

# How much exercise do we need?

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## ABSTRACT

How much exercise does one need? It is generally accepted that physical activity increases the chance of losing weight. However, an official recommended daily amount of physical activity began only 3 years ago. The amount is still debated, but current public health recommendations for physical activity are 30 minutes of moderate-intensity activity per day to maintain cardiovascular health. Although there are certain health benefits that come with that level, some people may need more exercise or caloric restriction to control weight. For example, 75 minutes of brisk walking is said to be effective in long-term weight loss for someone who is on a diet. Moreover, in addition to aerobic exercise, people should engage in resistance training and flexibility exercises at least twice a week. This will maintain the lean body mass and improve muscular strength and endurance. By practicing regular physical activities one can promote the quality of life.

## INTRODUCTION

Most of us know that exercise is good because there have been many studies done over the years that support this statement (1). They show that when a person exercises consistently, their health is improved as the heart and lungs become more efficient, muscles become stronger, and cholesterol levels and blood pressure fall, along with the risk of getting diabetes and heart disease (2).

Planned or structured physical activity is exercise (3). Exercise can also be defined as repetitive body movements which help improve or maintain any of the components of physical fitness (3). The basic components of physical fitness are cardio-respiratory endurance (aerobic fitness), muscular strength, muscular endurance and flexibility (3). Long runs and swims improve cardio-respiratory endurance, which is the ability to deliver oxygen and nutrients to tissues and to remove wastes over sustained periods of time. Muscular strength is needed for the muscle to exert force in a short period of time and it can be increased through weight-lifting exercises. Muscular endurance is the ability of muscles to sustain repeated contractions or to continue applying force against a fixed object. Flexibility is needed to move joints and use muscles through their full range of motion (3).

There are different intensities of exercise: light, moderate-intense and vigorous-intense (3). Light physical is any activity that burns < 3.5 calories per minute. Moderate physical activity refers to a level that increases breathing and heart rate. Any activity that burns 3.5 to 7 kcal/min is considered moderate-intense. Vigorous-intense physical activity really challenges a person as their breathing or heart rate is increased substantially. Any activity that burns more than 7 kcal/ min is considered vigorous-intense (3). My hypothesis is that an average human needs around 30 minutes of vigorous physical activity per day in order to maintain their body weight.

## METHODOLOGY

In this research paper, I gathered information from different peer-reviewed articles, nutrition journals, government websites like *Centers for Disease Control and Prevention* (CDC), and reputable organization websites in the field of health such as *American Heart Association* and the *American College of Sports Medicine* (ACSM).

