
Recommendations to Increase Physical Activity in Communities

Task Force on Community Preventive Services

Medical Subject Headings (MeSH): exercise, leisure activities, physical fitness, physical endurance, decision making, evidence-based medicine, economics, preventive health services, public health practice (Am J Prev Med 2002;22(4S):67-72)

Introduction

Regular physical activity is associated with enhanced health and reduced risk of all-cause mortality.¹⁻⁴ Regular physical activity improves aerobic capacity, muscular strength, body agility and coordination, and metabolic functioning, exemplified by improvements in bone density, lipid profiles, insulin levels, and immune function.⁵ Those who are physically active have a reduced risk of developing cardiovascular disease,⁶⁻¹¹ ischemic stroke,^{12,13} non-insulin-dependent (type 2) diabetes,¹⁴⁻²⁰ colon cancers,²¹⁻²⁴ osteoporosis,²⁵⁻²⁷ depression,²⁸⁻³¹ and fall-related injuries.³²⁻³⁵ Despite the known benefits, most people in the United States do not engage in regular physical activity. Only 25% of adults report engaging in recommended levels of physical activity (either 30 minutes of moderate-intensity activity 5 or more days per week or 20 minutes of vigorous-intensity physical activity 3 or more days per week).³⁶ Twenty-nine percent report no leisure-time regular physical activity,³⁶ and only 27% of students (grades 9 to 12) engage in recommended amounts of moderate-intensity physical activity.³⁷

Recommendations to increase physical activity have been made for individuals and clinical settings but not for community settings. Increased physical activity has been linked not only to behavioral and social correlates but also to physical and social environmental correlates. Therefore, the role of community-based interventions to promote physical activity has emerged as a critical piece of an overall strategy to increase physical activity behaviors among the people of the United States. In 1996, the American College of Sports Medicine and the Centers for Disease Control and Prevention (CDC) recommended that every adult in the United States accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all,

days of the week.³⁸ That same year, the U.S. Preventive Services Task Force recommended that healthcare providers counsel all patients on the importance of incorporating physical activity into their daily routines.³⁹ To date, community-based interventions to increase physical activity have not been summarized in an evidence-based process.

This report provides recommendations on interventions that communities, policymakers, and public health providers can implement to increase physical activity. The recommendations in this report represent the work of the independent, nonfederal Task Force on Community Preventive Services (the Task Force). The Task Force is developing the *Guide to Community Preventive Services* (the *Community Guide*) with the support of the U.S. Department of Health and Human Services (DHHS) in collaboration with public and private partners. The CDC provides staff support to the Task Force for development of the *Community Guide*.

Task Force recommendations are based primarily on the effectiveness of interventions as determined by the systematic literature review process (described in the accompanying article⁴⁰). General methods used in evidence reviews for the *Community Guide* have been published previously.⁴¹ In making recommendations, the Task Force balances information about the effectiveness of an intervention with information about other potential benefits and potential harms. To determine how widely a recommendation should apply, the Task Force also considers the applicability of the intervention in various settings and populations. Finally, the Task Force reviews economic analyses of those interventions found to be effective and summarizes applicable barriers to intervention implementation. Economic information is provided to assist the reader with decision making but generally does not affect the Task Force's recommendation.

The Task Force believes that recommended and strongly recommended interventions can be used to address objectives set out in *Healthy People 2010*.³⁷ In addition, the recommendations complement and add to information published by other groups. For exam-

The names and affiliations of the Task Force members are listed in the front of this supplement, and at www.thecommunityguide.org.

