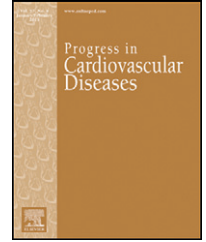




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# Epidemiology of Physical Activity and Exercise Training in the United States

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## ABSTRACT

The purpose of this review was to provide an overview of the descriptive epidemiology of physical activity (PA) and exercise training in the United States. Overall, there is a low prevalence of meeting the current PA guidelines in all age, sex and race/ethnic groups. Among adults the prevalence of meeting the aerobic component of the guidelines is approximately 51%, whereas the prevalence of meeting both the aerobic and muscle-strengthening guidelines is approximately 23%. Approximately 27% of high school students meet the aerobic component of the pediatric guidelines (60 minutes of daily moderate-to-vigorous activity), and the proportion of youth meeting the guidelines decreases with advancing age. Further research is required to promote physically active lifestyles across the age spectrum in order to achieve optimal health benefits for the overall population.

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Statement of Conflict of Interest: see page 9.

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### Abbreviations and Acronyms

CVD = Cardiovascular disease

ET = Exercise training

MET = Metabolic equivalent

MVPA = Moderate-to-vigorous physical activity

NHANES = National Health and Nutrition Examination Survey

PA = Physical activity

US = United States

YRBSS = Youth Risk Behavior Surveillance System

The purpose of this paper is to review the current state of evidence on the epidemiology of physical activity (PA) and exercise training (ET). We will focus largely on the descriptive epidemiology of PA using data from the United States (US), focusing on differences by age, sex, race/ethnicity, as well as trends over time. We will also supplement this information

with global data and trends where appropriate, especially where pertinent for the prevention of chronic diseases, including cardiovascular disease (CVD).

### Definition of PA and ET

PA refers to any bodily movement produced by the skeletal muscles that results in energy expenditure above resting levels,<sup>1</sup> whereas “ET” is PA that is usually performed repeatedly over an extended period of time for the purpose of increasing aerobic or muscular physical fitness, improving health, and/or improving sport performance.<sup>2</sup> PA can occur in many contexts, and it is most often considered within the domains of leisure-time, occupational, transport, and household chores. The intensity of specific physical activities is often expressed as the number of METs (metabolic equivalents, or multiples of resting energy expenditure measured in the sitting position). Moderate-to-vigorous physical activity (MVPA) is PA that elicits at least 3 METs.

### Current PA guidelines

The 2008 *Physical Activity Guidelines for Americans*<sup>3</sup> recommend that all adults should participate in at least 150 minutes a week of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic PA (or a combination of moderate- and vigorous-intensity activity giving equivalent energy expenditure). Further, adults should also be doing muscle-strengthening activities for 2 or more days a week.<sup>3</sup> Children should perform 60 minutes or more of PA daily, the majority of which should be moderate-to-vigorous aerobic activity, along with muscle-strengthening and bone-strengthening activities on at least 3 days of the week.<sup>3</sup> The US guidelines are consistent with the international PA recommendations from the World Health Organization.<sup>4</sup>

### Sources of PA data in the US

There are several US government surveys that contribute to the surveillance of PA/ET, including the American

Community Survey (active transportation), American Time Use Survey (active transportation, leisure time, household, occupational), Behavioral Risk Factor Surveillance System (non-occupational), National Household Transportation Survey (active transportation), National Health and Nutrition Examination Survey (NHANES; active transportation, leisure time, work, accelerometry), and the National Health Interview Survey (active transportation, leisure).<sup>5</sup> In addition, the Youth Risk Behavior Surveillance System (YRBSS) provides on-going surveillance of PA among middle and high school students.<sup>6</sup>

### Prevalence of meeting PA guidelines among adults

The PA guidelines for adults have both aerobic and muscle-strengthening components; however the focus of population surveillance efforts has traditionally been on the aerobic component. Fig 1 presents the temporal trends in the percentage of US adults who met only the aerobic component of the guidelines and the percentage who met both the aerobic and muscle-strengthening components from 1997 through 2015.<sup>7</sup> Both sets of data show an overall increase in leisure-time PA levels among adults starting around 2008; however, the prevalence of meeting both components of the guidelines is only about half of that for those who meet the aerobic component only. Based on the most recent data from January to March 2016, the prevalence of meeting the aerobic guidelines was 50.7% (95% CI: 49.0%–52.5%) whereas the prevalence of meeting both the aerobic and muscle-strengthening guidelines was 23.2% (95% CI: 21.8%–24.5%).<sup>7</sup>

Fig 2 presents the percentage of adults who meet the aerobic and muscle-strengthening guidelines by sex and age. It is clear that men self-report higher levels of leisure-time PA than women, and the prevalence of meeting the guidelines declines with advancing age in both men and women. Further, there are also differences by race/ethnicity. Hispanic or Latino adults report meeting the guidelines less often (18.2%; 95% CI: 14.7%–21.8%) than non-Hispanic white adults (25.3%; 95% CI: 23.7%–27.0%); whereas non-Hispanic black adults fall in the middle (21.3%; 95% CI: 17.3%–25.2%).<sup>7</sup> When considering the aerobic component of the guideline only, non-Hispanic white adults also report higher levels than both Hispanic adults and non-Hispanic black adults.<sup>7</sup>

In addition to the questionnaire data described above, NHANES has objectively monitored PA levels among US adults in several cycles of the survey using accelerometers. In the 2003–04 and 2005–06 cycles of NHANES, participants aged 6 years and older were asked to wear an Actigraph (model 7164) on their waist during all non-sleeping hours for 7 days, whereas in the 2011–12 and 2013–14 cycles of NHANES, the Actigraph (model GT3X+) was worn on the non-dominant wrist for 7 days.<sup>8</sup> The results from the NHANES (2005–06) accelerometry protocol indicate that 9.6% of adults are meeting the PA guidelines of 150 minutes of weekly MVPA.<sup>9</sup> This proportion is substantially lower than the prevalence reported above using self-reported data from the NHIS and it is also lower than the 62% prevalence reported in the 2005–06 NHANES based on self-reported information.<sup>9</sup>

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