## RESULTS

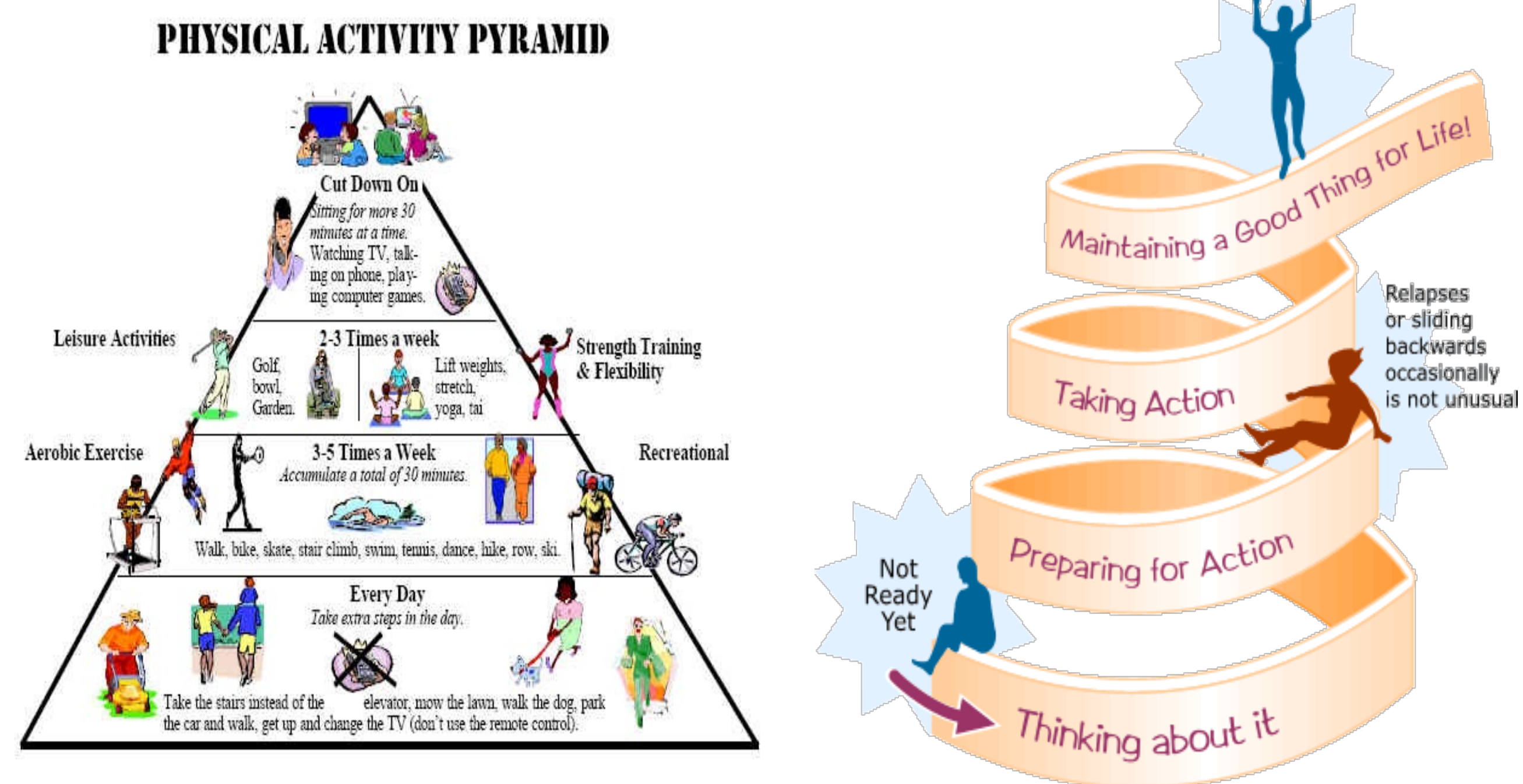
Another way of observing physical activity intensity is to determine whether a person's pulse or heart rate is within the target zone during physical activity. A person's target heart rate for moderate-intense physical activity should be 50 to 70% of his or her maximum heart rate. For vigorous-intense physical activity, target heart rate is 70 to 85% of maximum. This maximum is based on age. To estimate your maximum heart rate, subtract your age from 220. For example, for a 20-year-old, the estimate would be 220 - 20 years = 200 beats per minute (bpm). The 50% and 70% levels would be: 50% level: 200 x 0.50 = 100 bpm, and 70% level: 200 x 0.70 = 140 bpm. For vigorous-intense physical activity, the formula changes from "50 and 70%" to "70 and 85%".

**Table 2.** BMI and physical activity level (PAL) for normal-weight and overweight or obese men and women in 3 age groups

	Normal-weight <sup>1</sup>		Overweight or obese	
	BMI	PAL <sup>2</sup>	BMI	PAL <sup>2</sup>
<b>Men</b>	<i>kg/m<sup>1</sup></i>		<i>kg/m<sup>1</sup></i>	
19–30 y	22.02	1.74	29.62	1.85
31–50 y	22.55	1.81	30.82	1.85
51–70 y	22.95	1.63	29.55	1.72
<b>Women</b>				
19–30 y	21.42	1.80	29.82	1.77
31–50 y	21.64	1.83	31.91	1.79
51–70 y	22.18	1.70	30.37	1.59

<sup>1</sup> BMI (Body Mass Index) of 18.5–25.

<sup>2</sup> A simple way of calculating energy expenditure and estimating energy requirements by dividing total energy expenditure over Basal metabolic rate. Basal metabolic rate is the amount of cal/hr needed to maintain important body functions (breathing, heart beating, etc.). People who are fairly inactive have a PAL of 1.55 to 1.60, and individuals who are relatively active have a PAL of 1.75 or greater.

