Published in final edited form as:

Curr Geriatr Rep. 2014 December 1; 3(4): 291–298. doi:10.1007/s13670-014-0104-7.

Steps for Improving Physical Activity Orientation Among Health-care Providers of Older Cardiovascular Patients

Peter H. Brubaker

Department of Health and Exercise Science, Healthy Exercise & Lifestyle Program S, Wake Forest University, 305 Reynolds Gym, Wingate Dr., Winston-Salem, NC 27109, USA

Peter H. Brubaker: brubaker@wfu.edu

Abstract

Attaining appropriate levels of physical activity can have many potential physiological and psychological benefits in older adults with cardiovascular disease. However, these individuals often report low levels of physical activity and high levels of sedentary behavior. Older adults encounter many potential “barriers” to physical activity, but numerous studies have demonstrated the ability to positively influence this important health behavior using well-established behavior change theories and models. The information provided in this review is directed at health-care providers who have the potential to impact physical activity behaviors during regular, often brief, clinical interactions. In addition to providing the latest physical activity recommendations, this update will provide a brief summary of some of the more widely used behavioral skills and strategies for promoting physical activity in older adults with cardiovascular disease.

Keywords

Exercise; Lifestyle; Motivation; Behavior; Self-monitoring; Readiness; Relapse; Barriers; Goal setting; Counseling; Adherence; Inactivity; Aerobic; Strength; Flexibility; Balance; Endurance; Energy balance; FITT; Pedometers; Accelerometers; Self-efficacy; Interviewing; Physical function; Health

Introduction

Achieving an adequate level of physical activity (PA) is essential for older patients with or at risk for developing cardiovascular disease (CVD) due to its extensive “pleiotropic” benefits [1]. Regular PA reduces risk of disease, including cardiovascular disease, thromboembolic stroke, hypertension, type 2 diabetes mellitus, osteoporosis, obesity, colon cancer, breast cancer, anxiety and depression [2]. Regular PA also moderates disease even after it has arisen. Clinical practice guidelines identify a substantial therapeutic role for PA in coronary heart disease [3•, 4, 5], heart failure, hypertension [6, 7], peripheral vascular

© Springer Science+Business Media New York 2014

Correspondence to: Peter H. Brubaker, brubaker@wfu.edu.

Compliance with Ethics Guidelines: Conflict of Interest: Peter H. Brubaker declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent: This article does not contain any studies with human or animal subjects performed by any of the authors.

disease [8], type 2 diabetes [9], obesity [10], elevated cholesterol [5, 11], osteoporosis [12, 13], osteoarthritis [14, 15], claudication [16] and chronic obstructive pulmonary disease [17]. Of particular importance to older adults, is substantial evidence that PA reduces many age-related risks, including falls and injuries from falls [18], functional limitations [19–21] and even cognitive decline.

Despite the potential benefits derived from regular PA, older adults are the least physically active of any age group and generate the highest expenditures for medical care [22•]. Since PA is a complex and dynamic process involving an intricate series of behaviors, the “barriers” adoption of and adherence to PA should be identified. Acknowledging the unique challenges and clarifying the relevant issues for older adults with or at risk for CVD is an essential first step in developing a strategy for facilitating adoption of regular PA. To this end, a variety of behavioral and cognitive strategies, including brief counseling, motivational interviews and goal setting, can be employed by providers to help their older patients achieve vital PA goals [23].

General Physical Activity Recommendations: How Much is Enough?

While there is no debate that regular PA is “good medicine” and should be encouraged for adults, there are slightly differing professional opinions as to how much is sufficient for producing the “pleiotropic” benefits that PA offers. Guidelines from the American Heart Association (AHA) and the American College of Cardiology (ACC) Foundation [24•] recommend for primary and secondary prevention of coronary heart disease: “For all patients, the clinician should encourage 30 minutes of moderate-intensity aerobic activity at least 5 days and preferably 7 days per week.” Similarly, the US Department of Health and Human Services 2008 Physical Activity Guidelines for Americans [25] suggest that: “Most health benefits occur with at least 150 minutes (2 hours and 30 minutes) a week of moderate intensity PA, such as brisk walking.” Further recommendations from the 2008 PA Guidelines [25] include:

- Physical *Inactivity* should be avoided. Some PA is better than none, and adults who participate in any amount of PA gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes a week of moderate-intensity PA, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic PA, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes and, preferably, it should be spread throughout the week.
- For additional and more extensive health benefits, such as weight loss and aggressive CVD management, adults should increase their aerobic PA to 300 minutes (5 hours) a week of moderate intensity or 150 minutes a week of vigorous intensity aerobic PA, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in PA beyond this amount.