Address correspondence and reprint requests to: Peter A. Briss, MD, Community Guide Branch, Centers for Disease Control and Prevention, 4770 Buford Highway, MS K-73, Atlanta, GA 30341. E-mail: PBriss@cdc.gov.

ple, as noted, in 1996 the U.S. Preventive Services Task Force recommended that providers counsel their patients to incorporate regular physical activity into their daily routines,³⁹ and a consensus panel convened by the American College of Sports Medicine and CDC recommends that every adult in the United States accumulate 30 minutes or more of moderate-intensity physical activity on most (preferably all) days of the week.³⁸

Intervention Recommendations

The Task Force evaluated the evidence of effectiveness of 11 selected types of interventions that were grouped into three larger strategies for increasing physical activity: informational approaches, behavioral and social approaches, and environmental and policy approaches.⁴⁰ Detailed findings from this evaluation appear in the accompanying article.⁴⁰ Evaluations of additional interventions, including the effectiveness of urban form (design) and land-use planning approaches and changes to transportation and travel infrastructure and policy, are still in progress.

Informational Approaches to Increasing Physical Activity

Informational approaches focus on increasing physical activity by providing information that will motivate and enable people to change behavior and to maintain that change over time. The focus is primarily on the cognitive skills that are thought to precede behavior. The interventions primarily use educational approaches to present both general information, including information about cardiovascular disease prevention and risk reduction, and specific information about physical activity and exercise. These programs were originally developed to complement a medical model of disease management by involving communities in understanding the cognitive antecedents of behavior.

Information is intended to change knowledge about the benefits of physical activity, increase awareness of opportunities for increasing physical activity, explain methods for overcoming barriers and negative attitudes about physical activity, and increase physical activity behaviors among community members. Interventions reviewed here are “point-of-decision” prompts to encourage use of stairs as an alternative to elevators or escalators, community-wide campaigns, mass media campaigns, and classroom-based health education focused on information provision and skills related to decision making.

Point-of-decision prompts: recommended. Point-of-decision prompts are motivational signs placed by elevators and escalators to encourage people to use nearby stairs for health benefits or weight loss. For people who

want to increase their level of physical activity, these prompts serve as a reminder to take the stairs and offer information about a health benefit from using the stairs. All interventions evaluated in this category were single-component interventions, in which the placement of signs was the only intervention activity.

Point-of-decision prompts are recommended on the basis that they increase the number of people using stairs rather than escalators or elevators. This intervention has been shown to be effective in a range of settings and a variety of population subgroups. No harms or other potential benefits were reported, and no qualifying economic information was identified from the literature.

Community-wide campaigns: strongly recommended.

Community-wide campaigns are sustained efforts with ongoing high visibility. These large-scale campaigns deliver messages that promote physical activity by using television, radio, newspaper columns and inserts, and trailers in movie theaters. They use many components and include individually focused efforts such as support and self-help groups; physical activity counseling; risk factor screening and education at worksites, schools, and community health fairs; and environmental activities such as community events and the creation of walking trails. Community-wide education is strongly recommended on the basis of its effectiveness in increasing physical activity and improving physical fitness among adults and children. Other positive effects include increases both in knowledge about exercise and physical activity and in intentions to be physically active. No harms were reported, and no qualifying economic information was identified from the literature.

Mass media campaigns: insufficient evidence. Mass media campaigns, designed to increase knowledge, influence attitudes and beliefs, and change behavior, address messages about physical activity to large and relatively undifferentiated audiences. Messages about benefits and opportunities for physical activity are transmitted by using such media as newspapers, radio, television, and billboards, singly or in combination. Mass media campaigns include paid advertisements, donated time and space for promotions, and news or lifestyle features. These interventions differ from community-wide education in that they do not include other components such as support groups, risk factor screening and education, or community events.

The Task Force identified three qualifying studies that evaluated the effect of mass media campaigns. The studies identified in our search are more than 10 years old; however, research is currently being conducted on the effects of mass media campaigns on physical activity. On the basis of the small number of available studies and variability in the interventions evaluated, insufficient evidence was found to assess the effectiveness of single-component mass media campaigns.

Classroom-based health education focused on information provision: insufficient evidence. Health education classes that provide information and skills related to decision making are usually multicomponent, with curriculum typically addressing physical inactivity, nutrition, tobacco use, and alcohol and drug misuse. Health education classes, taught in elementary, middle, or high school, are designed to effect behavior change through personal and behavioral factors that provide children or adolescents with the skills they need for rational decision making. The classes in this review did not include physical education (PE) but sometimes included behavioral instruction. (For recommendations on classes involving PE, see School-based PE section.)

