or 45 minutes of playing volleyball, and these activities can be varied from day to day. It is hoped that this different emphasis on moderate amounts of activity, and the flexibility to vary activities according to personal preference and life circumstances, will encourage more people to make physical activity a regular and sustainable part of their lives.

The information in this report summarizes a diverse literature from the fields of epidemiology, exercise physiology, medicine, and the behavioral sciences. The report highlights what is known about physical activity and health, as well as what is being learned about promoting physical activity among adults and young people.

Development of the Report

In July 1994, the Office of the Surgeon General authorized the Centers for Disease Control and Prevention (CDC) to serve as lead agency for preparing the first Surgeon General's report on physical activity and health. The CDC was joined in this effort by the President's Council on Physical Fitness and Sports (PCPFS) as a collaborative partner representing the Office of the Surgeon General. Because of the wide interest in the health effects of physical activity, the report was planned collaboratively with representatives from the Office of the Surgeon General, the Office of Public Health and Science (Office of the Secretary), the Office of Disease Prevention (National Institutes of Health [NIH]), and the following institutes from the NIH: the National Heart, Lung, and Blood Institute; the National Institute of Child Health and Human Development; the National Institute of Diabetes and Digestive and Kidney Diseases; and the National Institute of Arthritis and Musculoskeletal and Skin Diseases. CDC's nonfederal partners—including the American Alliance for Health, Physical Education, Recreation, and Dance; the American College of Sports Medicine; and the American Heart Association—provided consultation throughout the development process.

The major purpose of this report is to summarize the existing literature on the role of physical activity in preventing disease and on the status of interventions to increase physical activity. Any report on a topic this broad must restrict its scope to keep its message clear. This report focuses on disease prevention and therefore does not include the considerable body of evidence on the benefits of physical activity for treatment or

rehabilitation after disease has developed. This report concentrates on endurance-type physical activity (activity involving repeated use of large muscles, such as in walking or bicycling) because the health benefits of this type of activity have been extensively studied. The importance of resistance exercise (to increase muscle strength, such as by lifting weights) is increasingly being recognized as a means to preserve and enhance muscular strength and endurance and to prevent falls and improve mobility in the elderly. Some promising findings on resistance exercise are presented here, but a comprehensive review of resistance training is beyond the scope of this report. In addition, a review of the special concerns regarding physical activity for pregnant women and for people with disabilities is not undertaken here, although these important topics deserve more research and attention.

Finally, physical activity is only one of many everyday behaviors that affect health. In particular, nutritional habits are linked to some of the same aspects of health as physical activity, and the two may be related lifestyle characteristics. This report deals solely with physical activity; a Surgeon General's Report on Nutrition and Health was published in 1988.

Chapters 2 through 6 of this report address distinct areas of the current understanding of physical activity and health. Chapter 2 offers a historical perspective: after outlining the history of belief and knowledge about physical activity and health, the chapter reviews the evolution and content of physical activity recommendations. Chapter 3 describes the physiologic responses to physical activity—both the immediate effects of a single episode of activity and the long-term adaptations to a regular pattern of activity. The evidence that physical activity reduces the risk of cardiovascular and other diseases is presented in Chapter 4. Data on patterns and trends of physical activity in the U.S. population are the focus of Chapter 5. Lastly, Chapter 6 examines efforts to increase physical activity and reviews ideas currently being proposed for policy and environmental initiatives.

Major Conclusions

1. People of all ages, both male and female, benefit from regular physical activity.
2. Significant health benefits can be obtained by including a moderate amount of physical activity (e.g., 30 minutes of brisk walking or raking leaves, 15 minutes of running, or 45 minutes of playing volleyball) on most, if not all, days of the week. Through a modest increase in daily activity, most Americans can improve their health and quality of life.
3. Additional health benefits can be gained through greater amounts of physical activity. People who can maintain a regular regimen of activity that is of longer duration or of more vigorous intensity are likely to derive greater benefit.
4. Physical activity reduces the risk of premature mortality in general, and of coronary heart disease, hypertension, colon cancer, and diabetes mellitus in particular. Physical activity also improves mental health and is important for the health of muscles, bones, and joints.
5. More than 60 percent of American adults are not regularly physically active. In fact, 25 percent of all adults are not active at all.
6. Nearly half of American youths 12–21 years of age are not vigorously active on a regular basis. Moreover, physical activity declines dramatically during adolescence.
7. Daily enrollment in physical education classes has declined among high school students from 42 percent in 1991 to 25 percent in 1995.
8. Research on understanding and promoting physical activity is at an early stage, but some interventions to promote physical activity through schools, worksites, and health care settings have been evaluated and found to be successful.

