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Review

Physical activity: Health outcomes and importance for public health policy

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ABSTRACT

This manuscript presents a brief summary of the substantial data supporting an inverse relationship between the amount of habitual physical activity performed and a variety of negative health outcomes throughout the lifespan. It points out that despite these data a large segment of the US population remain insufficiently active resulting in a high population attributable risk for chronic disease due to inactivity. The accumulated data support the need for more comprehensive health promoting physical activity policies and programs, especially for the economically and socially disadvantaged and medically underserved.

Contents

Introduction

Over the past half-century scientific data have continued to accumulate indicating that being physically inactive or unfit has major negative health consequences throughout the lifespan and is an important component of a comprehensive approach to chronic disease prevention and health promotion. Numerous well-conducted prospective observational studies have demonstrated that the least active and unfit are at greatest risk for a variety of chronic diseases, loss of function, and all-cause mortality; that this increased risk occurs independent of race/ethnicity, income, education, or body size and shape; and there is a dose–response across a wide range of activity and fitness levels (Physical Activity Guidelines Advisory Committee, 2008). Further, substantial data indicate that physical inactivity also contributes to disease by being a contributor along with excess caloric intake to weight gain and obesity (Giovannucci et al., 1995). These epidemiologic data are supported by experimental data showing that increases in physical activity improve a number of biological markers that are in the causal pathways for selected chronic diseases (e.g., blood pressure, atherogenic lipoprotein profile, blood clotting/fibrinolysis, insulin-mediated glucose uptake, bone and muscle strength, autonomic nervous system regulation) (Physical Activity Guidelines Advisory Committee, 2008).

Despite this growing body of evidence of benefit from being physically active, national surveillance data indicate that a substantial portion of youth and adults in the United States do not meet current recommendations (see Fig. 1; Centers for Disease Control and Prevention, 2007). Thus, when the risks of being physically inactive or unfit are combined with the low prevalence of activity in the US population, the population attributable risk for major causes of death and disability, such as heart disease and diabetes, is quite high and appears comparable to other well-established risk predictors (see Fig. 2; Blair, 2009).

Benefits and risks

By following the 2008 Physical Activity Guidelines for Americans (http://health.gov/paguidelines) many youth and adults who are now inactive or only sporadically active would substantially increase their health and fitness status contributing to less disability,

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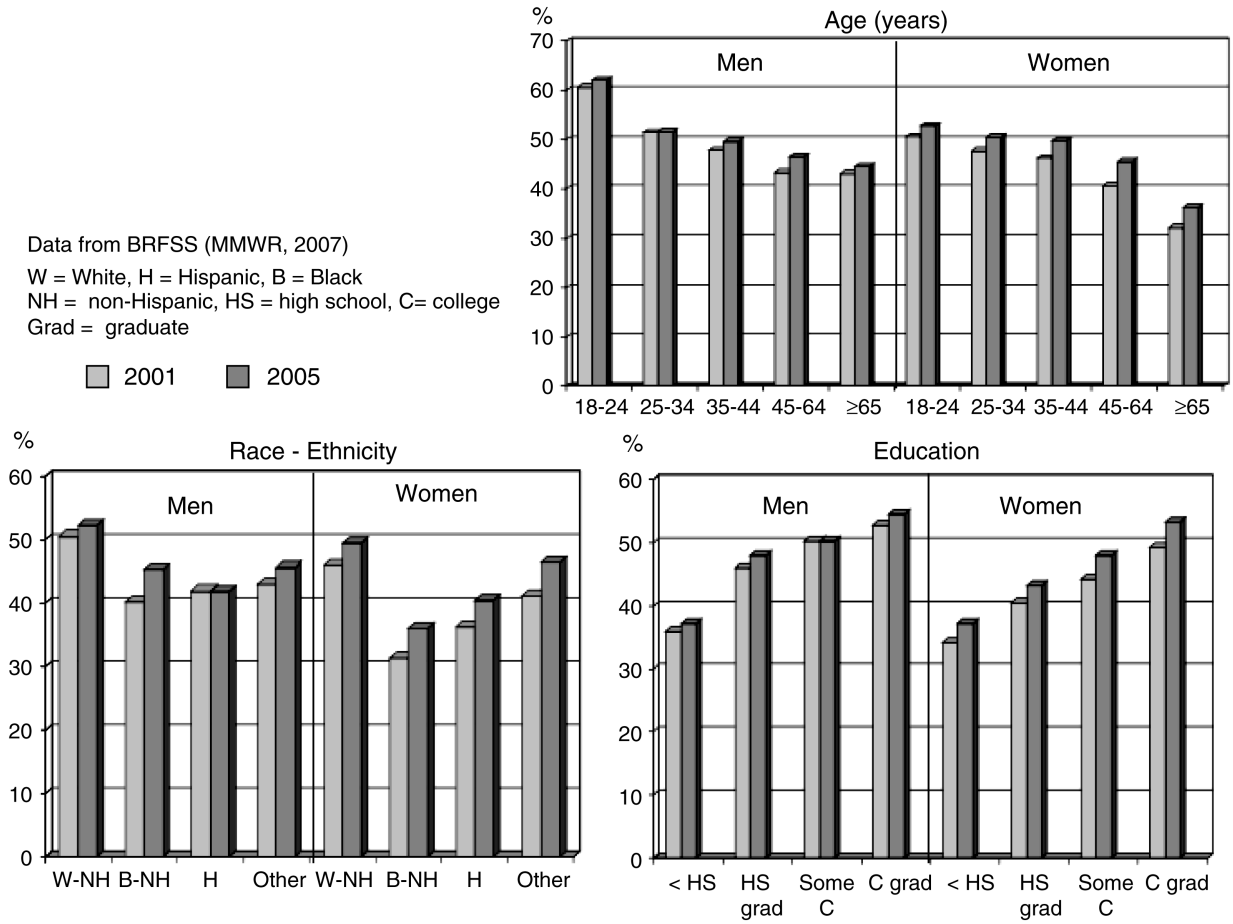