The Task Force identified six qualifying studies that evaluated the effect of classroom-based health education on students' physical activity levels and physical fitness. Because results were inconsistent across the body of evidence, insufficient evidence exists to make a conclusion about the effectiveness of classroom-based health education focused on information provision in improving physical activity levels and physical fitness. It is important to note, however, that such classes may provide other benefits, including increased knowledge, more supportive attitudes for physical activity initiatives, or changes in other health-related behaviors.

Behavioral and Social Approaches to Increasing Physical Activity

Behavioral and social approaches focus on increasing physical activity by teaching widely applicable behavioral management skills and by structuring the social environment in ways that provide support for people trying to initiate or maintain behavior changes. Behavioral and social approaches were combined because these interventions often involve group behavioral counseling and also may involve the friends or family members that constitute the individual's social environment. Skills focus on recognizing cues and opportunities for physical activity, ways to manage high-risk situations, and ways to maintain desired behaviors and prevent relapse. These interventions also involve making changes in the home, family, school, and work environments.

Interventions reviewed here are school-based PE, college-based health education and PE, classroom-based health education focusing on reducing television viewing and video game playing, family-based social support interventions, social support interventions in community settings, and individually-adapted health behavior change programs.

School-based PE: strongly recommended. These interventions involve modifying curricula and policies to increase the amount of time students spend in moder-

ate to vigorous activity while in PE classes. Increasing the amount of time students are active can be achieved either by increasing the amount of time spent in PE class or increasing the amount of time students are active during already scheduled PE classes. Interventions in this review included changing the activities taught (e.g., substituting soccer for softball) and modifying the rules of the game so that students are more active (e.g., having the entire team run the bases together when the batter makes a base hit). School-based PE is strongly recommended because of its effectiveness in increasing physical activity and improving physical fitness among adolescents and children. Other positive effects associated with school-based PE are increases in physical activity knowledge and increases in muscular endurance. One potential harm suggested in the literature is that PE classes could take away from the time that schools can devote to academic subjects, thereby harming academic performance. Examination of these studies and a systematic search for other studies of the effects of PE on academic performance found no evidence of this harm. No qualifying economic information was identified from the literature.

College-based health education and PE: insufficient evidence. These interventions use didactic and behavioral education efforts to increase physical activity levels among college students with the aim of setting long-term behavioral patterns during the transition to adulthood. The PE classes do not have to be offered by PE or wellness departments in college and university settings, but they do include supervised activity in the class. These classes have both lectures and laboratory-type sessions; students engage in supervised physical activity, develop goals and activity plans, and write term papers based on their experiences. Social support is also built into these programs.

The Task Force identified two qualifying studies that evaluated the effectiveness of college-based health education and PE. On the basis of both the small number of available studies and variability in the interventions evaluated, insufficient evidence exists to assess the effectiveness of college-based health education and PE interventions.

Classroom-based health education focused on reducing television viewing and video game playing: insufficient evidence. In these interventions, health education classes taught in elementary school classrooms as part of a general health curriculum by regular classroom teachers specifically emphasize decreasing the amount of time spent watching television and playing video games. Lessons include behavioral management strategies such as self-monitoring of viewing behavior, limiting access to television and video games, and budgeting time for television and video. All studies reviewed included a "TV turnoff challenge" in which students

were encouraged not to watch television for a specified number of days. Alternative activities that required greater energy expenditure were not specifically recommended. Parental involvement was a prominent part of the intervention, and all households were given automatic television use monitors.

The Task Force identified three qualifying studies that evaluated the effectiveness of these interventions. Although the studies showed decreases in the amount of time spent in television viewing and other sedentary behaviors and found reductions in adiposity, they did not provide consistent evidence for increased physical activity. On the basis of the small number of available studies, the variability in the interventions evaluated, and the lack of information specifically linking these programs to increases in PA, insufficient evidence exists to assess the effectiveness of classroom-based health education focused on reducing television viewing and video game playing in increasing physical activity.

