

PART A. EXECUTIVE SUMMARY

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INTRODUCTION

The *2018 Physical Activity Guidelines Advisory Committee Scientific Report* abundantly demonstrates that physical activity is a “best buy” for public health. The report provides a detailed summary of the disease prevention and health promotion benefits of a more physically active America that is firmly established by the latest scientific evidence. It builds on and significantly expands the scientific evidence summarized in the first *Physical Activity Guidelines Advisory Committee Report, 2008*. The Committee judged the 2008 Scientific Report to be an excellent document and used it as the foundation for the current report. It is clear, however, that the expansion of knowledge about the relationships between physical activity and health during the past 10 years has provided evidence of even more health benefits, demonstrated greater flexibility about how to achieve those benefits, and shown that a more physically active American population can be facilitated in a wide variety of ways.

The 17 members of the 2018 Physical Activity Guidelines Advisory Committee were appointed in June 2016 and sworn into duty in July 2016. The Committee was instructed to examine the scientific literature, especially articles published in the 10 years since the publication of the 2008 Scientific Report, and to confirm, expand, or modify the recommendations in that report. The Committee conducted detailed searches of the scientific literature, evaluated and discussed at length the quality of the evidence, and developed conclusions based on the evidence as a whole. The quantity and quality of the report reflects this careful and diligent process.

MAJOR FINDINGS

Physically active individuals sleep better, feel better, and function better. The 2018 Scientific Report demonstrates that, in addition to disease prevention benefits, regular physical activity provides a variety of benefits that help individuals sleep better, feel better, and perform daily tasks more easily.

- Strong evidence demonstrates that moderate-to-vigorous physical activity improves the quality of sleep. It does so by reducing the length of time it takes to go to sleep and reducing the time one is awake after going to sleep and before arising in the morning. It also can increase the time in deep sleep and reduce daytime sleepiness.
- Single episodes of physical activity promote acute improvements in executive function for a period of time. Executive function includes the processes of the brain that help organize daily activities and plan for the future. Tasks such as one's ability to plan and organize, self-monitor and inhibit or facilitate behaviors, initiate tasks, and control emotions all are part of executive function. Physical activity also improves other components of cognition, including memory, processing speed, attention, and academic performance.
- Regular physical activity not only reduces the risk of clinical depression but reduces depressive symptoms among people both with and without clinical depression. Physical activity can reduce the severity of those symptoms whether one has only a few or many.
- Regular physical activity reduces symptoms of anxiety, including both chronic levels of anxiety as well as the acute feelings of anxiety felt by many individuals from time to time.
- Strong evidence also demonstrates that perceived quality of life is improved by regular physical activity.
- Physical activity improves physical function among individuals of all ages, enabling them to conduct their daily lives with energy and without undue fatigue. This is true for older adults, for whom improved physical function not only reduces risk of falls and fall-related injuries but contributes to their ability to maintain independence. It is also true for young and middle-aged adults, as improved physical function is manifested in the ability to more easily accomplish the tasks of daily living, such as climbing stairs or carrying groceries.

Some benefits happen immediately. A single bout of moderate-to-vigorous physical activity will reduce blood pressure, improve insulin sensitivity, improve sleep, reduce anxiety symptoms, and improve cognition on the day that it is performed. Most of these improvements become even larger with the

regular performance of moderate-to-vigorous physical activity. Other benefits, such as disease risk reduction and physical function, accrue within days to weeks after adopting a new physical activity routine.

Physical activity reduces the risk of a large number of diseases and conditions. The past 10 years have greatly expanded the list of diseases and conditions for which greater amounts of physical activity reduce the risk. Some of the major results include:

- Strong evidence demonstrates that greater volumes of moderate-to-vigorous physical activity are associated with preventing or minimizing excessive weight gain in adults, maintaining weight within a healthy range, and preventing obesity. This is important because losing weight is difficult and costly.
- Strong evidence demonstrates that higher amounts of physical activity are associated with a reduced risk of excessive increases in body weight and adiposity in children ages 3 to 17 years.
- Strong evidence also demonstrates that more physically active women are less likely to gain excessive weight during pregnancy. They also are less likely to develop gestational diabetes or develop postpartum depression than their less active peers. Maternal and child health has been, appropriately, a priority in the United States for generations. These findings indicate that physical activity is an important tool in the maintenance of maternal health, and affects a key time period when establishing lifelong healthy behaviors can be beneficial to women and their children alike.
- Strong evidence demonstrates that greater volumes of physical activity reduce the risk of dementia and improve other aspects of cognitive function. Given the high and rising prevalence of older Americans and the expense and heartache of caring for individuals with dementia, the value of preventing dementia is high.
- For the first time, the 2018 Scientific Report demonstrates that regular physical activity provides health benefits to children as young as ages 3 to 5 years. The 2008 Committee was unable to reach a conclusion about this young age group because of insufficient information. A substantial increase in evidence since then has allowed the 2018 Committee to conclude that, in addition to the reduced risk of excessive gains in body weight and adiposity, regular physical activity improves bone health in this young age group. These findings call attention to the importance of establishing healthy physical activity behaviors at an early age.
- For older adults, strong evidence demonstrates a reduced risk of falls and fall-related injuries.

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- The 2008 Committee concluded that regular moderate-to-vigorous physical activity reduced the risk of breast and colon cancer. The 2018 Committee expanded that list to include a reduced risk for cancers of the bladder, endometrium, esophagus, kidney, lung, and stomach.
- A large portion of the general population already has a chronic disease or condition. The 2018 Committee has concluded that, for many of these individuals, regular physical activity can reduce the risk of developing a new chronic condition, reduce the risk of progression of the condition they already have, and improve their quality of life and physical function. The conditions examined by the Committee included some of the most prevalent, including osteoarthritis, hypertension, and type 2 diabetes.

The benefits of physical activity can be achieved in a variety of ways. The public health target range suggested in the 2008 Scientific Report was 500 to 1,000 MET-minutes of moderate-to-vigorous physical activity (or 150 to 300 minutes per week of moderate-intensity physical activity). The 2018 Committee concurs with this target range. Unfortunately, half the U.S. adult population does not currently attain this level of physical activity. Thirty percent of the population reports doing no moderate-to-vigorous physical activity. Thus, for a large segment of the population, major improvements in health are available from modest increases in regular physical activity.

The 2008 Committee reported that inactive individuals can achieve substantial health gains by increasing their activity level even if they do not reach the target range. Since 2008, substantially more information in the scientific literature documents the value of reducing inactivity even if the 150- to 300-minute weekly target range is not achieved. Here is a brief review of the major findings.

- For individuals who perform no or little moderate-to-vigorous physical activity, replacing sedentary behavior with light-intensity physical activity reduces the risk of all-cause mortality, cardiovascular disease incidence and mortality, and the incidence of type 2 diabetes. Before this report, evidence that light-intensity physical activity could provide health benefits had not been clearly stated.
- Individuals who perform no or little moderate-to-vigorous physical activity, no matter how much time they spend in sedentary behavior, can reduce their health risks by gradually adding some or more moderate-intensity physical activity.
- For individuals whose amount of moderate-to-vigorous physical activity is below the current public health target range of 150 to 300 minutes of moderate-intensity physical activity, even

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small increases in moderate-intensity physical activity provide health benefits. There is no threshold that must be exceeded before benefits begin to occur.

- For individuals whose physical activity is below the current public health target range, greater benefits can be achieved by reducing sedentary behavior, increasing moderate-intensity physical activity, or combinations of both.
- For any given increase in moderate-to-vigorous physical activity, the relative gain in benefits is greater for individuals who are below the current public health target range than for individuals already within the physical activity target range. For individuals below the target range, substantial reductions in risk are available with relatively small increases in moderate-intensity physical activity.
- Individuals already within the physical activity target range can gain more benefits by doing more moderate-to-vigorous physical activity. Individuals within the target range already have substantial benefits from their current volume of physical activity.
- Bouts, or episodes, of moderate-to-vigorous physical activity of any duration may be included in the daily accumulated total volume of physical activity. The *2008 Physical Activity Guidelines for Americans* recommended accumulating moderate-to-vigorous physical activity in bouts of 10 minutes or more. Research now shows that any amount of moderate-to-vigorous physical activity counts toward meeting the target range. Previously, insufficient evidence was available to support the value of bouts less than 10 minutes in duration. The 2018 Committee was able to conclude that bouts of any length contribute to the health benefits associated with the accumulated volume of physical activity.