Fig. 1. Estimated age-adjusted percentage of persons in the USA ≥18 years reported meeting the Healthy People 2010 objective for regular physical activity in 2001 and 2005. Data presented for age, race/ethnicity and education categories.

premature morbidity and death due to major chronic diseases (see Fig. 3; Leitzmann et al., 2007). While just increasing life expectancy by itself does not insure any decrease in health care costs, the *compression of morbidity* during those increased years produced by an active and healthy lifestyle could lead to a decrease in overall health costs as well as enhanced quality of life (Chakravarty et al., 2008). The evidence available indicates that by following current physical activity guidelines,

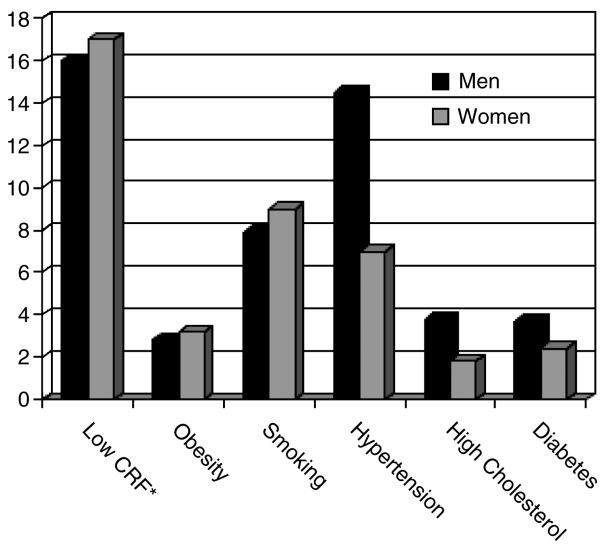

Fig. 2. Attributable fractions (%) for all-cause mortality in 40,842 (3333 deaths) men and 12,943 (491 deaths) women in the Aerobics Center Longitudinal Study. The attributable fractions are adjusted for age and each other item in the figure. * = cardiorespiratory fitness determined by a maximal exercise test on a treadmill.

