

PART H. APPENDIX 1. GLOSSARY OF TERMS

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This section provides definitions for many of the key terms used in this report, and the definitions reflect those commonly used in the scientific literature as well as in major reports and recommendations for physical activity and health. The Committee recognizes that as research continues and the evidence base for physical activity and health grows and evolves, new terms will emerge and definitions may change. Also, please see *Part C. Background and Key Physical Activity Concepts* for additional discussion of selected terms in this glossary and their related concepts.

Physical Activity and Exercise

Physical activity. Bodily movement produced by skeletal muscles that results in energy expenditure. The term does not require or imply any specific aspect or quality of movement and encompasses all types, intensities, and domains.

Exercise. Physical activity that is planned, structured, repetitive, and designed to improve or maintain physical fitness, physical performance, or health. Exercise encompasses all intensities.

Non-exercise physical activity. All physical activity that is not exercise.

Sedentary behavior. Any waking behavior characterized by an energy expenditure of 1.5 or fewer METs

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while sitting, reclining, or lying. Most office work, driving a car, and sitting while watching television are examples of sedentary behaviors. Sedentary behavior and sedentary activity (see definition below) are similar but not synonymous; both are limited to energy expenditures 1.5 or fewer METs, but sedentary activity includes standing.

Types of Physical Activity

Aerobic physical activity. Forms of activity that are intense enough and performed long enough to maintain or improve an individual's cardiorespiratory fitness. Aerobic activities commonly require the use of large muscle groups. Examples of aerobic activities include walking, basketball, soccer, wheelchair rolling, or dancing.

Anaerobic physical activity. High-intensity activity that exceeds the capacity of the cardiovascular system to provide oxygen to muscle cells for the usual oxygen-consuming metabolic pathways. Anaerobic activity can be maintained for only a short period of time, about 2 to 3 minutes. Sprinting and power lifting are examples of anaerobic physical activity.

Balance training. Movements that safely challenge postural control. If practiced regularly, they improve the ability to resist intrinsic or environmental forces that cause falls whether walking, standing, or sitting. Walking backward, standing on one leg, or using a wobble board are examples of balance training. Strengthening muscles of the core and legs also improves balance.

Bone-strengthening activities. Movements that create impact- and muscle-loading forces on bone. These forces stress the bone, which adapts by modifying its structure (shape) or mass (mineral content), thereby increasing its resistance to fracture. Jumping, hopping, skipping, and dancing are activities that strengthen bones, as are high-resistance muscle-strengthening activities.

Flexibility training (stretching). Activity that improves the range and ease of movement around a joint. Static stretching, various poses of yoga, and some movements of tai chi are examples of flexibility training.

High-intensity interval training (HIIT) is a form of interval training consisting of alternating short periods of intense anaerobic exercise with less intense aerobic recovery periods. There are no universally accepted lengths for either the anaerobic period, the recovery period, nor the ratio of the two; no universally accepted number of cycles for any HIIT session or the entire duration of the training bout;

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and no universally accepted relative intensity at which the intense anaerobic component should be performed.

Muscle-strengthening activities. Physical activities that maintain or improve muscular strength (how much resistance can be overcome), endurance (how many times or for how long can resistance be overcome), or power (how fast can the resistance be overcome). Muscle-strengthening activities include everyday behaviors, such as carrying heavy groceries, shoveling snow, lifting children, or climbing stairs, as well as the use of exercise equipment, such as weight machines, free weights, or elastic bands.

Resistance training. A method of muscle-strengthening activity or conditioning that involves the progressive use of resistance to increase one's ability to exert or resist force.

- **Isometric resistance exercise (iso meaning equal and metric meaning length).** A type of muscle contraction during which the muscle generates force without lengthening and movement of the object.
- **Dynamic resistance exercise.** A type of contraction during which the muscle generates force by changing length to move an object. Contractions that produce a lengthening of the muscle are termed eccentric, whereas those involving shortening are termed concentric.

Domains of Physical Activity

Activities of daily living: Activities required for everyday living, including eating, bathing, toileting, dressing, getting into or out of a bed or chair, and basic mobility.

Instrumental activities of daily living. Activities related to independent living, including preparing meals, managing money, shopping for groceries or personal items, and performing housework.