Summary

The benefits of physical activity have been extolled throughout western history, but it was not until the second half of this century that scientific evidence supporting these beliefs began to accumulate. By the 1970s, enough information was available about the beneficial effects of vigorous exercise on cardiorespiratory fitness that the American College of Sports Medicine (ACSM), the American Heart Association (AHA), and other national organizations began issuing physical activity recommendations to the public. These recommendations generally focused on cardiorespiratory endurance and specified sustained periods of vigorous physical activity involving large muscle groups and lasting at least 20 minutes on 3 or

more days per week. As understanding of the benefits of less vigorous activity grew, recommendations followed suit. During the past few years, the ACSM, the CDC, the AHA, the PCPFS, and the NIH have all recommended regular, moderate-intensity physical activity as an option for those who get little or no exercise. The *Healthy People 2000* goals for the nation's health have recognized the importance of physical activity and have included physical activity goals. The 1995 *Dietary Guidelines for Americans*, the basis of the federal government's nutrition-related programs, included physical activity guidance to maintain and improve weight—30 minutes or more of moderate-intensity physical activity on all, or most, days of the week.

Underpinning such recommendations is a growing understanding of how physical activity affects physiologic function. The body responds to physical activity in ways that have important positive effects on musculoskeletal, cardiovascular, respiratory, and endocrine systems. These changes are consistent with a number of health benefits, including a reduced risk of premature mortality and reduced risks of coronary heart disease, hypertension, colon cancer, and diabetes mellitus. Regular participation in physical activity also appears to reduce depression and anxiety, improve mood, and enhance ability to perform daily tasks throughout the life span.

The risks associated with physical activity must also be considered. The most common health problems that have been associated with physical activity are musculoskeletal injuries, which can occur with excessive amounts of activity or with suddenly beginning an activity for which the body is not conditioned. Much more serious associated health problems (i.e., myocardial infarction, sudden death) are also much rarer, occurring primarily among sedentary people with advanced atherosclerotic disease who engage in strenuous activity to which they are unaccustomed. Sedentary people, especially those with preexisting health conditions, who wish to increase their physical activity should therefore gradually build up to the desired level of activity. Even among people who are regularly active, the risk of myocardial infarction or sudden death is somewhat increased during physical exertion, but their overall risk of these outcomes is lower than that among people who are sedentary.

Research on physical activity continues to evolve. This report includes both well-established findings and newer research results that await replication and amplification. Interest has been developing in ways to differentiate between the various characteristics of physical activity that improve health. It remains to be determined how the interrelated characteristics of amount, intensity, duration, frequency, type, and pattern of physical activity are related to specific health or disease outcomes.

Attention has been drawn recently to findings from three studies showing that cardiorespiratory fitness gains are similar when physical activity occurs in several short sessions (e.g., 10 minutes) as when the same total amount and intensity of activity occurs in one longer session (e.g., 30 minutes). Although, strictly speaking, the health benefits of such intermittent activity have not yet been demonstrated, it is reasonable to expect them to be similar to those of continuous activity. Moreover, for people who are unable to set aside 30 minutes for physical activity, shorter episodes are clearly better than none. Indeed, one study has shown greater adherence to a walking program among those walking several times per day than among those walking once per day, when the total amount of walking time was kept the same. Accumulating physical activity over the course of the day has been included in recent recommendations from the CDC and ACSM, as well as from the NIH Consensus Development Conference on Physical Activity and Cardiovascular Health.

Despite common knowledge that exercise is healthful, more than 60 percent of American adults are not regularly active, and 25 percent of the adult population are not active at all. Moreover, although many people have enthusiastically embarked on vigorous exercise programs at one time or another, most do not sustain their participation. Clearly, the processes of developing and maintaining healthier habits are as important to study as the health effects of these habits.