- When an individual cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.
- Individuals should determine their level of effort for PA relative to their level of fitness and individuals with chronic conditions should understand if and how their conditions affect their ability to do regular physical activity safely.

Specific Physical Activity Recommendations for Older Adults

The ACSM and AHA jointly developed specifically for older adults recommendations for the amounts and types of PA that promote health and prevent disease [26]. These recommendation apply to all adults aged 65+ years and to adults aged 50-64 with clinically significant chronic conditions or functional limitations that affect movement, fitness or PA. The parts of the recommendation below that are not italicized repeat the recommendation for adults, whereas the italicized parts are specific for older adults [26]. *Regular PA, including aerobic activity and muscle-strengthening activity, is essential for healthy aging. This preventive recommendation specifies how older adults, by engaging in each recommended type of PA, can reduce the risk of chronic disease, premature mortality, functional limitations and disability.*

To promote and maintain health, older adults need moderate-intensity aerobic PA for a minimum of 30 min five days each week or vigorous-intensity aerobic activity for a minimum of 20 min three days each week [26]. Also, combinations of moderate- and vigorous-intensity activity can be performed to meet this recommendation. *Moderate-intensity aerobic activity involves a moderate level of effort relative to an individual's aerobic fitness. On a 10-point scale, where sitting is 0 and all-out effort is 10, moderate-intensity activity is a 5 or 6 and produces noticeable increases in heart rate and breathing. On the same scale, vigorous-intensity activity is a 7 or 8 and produces large increases in heart rate and breathing. For example, given the heterogeneity of fitness levels in older adults, for some older adults a moderate-intensity walk is a slow walk, and for others it is a brisk walk.* This recommended amount of aerobic activity is in addition to routine activities of daily living of light-intensity (e.g., self-care, cooking, casual walking or shopping) or moderate-intensity activities lasting less than 10 min in duration (e.g., walking around home or office, walking from the parking lot).

To promote and maintain health and physical independence, older adults will benefit from performing activities that maintain or increase *muscular strength and endurance* for a minimum of two days each week. It is recommended that 8–10 exercises using the major muscle groups be performed on two or more non-consecutive days per week [26]. *To maximize strength development, a resistance (weight) should be used that allows 10–15 repetitions for each exercise. The level of effort for muscle-strengthening activities should be moderate to high. On a 10-point scale, where no movement is 0 and maximal effort of a muscle group is 10, moderate-intensity effort is a 5 or 6 and high-intensity effort is a 7 or 8.* Muscle-strengthening activities include a progressive weight training program, weight-bearing calisthenics and similar resistance exercises that use the major muscle groups.

Participation in aerobic and muscle-strengthening activities above the minimum recommended amounts provides additional health benefits and results in higher levels of physical fitness [26]. Older adults should exceed the minimum recommended amounts of PA if they have no conditions that preclude higher amounts of PA, and they wish to do one or more of the following: (a) improve their personal fitness; (b) improve management of an existing disease where it is known that higher levels of PA have greater therapeutic benefits for the disease; and/or (c) further reduce their risk for premature chronic health conditions and mortality related to physical inactivity. To further promote and maintain skeletal health, older adults should engage in extra muscle strengthening activity and higher-impact weight-bearing activities, as tolerated. To help prevent unhealthy weight gain, some older adults may need to exceed minimum recommended amounts of PA to a point that is individually effective in achieving energy balance, while considering diet and other factors that affect body weight.