Family-based social support: insufficient evidence. These interventions attempt to change health behavior through strategies that increase the support of family members for behavioral change. The intent is to create and facilitate behavioral patterns, social interactions, and family norms that support greater levels of physical activity. These interventions target environmental factors and interpersonal and behavioral patterns. Typical elements include setting up behavioral “contracts” between family members as well as goal-setting, problem-solving, and other family behavioral management techniques. Interventions may be targeted to families with children or to couples without children. Programs typically include educational sessions on health, goal-setting, and problem-solving; family behavioral management; or both educational sessions and behavioral management. The programs may also incorporate some physical activities. Interventions directed toward children and their families are often implemented as part of a more comprehensive approach that includes school-based interventions, such as school-based PE or classroom-based health education. In these instances, the family component is often seen as an adjunct to the school activities, involving take-home packets, reward systems, and family record keeping. These interventions may also include family-oriented special events.

The Task Force identified 11 qualifying studies that evaluated the effect of family-based social support programs on physical activity levels and physical fitness. Because results across the body of evidence were inconsistent, the Task Force could not reach a conclusion about the effectiveness of these programs in improving physical activity levels and physical fitness.

Social support interventions in community settings: strongly recommended. These interventions focus on changing physical activity behavior through building, strengthening, and maintaining social networks that

provide supportive relationships for behavior change, specifically physical activity. This change can be achieved either by creating new social networks or by working within pre-existing networks in a social setting outside the family, such as the workplace. Interventions typically involved setting up a “buddy” system, making “contracts” with others to complete specified levels of physical activity, or setting up walking or other groups to provide friendship and support. These programs are strongly recommended because of their effectiveness in increasing physical activity (specifically the time spent exercising and frequency of exercise) and improving physical fitness among adults. Other positive effects include increases in muscular strength and flexibility and decreases in adiposity. No harms were reported, and no qualifying economic information was identified from the literature.

Individually-adapted health behavior change programs: strongly recommended. Individually-adapted health behavior change programs are tailored to the individual’s specific interests, preferences, and readiness for change. These programs teach participants the behavioral skills needed to incorporate moderate-intensity physical activity into daily routines. Behaviors may be planned (e.g., a daily scheduled walk) or unplanned (e.g., using the stairs when the opportunity arises). Many of these interventions use constructs from one or more established health behavior change models (e.g., Social Cognitive Theory,⁴² the Health Belief Model,⁴³ or the Transtheoretical Model of Change⁴⁴). All programs reviewed incorporated the following set of skills: (1) setting goals for physical activity and self-monitoring of progress toward goals, (2) building social support for new behavioral patterns, (3) behavioral reinforcement through self-reward and positive self-talk, (4) structured problem-solving geared to maintaining the behavior change, and (5) prevention of relapse into sedentary behaviors. All of the interventions evaluated were delivered either in group settings or by mail, telephone, or directed media.

Individually-adapted health behavior change programs are strongly recommended because of their effectiveness in increasing physical activity and improving physical fitness among adults and children. Other positive effects include decreases in weight and percentage of body fat and increases in flexibility, strength, and cognitive effects related to physical activity. No harms were reported, and no qualifying economic information was identified from the literature.

Environmental and Policy Approaches to Increasing Physical Activity

Environmental and policy approaches are designed to help people adopt healthier behaviors. The creation of healthful physical and organizational environments is

attempted through development of public policy that supports healthy practices, creation of supportive environments, and strengthening of community action. Correlational studies have shown that the availability of exercise equipment in the home and the proximity and density of places for physical activity within neighborhoods are associated with physical activity levels. Other neighborhood and environmental characteristics such as safety lighting, weather, and air pollution also affect physical activity levels, regardless of individual motivation and knowledge.