The effort to understand how to promote more active lifestyles is of great importance to the health of this nation. Although the study of physical activity determinants and interventions is at an early stage, effective programs to increase physical activity have been carried out in a variety of settings, such as schools, physicians' offices, and worksites. Determining the most effective and cost-effective intervention

approaches is a challenge for the future. Fortunately, the United States has skilled leadership and institutions to support efforts to encourage and assist Americans to become more physically active. Schools, community agencies, parks, recreational facilities, and health clubs are available in most communities and can be more effectively used in these efforts.

School-based interventions for youth are particularly promising, not only for their potential scope—almost all young people between the ages of 6 and 16 years attend school—but also for their potential impact. Nearly half of young people 12–21 years of age are not vigorously active; moreover, physical activity sharply declines during adolescence. Childhood and adolescence may thus be pivotal times for preventing sedentary behavior among adults by maintaining the habit of physical activity throughout the school years. School-based interventions have been shown to be successful in increasing physical activity levels. With evidence that success in this arena is possible, every effort should be made to encourage schools to require daily physical education in each grade and to promote physical activities that can be enjoyed throughout life.

Outside the school, physical activity programs and initiatives face the challenge of a highly technological society that makes it increasingly convenient to remain sedentary and that discourages physical activity in both obvious and subtle ways. To increase physical activity in the general population, it may be necessary to go beyond traditional efforts. This report highlights some concepts from community initiatives that are being implemented around the country. It is hoped that these examples will spark new public policies and programs in other places as well. Special efforts will also be required to meet the needs of special populations, such as people with disabilities, racial and ethnic minorities, people with low income, and the elderly. Much more information about these important groups will be necessary to develop a truly comprehensive national initiative for better health through physical activity. Challenges for the future include identifying key determinants of physically active lifestyles among the diverse populations that characterize the United States (including special populations, women, and young people) and using this information to design and disseminate effective programs.

Chapter Conclusions

Chapter 2: Historical Background and Evolution of Physical Activity Recommendations

1. Physical activity for better health and well-being has been an important theme throughout much of western history.
2. Public health recommendations have evolved from emphasizing vigorous activity for cardiorespiratory fitness to including the option of moderate levels of activity for numerous health benefits.
3. Recommendations from experts agree that for better health, physical activity should be performed regularly. The most recent recommendations advise people of all ages to include a minimum of 30 minutes of physical activity of moderate intensity (such as brisk walking) on most, if not all, days of the week. It is also acknowledged that for most people, greater health benefits can be obtained by engaging in physical activity of more vigorous intensity or of longer duration.
4. Experts advise previously sedentary people embarking on a physical activity program to start with short durations of moderate-intensity activity and gradually increase the duration or intensity until the goal is reached.
5. Experts advise consulting with a physician before beginning a new physical activity program for people with chronic diseases, such as cardiovascular disease and diabetes mellitus, or for those who are at high risk for these diseases. Experts also advise men over age 40 and women over age 50 to consult a physician before they begin a vigorous activity program.
6. Recent recommendations from experts also suggest that cardiorespiratory endurance activity should be supplemented with strength-developing exercises at least twice per week for adults, in order to improve musculoskeletal health, maintain independence in performing the activities of daily life, and reduce the risk of falling.

Chapter 3: Physiologic Responses and Long-Term Adaptations to Exercise

1. Physical activity has numerous beneficial physiologic effects. Most widely appreciated are its effects on the cardiovascular and musculoskeletal systems, but benefits on the functioning of metabolic, endocrine, and immune systems are also considerable.
2. Many of the beneficial effects of exercise training—from both endurance and resistance activities—diminish within 2 weeks if physical activity is substantially reduced, and effects disappear within 2 to 8 months if physical activity is not resumed.
3. People of all ages, both male and female, undergo beneficial physiologic adaptations to physical activity.

Chapter 4: The Effects of Physical Activity on Health and Disease

Overall Mortality

1. Higher levels of regular physical activity are associated with lower mortality rates for both older and younger adults.
2. Even those who are moderately active on a regular basis have lower mortality rates than those who are least active.

Cardiovascular Diseases

1. Regular physical activity or cardiorespiratory fitness decreases the risk of cardiovascular disease mortality in general and of coronary heart disease mortality in particular. Existing data are not conclusive regarding a relationship between physical activity and stroke.
2. The level of decreased risk of coronary heart disease attributable to regular physical activity is similar to that of other lifestyle factors, such as keeping free from cigarette smoking.
3. Regular physical activity prevents or delays the development of high blood pressure, and exercise reduces blood pressure in people with hypertension.