To maintain the flexibility of the musculoskeletal system necessary for regular PA and daily life, older adults should perform activities that maintain or increase flexibility on at least two days each week for at least 10 min each day. Furthermore, community-dwelling older adults with substantial risk of falls (e.g., with frequent falls or mobility problems) should perform exercises that maintain or improve balance. The ACSM/AHA Physical Activities Recommendation [26] offers the following points to consider when promoting PA in older adults versus younger adults:

- The promotion of PA in older adults should avoid ageism that discourages older adults from reaching their potential. At the same time, it is difficult or impossible for some older adults to attain high levels of PA;
- Reducing sedentary behavior. There is substantial evidence that older adults who do less activity than recommended still achieve some health benefits. Such evidence is consistent with the scientific consensus for a continuous dose–response relationship between PA and health benefits [19];
- Increasing moderate activity and placing less emphasis on attaining high levels of activity. Realistic goals for aerobic activity will commonly be in the range of 30–60 min of moderate-intensity activity a day [27]. Vigorous activity has higher risk of injury and lower adherence [23]. Age-related loss of fitness, chronic diseases and functional limitations act as barriers to attaining high levels of activity;
- Taking a gradual or stepwise approach. The standard advice for increasing PA gradually over time is highly appropriate and particularly important for older adults. This advice minimizes risk of overuse injury, makes increasing activity more pleasant, and allows positive reinforcement that can lead to the attainment of intermediate goals. In addition, activity plans need to be re-evaluated when there are changes in health status;
- Performing muscle-strengthening activity and engaging in all recommended types of activity. Muscle-strengthening activity is particularly important in older adults, given its role in preventing age-related loss of muscle mass [28], bone [21] and its

beneficial effects on functional limitations [19, 28–30]. Currently, only about 12 % of older adults perform muscle-strengthening activities at least twice a week [31];

- Sustaining emphasis on individual-level and community-level approaches. As with younger adults, promotion of PA in older adults relies upon both individual and community approaches that are evidence-based and reflect theory and research on behavior change. For example, the Task Force on Community Preventive Services has recommended or strongly recommended several community-level interventions as effective in promoting PA, such as interventions to increase access to places of PA combined with informational outreach [32];
- Using risk management strategies to prevent injury. Chronic conditions increase risk of activity-related adverse events, e.g., heart disease increases risk of sudden death and osteoporosis increases risk of activity-related fractures. Activity-related musculoskeletal injuries act as a major barrier to regular physical activity [33].

Barriers to Becoming More Physically Active

Despite the substantial evidence indicating the physical and psychological benefits derived from regular PA, 29.9 % of adults in the United States do not engage in any leisure-time PA [22•]. Physical *inactivity* increases with age from 24.5 % to 31.8 %, 35.7 % and 51.4 % among adults 18 to 44, 45 to 64, 65 to 74 and 75 years of age, respectively. The percentage of adults reporting the recommended level of at least 150 minutes of moderate PA (or 75 minutes of vigorous PA or an equivalent combination weekly) decreased with age from 55.8 % for adults 18 to 44 years of age to 27.4 % for those 75 years of age [22•]. Furthermore, the percentage of men engaging in both leisure-time aerobic and strengthening activities decreases with age, from 39.8 % at age 18 to 24 years to 11.1 % at 75 years of age. The percentage of women who engaged in both leisure-time aerobic and strengthening activities also decreased with age, from 20.7 % at age 18 to 24 years to 5.3 % at 75 years of age [22•].

There are multiple variables, including physiological, behavioral and psychological “barriers” that negatively affect an older adults PA levels and result in very low participation rates. In the early stages of PA adoption, most individuals will report more barriers and fewer benefits than those in later stages, thus finding it difficult to remain adherent to a recommended level. The ten most common reasons adults cite for not adopting a more physically active lifestyles are [34]:

- Poor health/fear of injury
- Lack of confidence in their ability to be physically active (low self-efficacy)
- Lack of self-management skills, such as the ability to set personal goals, monitor progress or reward progress toward such goals
- Perceived lack of time
- Physical activity is “inconvenient”
- Lack of self-motivation

- Exercise is not enjoyable
- Find exercise boring
- Lack of encouragement, support or companionship from family and friends
- Do not have parks, sidewalks, bicycle trails or safe and pleasant walking paths convenient to their homes or offices.