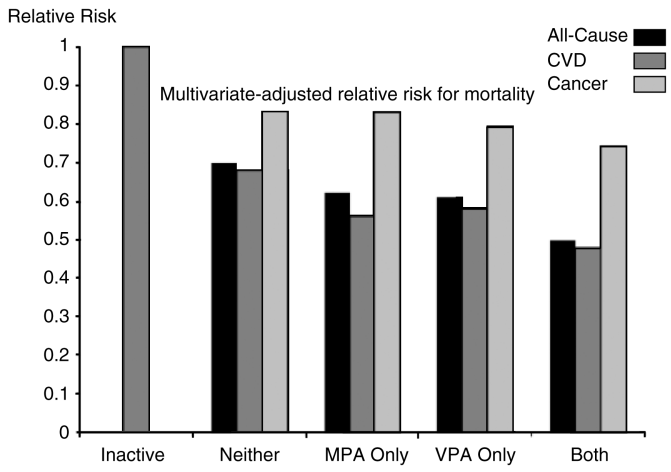

Fig. 3. Relation between habitual physical activity and all-cause, cardiovascular disease and cancer mortality in men and women ($N = 252{,}925$) age 50–71 years. Results are displayed for inactive persons (reference), persons doing some activity but not meeting either recommendation (neither), those meeting either the moderate (MPA only) or vigorous intensity (VPA only) recommendation, and those meeting both the moderate and vigorous intensity recommendations. Data are from multivariate model adjusting for age, gender, race/ethnicity, education, martial status, BMI, cigarette smoking, family history of cancer, hormone use in women, aspirin use, intake of fruits vegetables and red meat and multivitamin use.

the benefits far exceed any risk of musculoskeletal injury or sudden cardiac death caused by moderate intensity activity (Activity Guideline Advisory Committee, 2008 [Part G, Section 10]). The accumulated data on the general benefits of physical activity for people of all ages, while not perfect or complete, is more than adequate for the support of strong preventive medicine policies at all levels of government supporting the development and financing of major new physical activity program initiatives.

Research on the benefits and risks of increased activity is still somewhat limited for various race and ethnic minorities, persons of very low income and those with mental or physical disabilities. However, available data indicate that these persons have even more to gain from increases in physical activity as they are among the least active in the population, but have very limited access to needed resources (Powell et al., 2006). Data on the health benefits of physical activity in youth include favorable changes in biomarkers for cardiovascular disease and metabolic syndrome, increased bone and muscle strength and less adiposity (Strong et al., 2005). Policy makers would benefit from more definitive data on the causal relationships between physical activity participation or physical fitness and academic achievement, disruptive behavior as well as overall student performance (Chomitz et al., 2009).

Older adults receive a variety of benefits from being physically active yet represent one of the least active segments of the population. In addition to the reduced risk of various chronic diseases cited above, increases in endurance and strength help maintain their physical independence and more active seniors report less depression, better cognitive function and higher scores on indices of health-related quality of life (Nelson et al., 2007). However, studies are needed to determine if age-appropriate programs of increased physical activity in somewhat frail seniors will significantly delay disability and loss of independence, hospitalization and death. Data from such studies would inform public health officials about how to better reduce disability and health care costs in this rapidly growing and costly population.

Physical activity surveillance

To develop more effective and responsive policies and plans for enhancing the physical activity of target populations, more comprehensive and systematic long-term surveillance of physical activity is needed. Several special challenges regarding surveillance include the need for a national system that routinely samples diverse segments of the population and use of physical activity measurement tools, such as accelerometers, that capture all components of inactivity and activity (occupational, household/self care, leisure-time, transportation) and that provide accurate estimates of total energy expenditure. Recent reports suggest that the amount of inactivity a person performs each day, especially sitting, may provide data on risk independent of the time spent during moderate or vigorous intensity physical activity (Hamilton et al., 2007; Healy et al., 2008; Katzmarzyk et al., 2009). Also, in very inactive populations, some research indicates that health benefits are derived by light-intensity activity—more than sitting but less than brisk walking (Healy et al., 2007). To achieve these goals newly designed devices that provide objective measures of a diverse range of activities are being developed since it is unlikely that self-reported data will meet these needs. Such information is important to help determine which populations might benefit from changes in policies, services and programs and what the characteristics of the physical activity interventions should be.

Summary/conclusion

Existing data indicate that physical inactivity is widespread and a major contributor to chronic disease, disability, and premature mortality in the US. Moderate amounts of activities such as walking reduce chronic disease risk and enhance functional capacity. To realize the health-promoting benefits of increased activity by at-risk populations, major policies and programs need implementing that insure (1) the population at-large is educated about the health risks of inactivity and how best to reduce these risks, (2) lifestyle changes, including increases in physical activity, for chronic disease prevention and health promotion be given higher priority and increased funding by the US health care system, (3) schools at all levels enhance opportunities for students to be appropriately active, (4) employers develop ways to engineer physical activity back into the work day of sedentary employees while not decreasing worker productivity, and (5) the built environment throughout the community is made activity friendly for a greater portion of the population.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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