Cancer

1. Regular physical activity is associated with a decreased risk of colon cancer.
2. There is no association between physical activity and rectal cancer. Data are too sparse to draw conclusions regarding a relationship between physical activity and endometrial, ovarian, or testicular cancers.
3. Despite numerous studies on the subject, existing data are inconsistent regarding an association between physical activity and breast or prostate cancers.

Non–Insulin-Dependent Diabetes Mellitus

1.) Regular physical activity lowers the risk of developing non–insulin-dependent diabetes mellitus.

Osteoarthritis

1. Regular physical activity is necessary for maintaining normal muscle strength, joint structure, and joint function. In the range recommended for health, physical activity is not associated with joint damage or development of osteoarthritis and may be beneficial for many people with arthritis.
2. Competitive athletics may be associated with the development of osteoarthritis later in life, but sports-related injuries are the likely cause.

Osteoporosis

1. Weight-bearing physical activity is essential for normal skeletal development during childhood and adolescence and for achieving and maintaining peak bone mass in young adults.
2. It is unclear whether resistance- or endurance-type physical activity can reduce the accelerated rate of bone loss in postmenopausal women in the absence of estrogen replacement therapy.

Falling

1. There is promising evidence that strength training and other forms of exercise in older adults preserve the ability to maintain independent living status and reduce the risk of falling.

Obesity

1. Low levels of activity, resulting in fewer kilocalories used than consumed, contribute to the high prevalence of obesity in the United States.
2. Physical activity may favorably affect body fat distribution.

Mental Health

1. Physical activity appears to relieve symptoms of depression and anxiety and improve mood.
2. Regular physical activity may reduce the risk of developing depression, although further research is needed on this topic.

Health-Related Quality of Life

1. Physical activity appears to improve health-related quality of life by enhancing psychological well-being and by improving physical functioning in persons compromised by poor health.

Adverse Effects

1. Most musculoskeletal injuries related to physical activity are believed to be preventable by gradually working up to a desired level of activity and by avoiding excessive amounts of activity.
2. Serious cardiovascular events can occur with physical exertion, but the net effect of regular physical activity is a lower risk of mortality from cardiovascular disease.

Chapter 5: Patterns and Trends in Physical Activity

Adults

1. Approximately 15 percent of U.S. adults engage regularly (3 times a week for at least 20 minutes) in vigorous physical activity during leisure time.
2. Approximately 22 percent of adults engage regularly (5 times a week for at least 30 minutes) in sustained physical activity of any intensity during leisure time.
3. About 25 percent of adults report no physical activity at all in their leisure time.
4. Physical inactivity is more prevalent among women than men, among blacks and Hispanics than whites, among older than younger adults, and among the less affluent than the more affluent.
5. The most popular leisure-time physical activities among adults are walking and gardening or yard work.

Adolescents and Young Adults

1. Only about one-half of U.S. young people (ages 12–21 years) regularly participate in vigorous physical activity. One-fourth report no vigorous physical activity.
2. Approximately one-fourth of young people walk or bicycle (i.e., engage in light to moderate activity) nearly every day.
3. About 14 percent of young people report no recent vigorous or light-to-moderate physical activity. This indicator of inactivity is higher among females than males and among black females than white females.
4. Males are more likely than females to participate in vigorous physical activity, strengthening activities, and walking or bicycling.
5. Participation in all types of physical activity declines strikingly as age or grade in school increases.
6. Among high school students, enrollment in physical education remained unchanged during the first half of the 1990s. However, daily attendance in physical education declined from approximately 42 percent to 25 percent.
7. The percentage of high school students who were enrolled in physical education and who reported being physically active for at least 20 minutes in physical education classes declined from approximately 81 percent to 70 percent during the first half of this decade.
8. Only 19 percent of all high school students report being physically active for 20 minutes or more in daily physical education classes.

Chapter 6: Understanding and Promoting Physical Activity

1. Consistent influences on physical activity patterns among adults and young people include confidence in one's ability to engage in regular physical activity (e.g., self-efficacy), enjoyment of physical activity, support from others, positive beliefs concerning the benefits of physical activity, and lack of perceived barriers to being physically active.
2. For adults, some interventions have been successful in increasing physical activity in communities, worksites, and health care settings, and at home.
3. Interventions targeting physical education in elementary school can substantially increase the amount of time students spend being physically active in physical education class.