It is important for health care providers to understand these common barriers and assist participants in developing strategies to overcome them in order to make PA part of their daily life. As older adults with CVD begin a PA program and/or attempt to increase PA levels, the potential for injury and/or adverse events must be considered. Recommendations from the 2008 Physical Activity Guidelines [25] to increase PA safety and reduce the risk of injuries and other adverse events include:

- Understand the risks and yet be confident that PA is safe for most everyone, including older adults with chronic disease conditions if performed properly.
- Choose to do types of PA that are appropriate for their current fitness level and health goals.
- Increase PA gradually over time whenever more activity is necessary to meet guidelines or health goals. Inactive people should “start low and go slow” by gradually increasing how often and how long activities are done.
- Protect themselves by using appropriate gear and equipment, looking for safe environments, following rules and policies and making sensible choices about when, where and how to be physically active
- Be under the care of a health care provider if they have chronic conditions or symptoms. People with chronic conditions and symptoms should consult their health care provider about the types and amounts of PA appropriate for them

Strategies for Promoting Physical Activity Behavior Changes

Changing health-related behaviors, such as adopting a physically active lifestyle, can be very difficult for older adults with CVD. It is vital that health care providers assisting individuals with PA behavior change have a basic understanding of the most relevant theories and methods of behavior change. Some of the most widely recognized behavioral skills and strategies to promote PA [23, 35] are briefly described in the following sections.

Decisional Balance

In order for an individual to adopt a behavior such as regular PA, the perceived advantages (“pros”) have to outweigh the perceived disadvantages (“cons”). Thus, decisional balance is at the core of many theoretical behavior change models. Recognition of the benefits of regular PA, particularly those most important and specific to the individual's goals, can be used as motivation to promote behavior change. In contrast, the identified disadvantages can provide an opportunity to tailor the PA recommendations to overcome the perceived barriers and assist in further behavioral change strategies.

Self-monitoring

Self-monitoring is a very effective and practical behavioral strategy for improving PA behavior. While PA behaviors such as type and time of activity, time spent watching TV, etc. can be manually recorded on a basic log, there is the rapid growth and availability of activity monitors for this purpose. Most common types of activity monitors are pedometers and accelerometers but Global Positioning Systems (GPS) are coming down in price and are increasing in use. A comprehensive review of methods of assessing physical activity and various features of activity monitors is available with the recent release of the American Heart Association Guide to the Assessment of Physical Activity [36•]. To assist professionals looking to measure PA, a decision matrix is available to aid in making the appropriate selection.

A meta-analysis of 26 studies with 2,767 participants (85 % women, mean age=49 yrs) [37] conducted in 2007 demonstrated that pedometer wearers (mean study duration=18 weeks) increased their daily step counts by 2,491 (27 %) more than the control group. This analysis concluded that the use of a pedometer is associated with significant increases in PA and significant decreases in body mass index (BMI) and blood pressure. Furthermore, several studies have shown that self-monitoring of PA with pedometers during [38] or after the completion of a cardiac rehabilitation program [39] can improve PA behavior and improve cardiovascular health and overall physical function. While these studies used pedometers for self-monitoring, we have reported that self-monitoring PA with accelerometers is more effective at increasing moderate-vigorous intensity PA than pedometers in older adults with CVD and other chronic diseases [40•]. Regardless of the instrument used, there is ample evidence demonstrating the effectiveness of self-monitoring for increasing PA levels.

Goal Setting

At the initiation of a PA program, goals and priorities should be established for the individual. From the professional's perspective, promoting PA is a means to positively impact most of the CVD risk factors and to improve physical function and health-related quality of life. From the participant's perspective, physical activities are unstructured endeavors they can do intermittently throughout the day to supplement any formalized "exercise." Establishing short-and long-term PA goals should be prioritized and the individual must be an active participant in the goal setting process. The participant needs to commit to the goal verbally or in writing and the goals should be measurable and specific. Measuring progress and reassessing the specific goals should be reviewed periodically; this increases self-efficacy. The importance of planning and scheduling PA into an individual's daily routine needs to be emphasized. To establish PA goals, the "SMART" acronym can be employed as it encompasses the key principles of goal setting [41]:

- Specific: The physical activity should be clearly defined relative to the frequency intensity, time, and type (FITT) of PA;
- Measurable: Record the PAs beings performed using logs or activity monitors;
- Adjustable: Make adjustments to FITT components as indicated;

- **Realistic:** In establishing a goal it is important to balance putting forth a challenge with making the goal attainable;
- **Time Specific:** It is important to establish a timeframe, both short and long-term, within which the goal will be completed.

Commitment

Behavioral and cognitive approaches to PA goals, including verbal agreements with others and written contracts with others, can make some individuals responsible for their behavior. The goals established in the contract should be based on the SMART goal principles and should be updated regularly. Use of incentives and/or rewards can also motivate some individuals to increase their PA and/or improve other health behaviors [35].