Interventions in this category are not aimed at individuals but rather affect entire populations by targeting physical and organizational structures. They are implemented and evaluated over a longer period of time than more individually oriented interventions. Interventions are conducted by traditional health professionals, but they also involve many sectors that have not previously been associated with public health, such as community agencies and organizations, legislators, departments of transportation and planning, and the media. The goal is to create changes in social networks, organizational norms and policies, the physical environment, and laws. In addition to the intervention discussed here, reviews of two other interventions are under way: (1) urban form (design) and land-use planning strategies that lead to increased physical activity and (2) changes to transportation and travel policy and infrastructure that reduce dependence on motorized transport and increase physical activity.

Creation of or enhanced access to places for physical activity combined with informational outreach activities: strongly recommended. These interventions attempt to change the local environment to create opportunities for physical activity. Access to places for physical activity can be created or enhanced both by building trails or facilities and by reducing barriers (e.g., reducing fees or changing operating hours of facilities). Many of these programs also provide training in use of equipment, other health education activities, and incentives such as risk factor screening and counseling. Several programs reviewed were conducted at worksites. These interventions are strongly recommended because of their effectiveness in increasing physical activity and improving physical fitness among adults. Other positive effects include decreases in adiposity. No harms were reported, and no qualifying economic information was identified from the literature.

Interpreting and Using the Recommendations

Physical inactivity is a leading contributor to morbidity and disability, accounting for 22% of coronary heart disease, 22% of colon cancer, 18% of osteoporotic fractures, 12% of diabetes and hypertension, and 5% of

breast cancer.⁴⁵ Physical inactivity accounts for about 2.4% of U.S. health care or approximately \$24 billion a year.⁴⁵ In the United States, most people do not achieve the recommended amounts of physical activity. Communities can do much to increase levels of physical activity among people of all ages and thereby address this serious public health problem.

The Task Force recommendations are a compendium of tested interventions that promote physical activity at the community level. They can be used for planning interventions to promote physical activity or to evaluate existing programs, including creation of or enhanced access to places for physical activity combined with informational outreach activities, community-wide education, social support interventions in community settings, point-of-decision prompts to encourage use of stairs as an alternative to elevators or escalators, school-based PE, and individually-adapted health behavior change programs.

Choosing interventions that are well matched to local needs and capabilities and then carefully implementing those interventions are vital steps for increasing physical activity at the community level. In setting priorities for the selection of interventions to meet local objectives, recommendations and other evidence provided in the *Community Guide* should be considered along with such local information as resource availability, administrative structures and policies, and economic and social environments of organizations and practitioners.

Information about applicability⁴⁰ can be used to assess the extent to which the intervention might be useful in a particular setting or population. Although sparse, economic information can be useful both in identifying resource requirements for interventions and in choosing interventions that meet public health goals more efficiently than other available options. Taking into consideration local goals and resources, the use of strongly recommended and recommended interventions should be given priority for implementation. A finding of insufficient evidence of effectiveness should not be seen as evidence of ineffectiveness, but rather reflects the fact that our systematic review did not identify enough information for the Task Force to make a recommendation. Further, it is important for identifying areas of uncertainty that require additional research. In contrast, sufficient or strong evidence of ineffectiveness leads to a recommendation that the intervention not be used.

Although many of the recommended or strongly recommended interventions had small to moderate behavior change scores, readers should keep in mind that the interventions were targeted at populations of people rather than individuals and that such small changes occurring among populations can amount to significant changes in terms of public health. In addition, the largest public health benefit of physical activity

interventions is a result of increased activity among sedentary populations, rather than increased activity among already active people. Therefore, the interventions, if widely implemented, could create significant public health benefits.