Efforts to promote physical activity can be effective. The 2008 Scientific Report included no information about methods of promoting and facilitating healthy levels of physical activity. The 2018 Scientific Report includes a summary of major findings from the large body of scientific literature about promoting physical activity through different interventions.

- Strong evidence demonstrates that individual-level interventions can increase the volume of physical activity performed by youth and by adults, especially when the interventions are based on behavioral change theories and techniques.
- School-based, especially multi-component, programs and community-wide physical activity programs can be effective.

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- Environmental and policy changes that improve access to places where people can be physically active, modify the built environment to better support physical activity behaviors (including physically active transport), and that, in general, make it easier for people to be physically active can be effective.
- Information and communication technologies, including wearable activity monitors, telephone and smartphone programs and applications, computer-tailored print interventions, and the Internet, can be used to enable self-monitoring, deliver messages, and provide support, all of which are helpful in promoting regular physical activity.

PUBLIC HEALTH IMPACT

The public health impact of insufficient physical activity and the potential gains from even small population-wide increases are substantial. Information contained in this report indicates that, in addition to a reduced risk of death, greater amounts of regular moderate-to-vigorous physical activity reduce the risk of many of the most common and expensive diseases or conditions in the United States. Heart disease, stroke, hypertension, type 2 diabetes, dementia, depression, postpartum depression, excessive weight gain, falls with injuries among the elderly, and breast, colon, endometrial, esophageal, kidney, stomach, and lung cancer are all less common among individuals who are or become more physically active. In addition, this report provides evidence that for some of these conditions, individuals who are or become more physically active, relative to their peers with the same condition, have a reduced risk of mortality, reduced risk of developing other chronic diseases or conditions, and reduced risk of progression of the disease they already have. They also have improved physical function and better quality of life.

Each of these conditions alone adds substantially to annual direct and indirect medical costs in the United States. Even small increases in regular moderate-to-vigorous physical activity, especially if made by the least physically active individuals, would appreciably reduce the nation's direct and indirect medical costs. Quantification of the costs attributable to insufficient physical activity was beyond the scope of this Committee. It is clear, however, that the cost reductions would be large by any standards.

More difficult to quantify, but equally as important, are the benefits associated with how individuals feel every day and the energy and vitality they have to carry out their daily lives. Placing dollar estimates on improved cognition across the full life span, better quality of life, fewer symptoms of depression and anxiety, enhanced quality of sleep, and improved physical function is difficult. In addition, monetizing

these benefits likely cannot adequately describe the intangible societal benefits that derive from a happier and more energetic population.

THE FUTURE

The field of physical activity and public health has matured markedly in the past 10 years, and it will continue to develop at a rapid pace. Using the existing extensive scientific foundation and aided by recent technological advances, increases in knowledge about the relationships between physical activity and a wide variety of health and quality of life outcomes will surely continue. The Committee has described current evidence and recent gains in knowledge, but recognizes that in the near future, the field will generate more information about the benefits of physical activity and the types and volumes that provide those benefits. In addition, gains in the area of physical activity promotion are accumulating rapidly. Transferring this new knowledge into public health practice has the potential to improve the health of the American public to an unprecedented level.

At the same time, the Committee recognized that important gaps in knowledge still remain. It prepared a substantial list of topic-specific research recommendations. Six overarching recommendations are provided here.

- Determine the independent and interactive effects of physical activity and sedentary behavior on multiple health outcomes in youth, adults, and older adults.
- Determine the role and contribution of light-intensity physical activity alone or in combination with moderate-to-vigorous physical activity to health outcomes.
- Identify effective intervention strategies for increasing physical activity through actions in multiple settings in youth, adults, and older adults. Determine how the effectiveness of interventions differs by sex, age, race, ethnicity, socioeconomic status, and other factors.
- Strengthen the understanding of dose-response relationships between physical activity and multiple health outcomes in youth, adults, and older adults, and especially during the life transitions between these categories.
- Expand knowledge of the extent to which the relationships between physical activity and health outcomes are modified by demographic factors, including sex and race/ethnicity.
- Develop instrumentation and data collection systems that will enhance physical activity surveillance systems in the United States.