Social Support

Social support can be a very effective motivator of behavior change and can be delivered by a variety of people, including friends and family members, co-workers and health care professionals. Encouragement is a critical component of social support, especially for those just starting a PA program, and it is most effective when given immediately and is specific. With active and ongoing support from significant others, individuals are more likely to persist in a PA program than those without social support. Health care providers should also strive to be “role models” for their patients by “practicing what they preach.” It has been shown that physically active health care providers, and typically having a normal BMI, are more likely to engage in conversation with their patients about PA than health care providers that are inactive and overweight [42•].

Stimulus Control

Stimulus control involves structuring the environment to remind or encourage the individual to be physically active. Cues can be physical, psychological, environmental or social. This can be accomplished with visual (posting notes or motivational quotes, text or email messages, etc.) or auditory prompts to decrease sedentary behavior and/ or increase PA. For example, research indicates that placement of prompts (signage), as well as making the environment more pleasant with music or art, can result in greater use of stairways.

Relapse Prevention

Relapse prevention, the act of anticipating potential barriers and planning ahead for unforeseen events that lead to a lapse in PA, is another means of maintaining motivation and enhancing self-efficacy (RM). An occasional relapse is normal, even for those with excellent PA habits, and often occurs after an illness, a holiday, during high work demands and/or inclement weather. Having cognitive coping and behavioral skills in place will be critical for minimizing the impact and duration of a relapse, especially for individuals that are at high risk for PA discontinuation due to low PA self-efficacy. Strategies for preparing for lapses and for restarting PA include: an alternative PA routine; a commitment ($\pm$ rewards) to resume PA as soon as possible; an arrangement to perform PA with someone else; and/or modifying goals to be realistic and avoid further discouragement [35].

Further Motivational Considerations

The “Stages of Change” model, also known as the Transtheoretical Model developed by Prochaska and colleagues [43], has gained wide-spread acceptance in health care settings and is effective at motivating PA behavior change. This theory assesses an individual's ability to make permanent behavior changes based upon their emotional and intellectual “readiness.” This process-oriented model describes five stages of intentional behavior change that individuals can move through in either direction. Several questionnaires are available to evaluate an individual's motivational readiness for PA change [35]. Table 1 describes the goals and suggested strategies to promote PA for each stage of motivational readiness.

In addition to the Transtheoretical Model, brief counseling and motivational interviewing [23] are useful and practical approaches for promoting PA in the clinic setting. The *Brief Counseling Model* involves the ability to perform the following 5 A's at every encounter with the individual attempting the behavior change [44]. The essential skills of *Motivational Interviewing* are open ended questions, reflective listening, affirmations and summary statements with all encounters when helping patients with behavior change, especially when there is ambivalence. Similarly, motivational interviewing promotes intrinsic motivation to change and encourages self-efficacy. The 5 Rs of motivational interviewing are:

- Relevance: Personalize why PA is relevant to them
- Risks: Ask patients to identify negative consequences of inadequate PA
- Rewards: Ask patients to identify the benefits of adopting a more physically active lifestyle
- Roadblocks: Ask patients to identify barriers to PA
- Repetition: Repeat this intervention at every visit

Health care providers should remember to use reflective listening techniques so that the 5 R's are elicited from the patient, thus increasing patient-centered motivation.

Conclusions

Unfortunately a very large percentage of older adults with or at risk for CVD fail to obtain an amount of regular PA sufficient for producing the pleiotropic health benefits PA has to offer. However, research and practical experience indicate that a variety of behavioral skills and strategies can be effective at improving PA behavior in older adults. In addition to the strategies described in this review, many of which can be provided relatively easily and inexpensively by a variety of health-care providers (physicians, nurses, PAs), high risk CVD patients should be referred to and encouraged to participate in a structured behaviorally-based intervention program, including a cardiac rehabilitation or medical-based fitness program, that employ a multi-disciplinary approach to improving PA behaviors.