References

- Lee IM, Hsieh CC, Paffenbarger RS Jr. Exercise intensity and longevity in men. The Harvard Alumni Health Study. *JAMA* 1995;273:1179–84.
- Paffenbarger RS Jr, Hyde RT, Wing AL, Lee IM, Jung DL, Kampert JB. The association of changes in physical-activity level and other lifestyle characteristics with mortality among men. *N Engl J Med* 1993;328:538–45.
- Paffenbarger RS Jr, Kampert JB, Lee IM, Hyde RT, Leung RW, Wing AL. Changes in physical activity and other lifestyle patterns influencing longevity. *Med Sci Sports Exerc* 1994;26:857–65.
- Blair SN, Kohl HW III, Barlow CE, Paffenbarger RS Jr, Gibbons LW, Macera CA. Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. *JAMA* 1995;273:1093–8.
- U.S. Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
- Paffenbarger RS Jr, Hyde RT, Wing AL, Steinmetz CH. A natural history of athleticism and cardiovascular health. *JAMA* 1984;252:491–5.
- Wannamethee SG, Shaper AG. Physical activity in the prevention of cardiovascular disease: an epidemiological perspective. *Sports Med* 2001; 31:101–14.
- Sesso HD, Paffenbarger RS Jr, Lee IM. Physical activity and coronary heart disease in men: The Harvard Alumni Health Study. *Circulation* 2000;102: 975–80.
- Kannel WB, Sorlie P. Some health benefits of physical activity. The Framingham Study. *Arch Intern Med* 1979;139:857–61.
- LaCroix AZ, Leveille SG, Hecht JA, Grothaus LC, Wagner EH. Does walking decrease the risk of cardiovascular disease hospitalizations and death in older adults? *J Am Geriatr Soc* 1996;44:113–20.
- Kannel WB, Belanger A, D'Agostino R, Israel I. Physical activity and physical demand on the job and risk of cardiovascular disease and death: the Framingham Study. *Am Heart J* 1986;112:820–5.
- Hu FB, Stampfer MJ, Colditz GA, et al. Physical activity and risk of stroke in women. *JAMA* 2000;283:2961–7.
- Gorelick PB, Sacco RL, Smith DB, et al. Prevention of a first stroke: a review of guidelines and a multidisciplinary consensus statement from the National Stroke Association. *JAMA* 1999;281:1112–20.
- Hu FB, Manson JE, Stampfer MJ, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. *N Engl J Med* 2001;345:790–7.
- Hu FB, Leitzmann MF, Stampfer MJ, Colditz GA, Willett WC, Rimm EB. Physical activity and television watching in relation to risk for type 2 diabetes mellitus in men. *Arch Intern Med* 2001;161:1542–8.
- Pfohl M, Schatz H. Strategies for the prevention of type 2 diabetes. *Exp Clin Endocrinol Diabetes* 2001;109(suppl 2):S240–S249.
- Fulton-Kehoe D, Hamman RF, Baxter J, Marshall J. A case-control study of physical activity and non-insulin dependent diabetes mellitus (NIDDM). The San Luis Valley Diabetes Study. *Ann Epidemiol* 2001;11:320–7.
- Helmrich SP, Ragland DR, Leung RW, Paffenbarger RS Jr. Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus. *N Engl J Med* 1991;325:147–52.
- Kaye SA, Folsom AR, Sprafka JM, Prineas RJ, Wallace RB. Increased incidence of diabetes mellitus in relation to abdominal adiposity in older women. *J Clin Epidemiol* 1991;44:329–34.
- Uusitupa M, Siitonen O, Pyorala K, et al. The relationship of cardiovascular risk factors to the prevalence of coronary heart disease in newly diagnosed type 2 (non-insulin-dependent) diabetes. *Diabetologia* 1985;28:653–9.
- Brownson RC, Zahm SH, Chang JC, Blair A. Occupational risk of colon cancer. An analysis by anatomic subsite. *Am J Epidemiol* 1989;130:675–87.
- Brownson RC, Chang JC, Davis JR, Smith CA. Physical activity on the job and cancer in Missouri. *Am J Public Health* 1991;81:639–42.
- Dosemeci M, Hayes RB, Vetter R, et al. Occupational physical activity, socioeconomic status, and risks of 15 cancer sites in Turkey. *Cancer Causes Control* 1993;4:313–21.
