

Field Assessments for Obesity Prevention in Children and Adults: Physical Activity, Fitness, and Body Composition

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ABSTRACT

Nutrition and health educators work in community settings implementing lifestyle programs focused on obesity prevention and chronic disease risk reduction. These programs typically focus on improving diet and physical activity (PA) behaviors. Many nutrition educators may not be confident in their ability to select, administer, and interpret PA assessments to effectively evaluate their PA or lifestyle programs. This report will assist educators in identifying and selecting appropriate field-based assessments for measurement of PA, physical fitness, and body composition for children and adults. Specific guidelines, references, and resources are given for selecting assessment methods and test within these 3 areas.

Key Words: body fat, waist circumference, exercise, physical activity assessment, community nutrition (*J Nutr Educ Behav.* 2014;46:43-53.)

INTRODUCTION

There is strong scientific evidence that physical activity (PA) increases health-related fitness and decreases risk for chronic and disabling diseases, including obesity, in active compared with inactive adults.¹ To achieve these benefits, adults need to participate in 150 min/wk of moderate or 75 min/wk of vigorous PA. For youth and children ages 6 years and older, there is also strong scientific evidence that PA substantially improves cardiorespiratory fitness, strengthens bones and muscles, helps to attain and maintain healthy weight, reduces risk of depression and anxiety, and decreases the likelihood of developing risk factors associated with chronic disease.² To achieve these benefits children and youth need to participate in 60 min/d or more of PA,¹ including aerobic and age-appropriate muscle and bone-strengthening activities.² In addition,

the 2010 *Dietary Guidelines for Americans*³ support engaging in PA to assist in balancing energy expenditure with energy intake for the maintenance of a healthy body weight and reduction of chronic disease.

Health and nutrition educators work in community settings implementing healthy lifestyle programs focused on obesity prevention and chronic disease reduction. These lifestyle programs typically emphasize improving diet and PA behaviors, which will result in improvements in health outcomes such as body size and fitness, or reduced chronic disease risk factors. To determine the effectiveness of these programs, nutrition educators must identify and measure outcomes related to their program goals. As part of the overall lifestyle program evaluation, assessing changes in diet, PA, or physical fitness (PF) is frequently done. Although nutrition educators are confident in their ability

to assess dietary change, they may be less confident in their ability to select, administer, and interpret PA or PF assessments to measure the impact of a PA intervention. The goal of this report is to help nutrition educators, who are less familiar with exercise science, to identify and select appropriate field-based assessment tools for the measurement of change in PA, PF, and/or body composition. First, definitions of the PA and exercise science terms used within this report are given. Second, field assessments of PA and PF are given based on the measures each method or test provides, the audience for which they were designed and validated, the length of the assessment, the method description, and the advantages and disadvantages of the method. Within each of these areas, the method or test that would work best within a community-based setting with limited training and costs is identified. Third, field assessment measures of body composition are briefly addressed. Emphasis is placed on helping the educator identify the method or test that will work best in the field, based on the skills, time, and resources of the educator, the environment in which they are working, and the population they are evaluating.

DEFINITIONS

To understand the assessment measures of the PA and PF methods in this report, it is important to

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understand the meaning of the terms used. Physical activity refers to the body movement that enhances health and increases energy expenditure; PF is the capacity to perform PA based on various physiological indicators.

An individual can be physically active and not physically fit, or have some increased measure of fitness and not be active. Other exercise science and PA terms used within this report are defined in Table 1.^{1,2}

PHYSICAL ACTIVITY ASSESSMENT

Ideally, PA assessment should measure all dimensions of PA, including type, frequency, intensity, and duration.

Table 1. Terms and Definitions Used to Describe Physical Activity and Exercise¹

Terms	Definitions
PA	Any body movement that enhances health and increases energy expenditure above basal levels
PF	Capacity to perform PA based on various physiological parameters. One can be physically active and not physically fit, or have some increases measure of fitness and not be active
Exercise	A subcategory of PA identified as planned, structured, and purposeful, designed for improvement or maintenance of PF (eg, sports, jogging, swimming, physical education classes). Exercise is sometimes referred to as programmed PA
ADL	Activities required for everyday living, including eating, walking, standing, cooking, dressing, getting up from chair, and activities associated with one's job, work, or school. There is clear research evidence that all PA, including ADL and planned exercise, can contribute to overall health, especially maintenance of healthy body weight and weight loss, or maintenance of weight loss after dieting
Duration	Length of time in which an activity or exercise is performed and is reported as minutes per day or week.
Frequency	Number of times an activity or exercise is performed and is reported as number of sessions or bouts per day or week
Intensity	Work that is being performed or magnitude of effort required to perform and activity or exercise, expressed in absolute or relative terms
Absolute intensity	Amount of work being performed, not taking into account physiological capacity of individual. Absolute intensity is reported as energy expenditure required per kilogram body weight per minute or amount of oxygen used by the body doing the activity, expressed using an MET level (eg, 1 MET at rest; 7 METs while running quickly). Absolute intensity is sometimes expressed as the speed in which an activity is performed (eg, walking at 3 mph)
Relative intensity	An individual's exercise capacity (eg, how PF they are). For aerobic activity, relative intensity is expressed as a percentage of an individual's total aerobic capacity, measured or estimated heart rate.
Sedentary behavior	A new measure of activity being assessed by some researchers, defined as the amount of inactivity an individual engages in each day (eg, sitting or lying down; typically 1–1.5 times the resting metabolic rate ³⁷). Sedentary behavior can be measured in 3 ways: time (minutes per day in inactivity), type (eg, TV or screen viewing, reading, sitting, motorized transport), and frequency (length [minutes per bout] and frequency [bouts per day] of sedentary behavior). Television viewing is the most frequently surveyed type of sedentary behavior in children. ^{38,39} The Youth Risk Behavior Survey designates ≥ 3 h/d of TV viewing as excessive, whereas the National Health and Nutrition Examination Survey 2001–2006 reports ≥ 2 h/d as excessive. When using accelerometers to define sedentary behavior, several cutoff points (< 100 to $< 1,100$ counts/min) have been applied to sedentary behavior ⁴⁰
Body composition	Health-related component of PF that applies to body weight and relative amounts of muscle, fat, bone, and other vital tissues of the body. Most often, the components are limited to fat and lean body mass (or fat-free mass) and expressed as relative (percentage) and absolute (kilograms)
Body size	Measured height (centimeters) and weight (kilograms); can be used to determine BMI (kilograms per square meter), a proxy measure for body fat. Body composition and size are frequently used as outcome measures to determine whether improvements in diet and PA are effective in weight management or obesity prevention
Aerobic capacity	Body's capacity to transport and use oxygen during maximal exertion involving dynamic contraction of large muscle groups, such as during running and cycling
Muscular strength	Health and performance component of physical fitness: ability of a muscle or muscle group to exert force
Muscular endurance	Health-related component of PF that applies to ability to produce force or torque repeatedly against submaximal external resistances
Flexibility	Health- and performance-related component of physical fitness: range of motion possible at a joint
MET	1 MET is the rate of energy expenditure while sitting at rest. It is taken by convention to be an oxygen uptake of 3.5 mL/kg body weight/min. Physical activities frequently are classified by their intensity using MET as a reference

ADL indicates activities of daily living; BMI, body mass index; MET, metabolic equivalent; PA, physical activity; PF, physical fitness; TV, television.

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