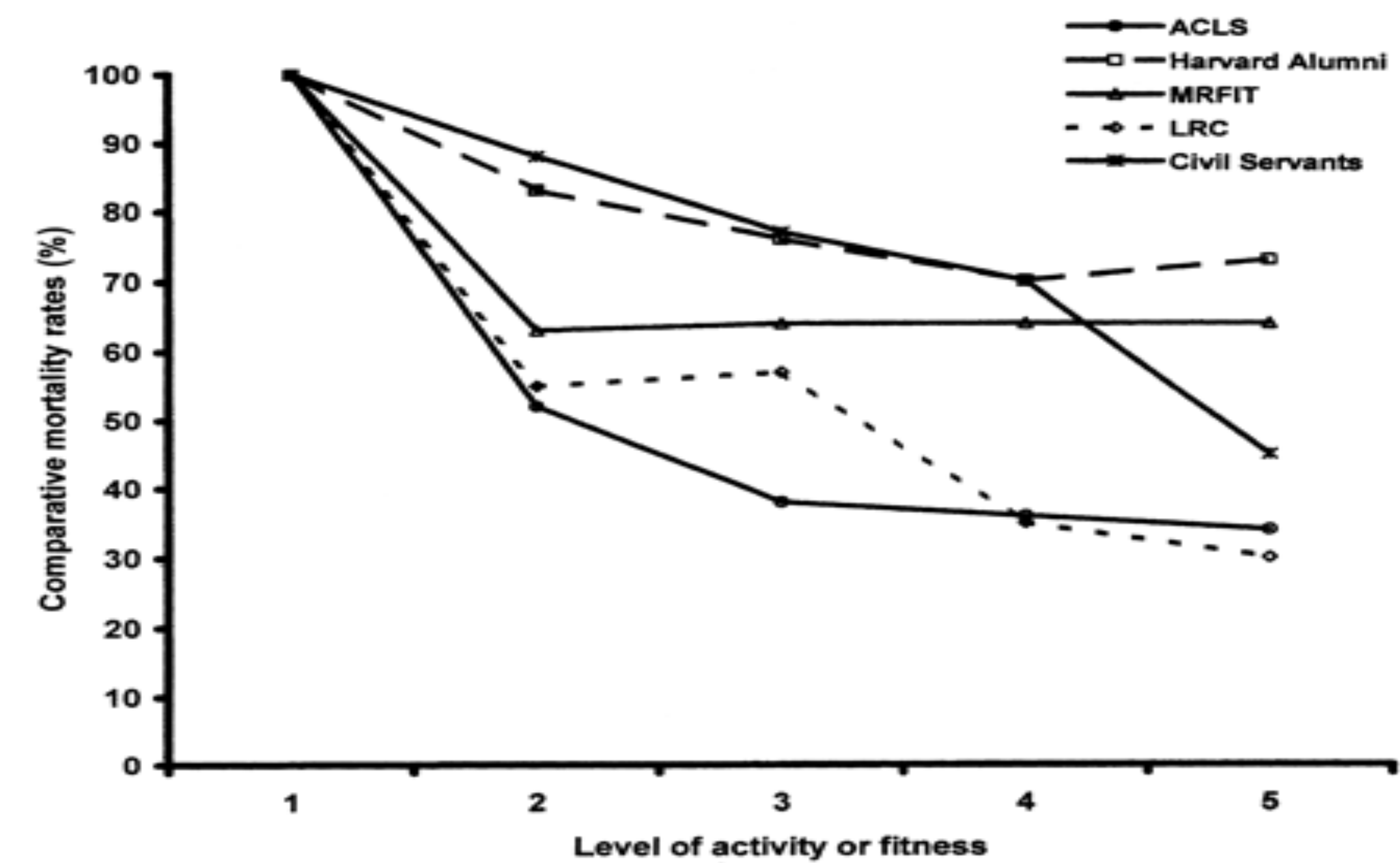
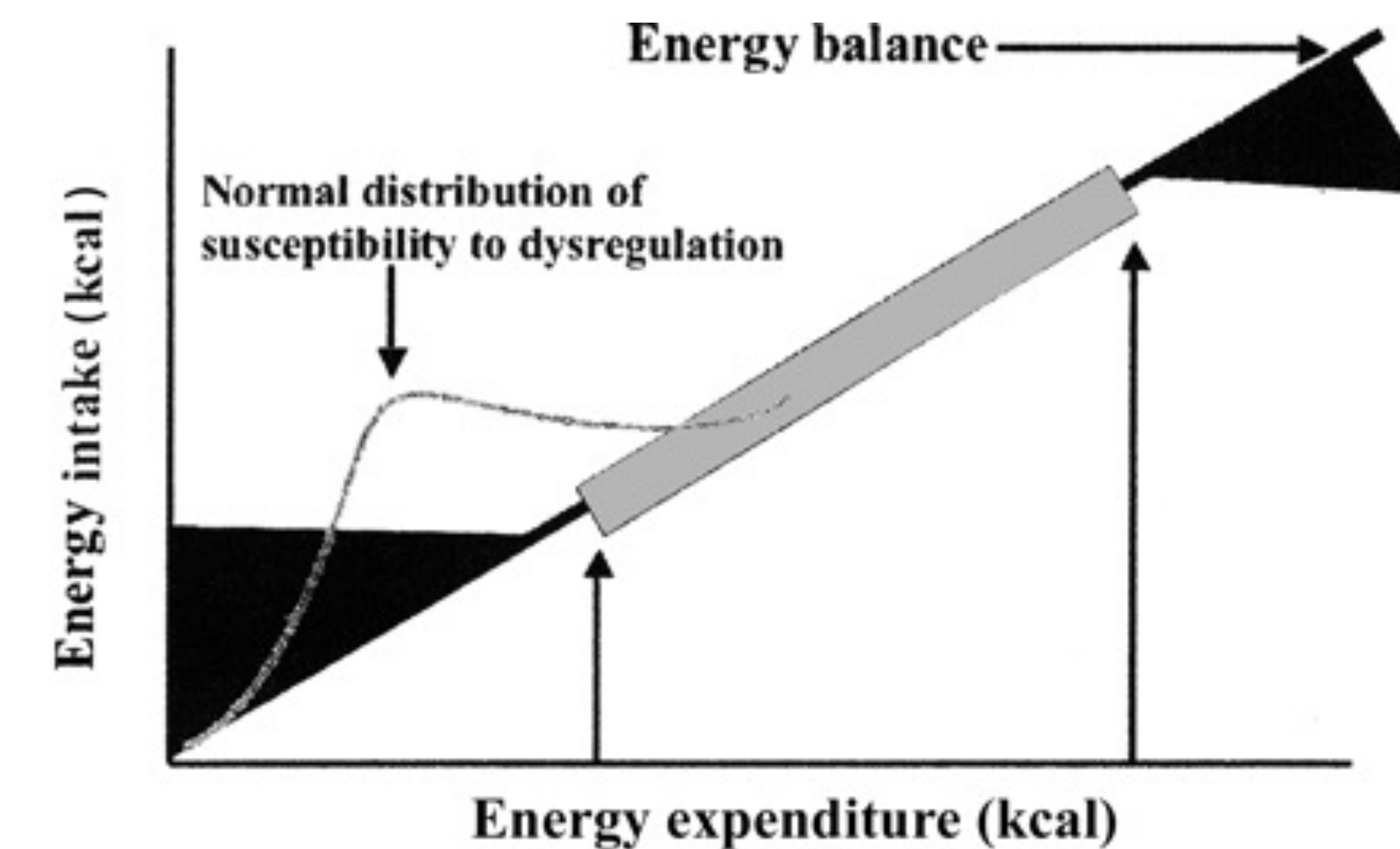