Household physical activity. Activity done in or around the home, such as cooking, cleaning, home repair, yardwork, or gardening.

Leisure-time physical activity. Discretionary activity performed when one is not working, transporting oneself to a different location, or doing household chores. Sports or exercise, going for a walk, and playing games (hopscotch, basketball), are examples of leisure-time physical activity.

Occupational physical activity. Activity performed at work, such as stocking shelves in a store, delivering packages in an office, preparing or serving food in restaurant, or carrying tools in a garage are examples of occupational physical activity.

Transportation physical activity. Activity performed to get from one place to another, such as walking to and from work, school, or shopping.

Absolute and Relative Intensity

Absolute intensity. The rate of energy expenditure required to perform any given physical activity. It can be measured in metabolic equivalents, kilocalories, joules, or milliliters of oxygen consumption.

- **Metabolic equivalent of task (MET).** A unit that represents the metabolic cost of physical activity. One MET is the rate of energy expenditure while sitting at rest, which, for most people approximates an oxygen uptake of 3.5 ml per kg per min. The energy expenditure of other activities is expressed in multiples of METs. For example, for the average adult, sitting and reading requires about 1.3 METs, strolling or walking slowly requires about 2.0 METs, and running at 5 miles per hour requires about 8.3 METS.

Absolute rates of energy expenditure are commonly divided into four categories:

- **Sedentary activity.** Activity requiring 1.0 to 1.5 METs, such as sitting and reading or watching television, or standing quietly.
- **Light intensity.** Activity requiring 1.6 to less than 3.0 METs, such as walking at a slow pace (2 mph or less) or cooking.
- **Moderate intensity.** Activity requiring 3.0 to less than 6.0 METs, such as walking briskly (3 to 4 mph), mopping or vacuuming, or raking a yard.
- **Vigorous intensity.** Activity requiring 6.0 or greater METs, such as walking very fast (4.5 to 5 mph), running, mowing grass with a hand-push mower, or participating in an aerobics class.

Relative intensity. Relative intensity refers to the ease or difficulty with which an individual performs any given physical activity. It has a physiologic basis and can be described using physiologic parameters, such as percent of aerobic capacity (VO_2max) or percent of maximal heart rate. Relative intensity can also be estimated by self-report of level of perceived exertion during an activity.

Dose, Volume, and Dose-response for Aerobic Activities

Dose. The amount of physical activity performed or prescribed. Dose is commonly calculated for a specific period of time, such as per day or per week, and has been limited to moderate-to-vigorous

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physical activity. Aerobic physical activity dose commonly has three components:

- **Frequency.** The number of sessions or bouts of physical activity performed per day or per week.
- **Duration.** The length of time for each session or bout.
- **Intensity.** The rate of energy expended during the physical activity session or bout, usually in METs.

Dose-response. The relationship between the dose or volume of physical activity and the magnitude of its effect on a health outcome (e.g., mortality) or physiologic measure (e.g., aerobic fitness). A graduated response—small dose with small response, large dose with large response—is evidence of the truth of the relationship. For ordinal data, a dose-response relationship requires at least three levels of exposure.

Volume. The quantification of the dose of activity accumulated over a specified length of time. Volume is usually expressed in MET-minutes or MET-hours per day or week, which involves multiplying the physical activity frequency and duration by the MET values corresponding to that physical activity.

Physical Fitness and Physical Function

Physical fitness. The ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and meet unforeseen emergencies. It has been defined by the World Health Organization as "the ability to perform muscular work satisfactorily." Physical fitness includes a number of components consisting of cardiorespiratory endurance (aerobic power), skeletal muscle endurance, skeletal muscle strength, skeletal muscle power, flexibility, balance, speed of movement, reaction time, and body composition.

- **Agility.** Ability to change position of the entire body in space with speed and accuracy.
- **Balance.** Ability to maintain the body's equilibrium while stationary or moving.
- **Cardiorespiratory endurance.** Ability to perform large muscle, whole-body exercise at moderate to high intensities for extended periods of time.
- **Coordination.** Ability to carry out motor tasks smoothly and accurately.
- **Flexibility.** The range of motion possible at a joint.