References

1. Thompson, PD.; Buchner, D.; Pina, IL., et al. *Circulation*. Vol. 107. American Heart Association Council on Clinical Cardiology Subcommittee on Exercise, Rehabilitation, and Prevention; American Heart Association Council on Nutrition, Physical Activity, and Metabolism Subcommittee on Physical Activity; 2003. Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: a statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity); p. 3109-16.
2. Haskell WL, Lee IM, Pate RR, Powell KL, Blair SN, Franklin BA, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc*. 2007; 39:1423-34. [PubMed: 17762377]
3. Artinian, NT.; Fletcher, GF.; Mozaffarian, D., et al. *Circulation*. Vol. 122. American Heart Association Prevention Committee of the Council on Cardiovascular Nursing; 2010. Interventions to promote physical activity and dietary lifestyle changes for cardiovascular risk factor reduction in adults: a scientific statement from the American Heart Association; p. 406-41. This scientific statement provides evidence-based recommendations on implementing PA and dietary interventions among adult individuals. The most efficacious and effective strategies are summarized into practice
4. Pollock M, Franklin B, Balady G, et al. AHA Science Advisory. Resistance exercise in individuals with and without cardiovascular disease: benefits, rationale, safety, and prescription: an advisory from the Committee on Exercise, Rehabilitation, and Prevention, Council on Clinical Cardiology, American Heart Association; Position paper endorsed by the American College of Sports Medicine. *Circulation*. 2000; 101:828-33. [PubMed: 10683360]
5. Thompson P, Buchner D, Pina I, et al. Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: a statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity). *Circulation*. 2003; 107:3109-16. [PubMed: 12821592]
6. American Geriatric Society, British Geriatric Society, and American Academy of Orthopedic Surgeons Panel on Falls Prevention. Guideline for the prevention of falls in older persons. *J Am Geriatr Soc*. 2001; 49:664-72. [PubMed: 11380764]
7. Chobanian A, Bakris B, Black H, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003; 289:2560-72. [PubMed: 12748199]
8. McDermott M, Liu K, Ferrucci L, et al. Physical performance in peripheral arterial disease: a slower rate of decline in patients who walk more. *Ann Intern Med*. 2006; 144:10-20. [PubMed: 16389250]
9. Sigal R, Kenny G, Wasserman D, Casteneda-Sceppa D. Physical activity/exercise and type 2 diabetes. *Diabetes Care*. 2004; 27:2518-39. [PubMed: 15451933]
10. Preventive US. Service Task Force. Screening for obesity in adults: recommendations and rationale. *Ann Intern Med*. 2003; 139:930-2. [PubMed: 14644896]
11. Geliebter A, Mahar M, Gerace L, Gutin B, Heysmfield S, Hashim S. Effects of strength or aerobic training on body composition, resting metabolic rate, and peak oxygen consumption in obese dieting subjects. *Am J Clin Nutr*. 1997; 66:557-63. [PubMed: 9280173]
12. Going S, Lohman T, Houtkooper L, et al. Effects of exercise on bone mineral density in calcium-replete postmenopausal women with and without hormone replacement therapy. *Osteoporos Int*. 2003; 14(8):637-43. [PubMed: 12844212]
13. US Department of Health and Human Services. Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville MD: U.S. Department of Health and Human Services, Office of the Surgeon General; 2004.
14. American College of Rheumatology. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. *Arthritis Rheum*. 2000; 43:1905-15. [PubMed: 11014340]
15. American Geriatric Society. Exercise prescription for older adults with osteoarthritis pain: consensus practice recommendations. A supplement to the AGS Clinical Practice Guidelines on