**Table 1.** General Physical Activities Defined by Level of Intensity  
The following is in accordance with CDC and ACSM guidelines.

Moderate activity 3.0 to 6.0 METs* (3.5 to 7 kcal/min)	Vigorous activity Greater than 6.0 METs* (more than 7 kcal/min)
Walking at a moderate or brisk pace of 3 to 4.5 mph on a level surface inside or outside	Racewalking and aerobic walking—5 mph or faster (Jogging or running)
Bicycling 5 to 9 mph, level terrain, or with few hills	Bicycling more than 10 mph or bicycling on steep uphill terrain
Calisthenics—light Yoga Gymnastics	Calisthenics—push-ups, pull-ups Karate, judo, tae kwon do, jujitsu
Ballroom dancing Modern dancing	Professional ballroom dancing— energetically
Golf, wheelchair or carrying clubs	—
Softball—fast pitch or slow pitch Basketball—shooting baskets Coaching children's or adults' sports Volleyball — competitive	Most competitive sports Football game Basketball game Soccer Beach volleyball – on sand court
Playing Frisbee Juggling Badminton Fencing Tennis—doubles	Handball—general or team Racquetball Squash Tennis—singles
Downhill skiing—with light effort Ice skating at a leisurely pace (9 mph or less)	Downhill skiing—racing or with vigorous effort Ice skating at fast pace (10 mph or more)
Swimming—recreational Diving—springboard or platform Aquatic aerobics	Swimming—steady paced laps Synchronized swimming Water polo
Canoeing or rowing a boat at less than 4 mph	Canoeing or rowing—4 or more mph
~Work that require extended periods of pushing or pulling objects weighing less than 75 lbs, standing while lifting objects weighing less than 50 lbs, or carrying objects of less than 25 lbs while walking	~Work that require extensive periods of pushing or pulling objects weighing 75 lbs or more, standing while lifting heavy objects of 50 lbs or more, walking while carrying heavy objects of 25 lbs or more

\* MET is a unit that estimates the amount of oxygen the body uses during physical activity (3).