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- **Musculoskeletal fitness.** The integrated function of muscle strength, muscle endurance, and muscle power to enable the performance of work.
- **Power.** The rate at which work can be performed.
- **Strength.** Ability of a muscle or muscle group to exert force.

Physical function. The ability of a person to move around and to perform types of physical activity.

Measures of physical function include measures of ability to walk (e.g., usually gait speed), run, climb stairs, carry groceries, sweep the floor, stand up, and bathe.

Related Physical Fitness Terms

Accumulation/Accumulate The concept of meeting a specific physical activity dose or goal by performing activity in several bouts, then adding together the time spent during each of these bouts. For example, a 30-minute per day goal could be met by performing several bouts of moderate-to-vigorous physical activity throughout the day.

Adaptation. The body's response to exercise or activity. Some of the body's structures and functions favorably adjust to the increase in demands placed on them whenever physical activity of a greater amount or higher intensity is performed than what is usual for the individual. It is these adaptations that are the basis for much of the improved health and fitness associated with increases in physical activity.

Adverse event. In the context of physical activity, a negative health event. Examples of adverse events as a result of physical activity include musculoskeletal injuries (injury to bone, muscles, or joints), heat-related conditions (e.g., heat exhaustion), and cardiovascular (e.g., heart attack or stroke) events.

Maximal oxygen uptake ($\text{VO}_{2\text{max}}$). The body's capacity to transport and use oxygen during a maximal exertion involving dynamic contraction of large muscle groups, such as during running or cycling. It is also known as maximal aerobic power. Peak oxygen consumption ($\text{VO}_{2\text{peak}}$) is the highest rate of oxygen consumption observed during an exhaustive exercise test.

Overload. The amount of new activity added to a person's usual level of activity. The risk of injury to bones, muscles, and joints is directly related to the size of the overload.

Progression. The process of increasing the intensity, duration, frequency, or amount of activity or exercise as the body adapts to a given activity pattern.

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Repetitions. The number of times a person lifts a weight in muscle-strengthening activities.

Specificity. A principle of exercise physiology that indicates that physiologic changes in the human body in response to physical activity are highly dependent on the type of physical activity. For example, the physiologic effects of walking are largely specific to the lower body and the cardiovascular system.

Health and Health Conditions

Health. A human condition with physical, social, and psychological dimensions, each characterized on a continuum with positive and negative poles. Positive health is associated with a capacity to enjoy life and to withstand challenges; it is not merely the absence of disease. Negative health is associated with morbidity, and in the extreme, with premature mortality.

Quality of life. A concept that reflects how individuals perceive and react to their health status and to other, non-medical aspects of their lives.

- **Health-related quality of life.** A multi-dimensional concept that reflects the way that individuals perceive and react to their health status. It includes domains related to physical, mental, emotional, and social functioning.

Body weight status. A concept encompassing issues related to weight gain, loss, and maintenance.

- **Clinically significant weight loss.** A change in body weight of 5 percent or greater.
- **Excessive weight gain.** A change in body weight of more than 2 kg per year or 10 kg per decade; or, a weight increase of more than 3 percent.

Brain health. The optimal functioning of behavioral and biological measures of the brain and the subjective experiences arising from brain function (e.g., mood).

- **Affect.** Subjective experience of feeling states defined by independent dimensions of valence (pleasure) and activation.
- **Anxiety.** An unpleasant high activation feeling state characterized by feelings of apprehension, worry, and physical sensations arising from activation of the autonomic nervous system. In the extreme, these feelings can become a clinical disorder.

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- **Cognition.** The set of mental processes that contribute to perception, memory, intellect, and action. Cognitive function can be assessed using a variety of techniques including paper-pencil based tests, neuropsychological testing, and computerized testing methods. Cognitive functions are divided into different domains that capture both the type of process as well as the brain areas and circuits that support those functions. Working memory, visual attention, and long-term memory are all examples of different cognitive domains that are thought to be dependent on overlapping yet largely separate neural systems.
- **Depression.** An unpleasant low activation feeling state characterized by sadness, or feelings of hopelessness or guilt. In the extreme, these feelings can become a clinical disorder.
- **Sleep.** A reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment, which consists of two separate states that are as different from one another as they are from wakefulness: Rapid Eye Movement (REM) and Non-REM.