- Giovannucci E, Ascherio A, Rimm EB, Colditz GA, Stampfer MJ, Willett WC. Physical activity, obesity, and risk for colon cancer and adenoma in men. *Ann Intern Med* 1995;122:327–34.
- Nichols DL, Sanborn CF, Bonnick SL, Ben Ezra V, Gench B, DiMarco NM. The effects of gymnastics training on bone mineral density. *Med Sci Sports Exerc* 1994;26:1220–5.
- Rubin K, Schirduan V, Gendreau P, Sarfarazi M, Mendola R, Dalsky G. Predictors of axial and peripheral bone mineral density in healthy children and adolescents, with special attention to the role of puberty. *J Pediatr* 1993;123:863–70.
- Kohrt WM, Snead DB, Slatopolsky E, Birge SJ Jr. Additive effects of weight-bearing exercise and estrogen on bone mineral density in older women. *J Bone Miner Res* 1995;10:1303–11.
- Fox KR. The influence of physical activity on mental well-being. *Public Health Nutr* 1999;2(3A):411–8.
- Ross CE, Hayes D. Exercise and psychologic well-being in the community. *Am J Epidemiol* 1988;127:762–71.
- Camacho TC, Roberts RE, Lazarus NB, Kaplan GA, Cohen RD. Physical activity and depression: evidence from the Alameda County Study. *Am J Epidemiol* 1991;134:220–31.
- Weyerer S. Physical inactivity and depression in the community. Evidence from the Upper Bavarian Field Study. *Int J Sports Med* 1992;13:492–6.
- Farmer ME, Harris T, Madans JH, Wallace RB, Cornoni-Huntley J, White LR. Anthropometric indicators and hip fracture. The NHANES I epidemiologic follow-up study. *J Am Geriatr Soc* 1989;37:9–16.
- Meyer HE, Tverdal A, Falch JA. Risk factors for hip fracture in middle-aged Norwegian women and men. *Am J Epidemiol* 1993;137:1203–11.
- Cummings SR, Nevitt MC, Browner WS, et al. Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. *N Engl J Med* 1995;332:767–73.
- Jaglal SB, Kreiger N, Darlington G. Past and recent physical activity and risk of hip fracture. *Am J Epidemiol* 1993;138:107–18.
- Centers for Disease Control and Prevention. Physical activity trends—United States, 1990–1998. *MMWR Morb Mortal Wkly Rep* 2001;50:166–9.
- U.S. Department of Health and Human Services. Healthy people 2010: conference edition. Washington, DC: U.S. Department of Health and Human Services, 2000.
- 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* 1995;273:402–7.
- U.S. Preventive Services Task Force. Guide to Clinical Preventive Services: report of the U.S. Preventive Services Task Force, 2nd ed. Baltimore, MD: Williams & Wilkins, 1996.
- Kahn E, Ramsey LT, Brownson RC, et al. The effectiveness of interventions to increase physical activity: a systematic review. *Am J Prev Med* 2002; 22(suppl 4):73–107.
- Briss PA, Zaza S, Pappaioanou M, et al. Developing an evidence-based Guide to Community Preventive Services—methods. The Task Force on Community Preventive Services. *Am J Prev Med* 2000;18(suppl 1):35–43.
- Bandura A. Social foundations of thought and action: a social-cognitive theory. Englewood Cliffs, NJ: Prentice-Hall, 1986.
- Rosenstock IM. The health belief model: explaining health behavior through expectancies. In: Health behavior and health education. Theory, research, and practice. San Francisco: Jossey-Bass Publishers, 1990:39–62.
- Prochaska JO, DiClemente CC. The transtheoretical approach: crossing traditional boundaries of change. Homewood, IL: Dorsey Press, 1984.
- Colditz GA. Economic costs of obesity and inactivity. *Med Sci Sports Exerc* 1999;31(suppl 11):S663–S667.

**Reprinted by permission of Elsevier Science from:
Recommendations to increase physical activity in communities. Task Force on
Community Preventive Services., American Journal of Prevention Medicine. Vol 22 No 4S,
pp 67-72.**