**Figure 1.** The relationship between eating, exercise and weight maintenance (1). The kcal values on the horizontal and vertical axes represent a range of values from low to high. The diagonal line represents energy balance, which is where energy intake equals energy expenditure and weight is stable. When the energy intake and energy expenditure are not equal, it creates positive energy balance and leads to weight gain. The triangle in the lower left of the graph suggests that weight gain is likely at low levels of daily exercise because of dysregulation. The triangle at the upper right part of the graph represents the people who lose weight through vigorous exercise.



**Figure 2.** The association between self-reported physical activity [Harvard Alumnus Health Study (Harvard Alumni), Multiple Risk Factor Intervention Trial (MRFIT), and British Civil Servants Health Study (Civil Servants)] or cardiorespiratory fitness [Aerobics Center Longitudinal Study (ACLS) and Lipid Research Clinics Mortality Follow-up Study (LRC)] and cardiovascular disease mortality in 5 large prospective studies (1).

Figure 2 summarizes the results of several large primary prevention studies on the relation between physical activity or fitness and cardiovascular disease risk (1). There is a decline in disease risk that is associated with higher levels of activity or fitness, which indicates that there is a large difference in risk between the least active and those who are only modestly more active. Collectively, these data suggest that small changes in activity or fitness of inactive people might reduce the risk of disease (1).

The main study that I focused on is the study done by five scientists who were selected by the CDC and the ACSM. This committee of five also chose 15 other experts in issues related to the health implications of physical activity, from other organizations and federal agencies. The panel of experts then reviewed significant physiological, epidemiologic, and clinical evidence, including primary research articles and recent review articles (6). The consensus was reached by reviewing the major issues related to physical activity and health. Coming up with recommended types and amounts of physical activity was the primary focus. Even after the panel developed a consensus statement, it was further reviewed and revised for months before the CDC and ACSM formally approved it. "Every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week" was the conclusion of this study (6).

## DISCUSSION

Determining the minimal dose of exercise is a difficult process. At present, we can rely on the consensus amount of 30 minutes per day of moderate physical activity. Some benefits of regular exercise are it improves the sense of well-being, because we will feel more energetic and less stressed (7). A better quality of sleep occurs and the ability to cope with stress improves (7). Other benefits of exercising are weight loss, toned muscles, increased stamina, less frequent injuries and improved immunity to minor illnesses (7). In conclusion, although meeting the basic recommendation is good, there are additional health and weight benefits from more and higher-intensity activities.

## REFERENCES

- Steven N Blair, Michael J LaMonte and Milton Z Nichaman. "The Evolution of Physical Activity Recommendations: How much is enough?" *American Journal of Clinical Nutrition* 79 (2004): 913S-920S.
- Robert W Jeffery, Rena R Wing, Nancy E Sherwook, and Deborah F Tate "Physical Activity and Weight Loss: Does prescribing higher physical activity goals improve outcome?" *American Journal of Clinical Nutrition* 78 (2003): 684-689.
- United States. Centers for Disease Control and Prevention. 22 March 2006. 23 March 2006 [Physical Activity for Everyone: Physical Activity Terms](http://www.cdc.gov/nccdphp/dnpa/physical/terms/). <http://www.cdc.gov/nccdphp/dnpa/physical/terms/>
- John M Jakicic and Amy D Otto. "Exercise and Obesity Treatment." *American Journal of Clinical Nutrition* 82 (2005): 226S-229S.
- Pauline Koh-Banerjee, Nain-Feng Chu, Donna Spiegelman, Bernard Rosner, Graham Colditz, Walter Willet, and Eric Rimm. "Predictors of Waist Gain." *American Journal of Clinical Nutrition* 78 (2003): 719-727.
- Pate RR, Pratt M, Blair SN, et al. "Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine." *JAMA* 273 (1995): 402–407.
- American Heart Association*. 23 March 2006. Exercise and Fitness. 23 March 2006 <http://www.americanheart.org/presenter.jhtml?identifier=756>
- National Institutes of Health*. 9 Sept. 2003. NHLBI Study Finds Moderate Physical Activity Promotes Weight Loss as well as Intense Exercise. 23 March 2006 <http://www.nih.gov/news/pr/sep2003/nhlbi-09.htm>