Cancer. A collection of related diseases in which some of the body's cells begin to divide without stopping and spread into surrounding tissues.

- **Cancer survivor.** A person who has been diagnosed with, is undergoing treatment for, or has received treatment for any type of cancer.
- **Cancer recurrence.** An event in which the original primary cancer is detected after a remission (the period during which cancer was no longer detected).
- **Second primary cancer.** A new cancer that occurs sometime after diagnosis of original primary cancer.

Cardiovascular disease. Diseases of the heart, brain, and blood vessel system (arteries, capillaries, veins) within the entire body. Cardiovascular disease encompasses coronary heart disease/ischemic heart disease, coronary artery disease, stroke, and heart failure. It does not include congenital heart disease.

Diabetes. A disease characterized by high blood glucose levels caused by either a lack of insulin or the body's inability to use insulin efficiently. The extent that blood glucose is persistently elevated is commonly assessed by measuring glycated hemoglobin, abbreviated as HbA1C. The current criteria used to diagnose diabetes are an HbA1C of 6.5% or higher, fasting blood glucose of 126 mg per dL or higher, and/or a 2-hour oral glucose tolerance test (OGTT) blood glucose of 200 mg per dL or higher.

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- **Prediabetes.** Having an HbA1C of 5.7% to 6.4%, fasting blood glucose of 100 to 125 mg per dl, and/or an OGTT 2-hour blood glucose of 140 mg per dL to 199 mg per dL with fasting blood glucose of less than 126 mg per dL.
- **Normal blood glucose.** Having an HbA1C below 5.7%, fasting blood glucose less than 100 mg per dL, and an OGTT 2-hour blood glucose lower than 140 mg per dL.

Disease progression. A change or worsening of a disease over time.

Fall. The act of moving without control from being upright to not being upright.

Hypertension. A condition in which blood pressure remains elevated over time.

- **Current blood pressure classification scheme.** According to the 2017 *Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults*, hypertension is defined as a resting systolic blood pressure of 130 mmHg or greater and/or a resting diastolic blood pressure 80 mmHg or greater, or taking antihypertensive medication, regardless of the resting blood pressure level. Normal blood pressure is defined as having resting systolic blood pressure less than 120 mmHg and a diastolic blood pressure less than 80 mmHg. These Guidelines eliminate the term “prehypertension” and add “elevated blood pressure,” which is defined as a resting systolic blood pressure between 120 to 129 mmHg and a diastolic blood pressure less than 80 mmHg.
- **Blood pressure classification scheme used by the Committee.** Because the literature reviewed by the Committee was based upon the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) blood pressure classification scheme, these classifications were used to answer the Committee’s blood pressure questions. The JNC 7 defines hypertension as having a resting systolic blood pressure of 140 mmHg or greater and/or a resting diastolic blood pressure 90 mmHg or greater, or taking antihypertensive medication, regardless of the resting blood pressure level. Prehypertension is defined as a systolic blood pressure from 120 to 139 mmHg and /or diastolic blood pressure from 80 to 89 mmHg. Normal blood pressure is defined as having a systolic blood pressure less than 120 mmHg and diastolic blood pressure less than 80 mmHg.

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Intellectual disability. Significant limitation in both intellectual function and adaptive behavior, defined as the collection of conceptual, social, and practical skills that are learned and performed within everyday life, that manifests before the age of 18 years.

Multiple sclerosis. An immune-mediated process in which an abnormal response of the body's immune system is directed against the central nervous system, which consists of the brain, spinal cord, and optic nerves. It is marked by symptoms such as fatigue, gait disturbances, and spasticity and is typically characterized by evidence of damage in at least two separate areas of the central nervous system that occurred at least 1 month apart.

Osteoarthritis. A disorder of movable joints occurring idiopathically in characteristic locations and increasing with age. Osteoarthritis can occur secondarily in any joint in response to a joint insult (e.g., injury, infection). Osteoarthritis involves anatomic, and/or physiologic derangements of all joint tissues (characterized by cartilage degradation, bone remodeling, osteophyte formation, joint inflammation, muscle weakness and loss of normal joint function), that can culminate in illness (pain, stiffness, or loss of quality of life).

Postpartum period. A period of time for a woman that encompasses the date of birth through 1 year after birth.

Risk of co-morbid conditions. The chance of having one or more additional conditions.

Spinal cord injury. Damage incurred to the spinal cord resulting from trauma, disease, or degeneration and marked by symptoms that vary according to the level (location) and severity of the injury.

Study Design and Synthesis

Case-control study. A type of epidemiologic study design in which participants are selected based on the presence or absence of a specific outcome of interest, such as cancer or diabetes. The participant's past physical activity practices are assessed, and the association between past physical activity and presence of the outcome is determined.

Cross-sectional study. A type of epidemiologic study that compares and evaluates specific groups or populations at a single point in time.

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Intervention. Any kind of planned activity or group of activities (including programs, policies, and laws) designed to prevent disease or injury or promote health in a group of people, about which a single summary conclusion can be drawn.

Meta-analysis. A review of a focused question that follows rigorous methodological criteria and uses statistical techniques to combine data from studies on that question.

Observational study. A study in which outcomes are measured but no attempt is made to change the outcome. The two most commonly used designs for observational studies are case-control studies and prospective cohort studies.

Prospective cohort study. A type of epidemiologic study in which the practices of the enrolled subjects are determined and the subjects are followed (or observed) for the development of selected outcomes. It differs from randomized controlled trials in that the exposure is not assigned by the researchers.

Randomized controlled trial. A type of study design in which participants are randomly grouped on the basis of an investigator-assigned exposure of interest, such as physical activity. For example, among a group of eligible participants, investigators may randomly assign them to exercise at three levels: no activity, moderate-intensity activity, and vigorous-intensity activity. The participants are then followed over time to assess the outcome of interest, such as change in abdominal fat.

Retrospective study. A study in which the outcomes have occurred before the study data collection has begun.

Systematic review. A review of a clearly defined question that uses systematic and explicit methods to identify, select, and critically evaluate relevant research, and to collect and analyze data from the studies included in the review.

Measurement

Effect size. The difference in mean outcomes of the treatment (exposed) and control (unexposed) groups, divided by the standard deviation of the outcome in the control group or the pooled standard deviation.

Hazard ratio. A measure of how often a particular event happens in one group compared to how often it happens in another group, over time. A hazard ratio of 1.0 means that there is no difference in survival or time to event between the two groups. A hazard ratio of greater than 1.0 or less than 1.0 means that

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survival or time to event was better in one of the groups. For example, a hazard ratio of 0.5 for mortality in people who participate in physical activity, compared with people who are inactive, indicates that active persons are 0.5 times (50%) less likely to have died at any particular point in time, compared with those who are inactive.

Odds ratio. A measure of association used in epidemiologic studies. It measures the chances of an event (or disease) occurring in one group of people as compared to another group with different characteristics. For example, an odds ratio of 0.5 for high blood pressure in people who participate in physical activity, compared with people who are inactive, indicates that active persons have 50% lower odds of having high blood pressure, compared with those who are inactive.

Relative risk. A measure of association used in epidemiologic studies. It measures the magnitude of association between an exposure (such as physical activity) and a disease (such as colon cancer). In physical activity, relative risk is typically the ratio of the risk of a disease or disorder when comparing groups of people who vary in their amount of physical activity. A relative risk of 0.5 for colon cancer associated with physical activity, compared with inactivity, indicates that active persons have 0.5 times (or 50%) the risk of developing colon cancer compared to inactive persons.

Confidence interval. When a measure of association, such as relative risk or hazard ratio, is calculated, one can also calculate a confidence interval, or a band of uncertainty, around the estimate. Typically, 95% confidence intervals are used in epidemiologic studies. For example, if the estimated relative risk for colon cancer associated with physical activity, compared with inactivity, is 0.5 with a 95% confidence interval of 0.3 to 0.8, this means that if the study were repeated over and over, in at least 95% of the repetitions the true estimate of the relative risk would be between 0.3 and 0.8.

Standardized mean difference. A summary statistic used in meta-analyses when the studies all assess the same outcome but measure it in a variety of ways (for example, all studies measure depression but they use different psychometric scales). In this circumstance, it is necessary to standardize the results of the studies to a uniform scale before they can be combined. The standardized mean difference expresses the size of the intervention effect in each study relative to the variability observed in that study, usually the standard deviation of the measures.