- the management of chronic pain in older adults. *J Am Geriatr Soc.* 2001; 49:808–23. [PubMed: 11480416]
16. Stewart K, Hiatt W, Regensteiner J, Hirsch A. Exercise training for claudication. *N Engl J Med.* 2002; 347:1941–51. [PubMed: 12477945]
  17. Pauwells RA, Buist RA, Calverley PM, Jenkins CR, Hurd SS. GOLD Scientific Committee. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) Workshop summary. *Am J Respir Crit Care Med.* 2001; 163:1256–76. [PubMed: 11316667]
  18. American College of Sports Medicine. Position Stand. Exercise and hypertension. *Med Sci Sports Exerc.* 2004; 36:533–53. [PubMed: 15076798]
  19. Kesaneimi Y, Danforth E, Jensen M, Kopelman P, Lefebvre P, Reeder B. Dose–response issues concerning physical activity and health: an evidence-based symposium. *Med Sci Sports Exerc.* 2001; 33(6 Suppl):S351–8. [PubMed: 11427759]
  20. Study LIFE. Investigators. Effects of a physical activity intervention on measures of physical performance: results of the Lifestyle Interventions and Independence for Elders Pilot (LIFE-P) Study. *J Gerontol A Biol Sci Med Sci.* 2006; 61:1157–65. [PubMed: 17167156]
  21. Nelson M, Layne J, Bernstein M, et al. The effects of multidimensional home-based exercise on functional performance in elderly people. *J Gerontol A Biol Sci Med Sci.* 2004; 59:154–60. [PubMed: 14999030]
  22. Go, AS.; Mozaffarian, D.; Roger, VL., et al. *Circulation.* Vol. 129. American Heart Association Statistics Committee and Stroke Statistics Subcommittee; 2014. Heart disease and stroke statistics–2014 update: a report from the American Heart Association; p. e28–e292. An important update that provides the most current evidence relating to the low PA participation and adherence rates in older CVD patients
  23. Pescatello, LS., editor. *ACSM's Guidelines for Exercise Testing and Prescription.* 9th. Baltimore: Lippincott Williams & Wilkins; 2013.
  24. Smith, SC., Jr; Benjamin, EJ.; Bonow, RO., et al. *Circulation.* Vol. 124. World Heart Federation and the Preventive Cardiovascular Nurses Association; 2011. AHA/ACC Secondary Prevention and Risk Reduction Therapy for Patients with Coronary and other Atherosclerotic Vascular Disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation; p. 2458–73. These updated guidelines combine other guideline statements and new evidence from clinical trials to further supports and broadens the merits of intensive risk-reduction therapies for patients with established coronary and other atherosclerotic vascular disease
  25. US Department of Health and Human Services. 2008 physical activity guidelines for Americans. <http://www.health.gov/paguidelines/guidelines/default.aspx>
  26. Nelson M, Rejeski WJ, Blair SN, Duncan PW, Judge JO, King AC, et al. Physical Activity and Public Health in Older Adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc.* 2007; 39(8):1435–45. [PubMed: 17762378]
  27. Health Canada. *Canada's Physical Activity Guide to Healthy Active Living for Older Adults.* Ottawa, Ontario, Canada: 1999.
  28. Tseng B, Marsh D, Hamilton M, Booth F. Strength and aerobic training attenuate muscle wasting and improve resistance to the development of disability with aging. *J Gerontol A Biol Sci Med Sci.* 1995; 50:113–9. [PubMed: 7493203]
  29. Singh N, Clements K, Fiatarone M. A randomized controlled trial of the effect of exercise on sleep. *Sleep.* 1997; 20:95–101. [PubMed: 9143068]
  30. Latham M, Anderson C, Bennett D, Stretton C. Progressive resistance strength training for physical disability in older people. *Cochrane Database Syst Rev.* 2003; 2:CD002759. [PubMed: 12804434]
  31. US Department of Health and Human Services. Strength training among adults aged >65 years - United States 2001. *MMWR.* 2004; 53:25–8. [PubMed: 14737059]

32. Kahn E, Ramsey L, Brownson R, et al. The effectiveness of interventions to increase physical activity. A systematic review. *Am J Prev Med.* 2002; 22(4 Suppl):73–107. [PubMed: 11985936]
33. Hootman J, Macera C, Ainsworth B, Addy C, Martin M, Blair S. Epidemiology of musculoskeletal injuries among sedentary and physically active adults. *Med Sci Sports Exerc.* 2002; 34:838–44. [PubMed: 11984303]
34. Sallis JF, Hovell MF. Determinants of exercise behavior. *Exerc Sport Sci Rev.* 1990; 18:307–30. [PubMed: 2192898]
35. Swain. ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription. Principles of behavior change: skill building to promote physical activity (7th). 2013; Chp. 45:745–760.
- 36•. Strath, SJ.; Kaminsky, LA.; Ainsworth, BE., et al. Circulation. Vol. 128. American Heart Association Physical Activity Committee of the Council on Lifestyle and Cardiometabolic Health and Cardiovascular, Exercise, Cardiac Rehabilitation and Prevention Committee of the Council on Clinical Cardiology, and Council; 2013. Guide to the assessment of physical activity: Clinical and research applications: a scientific statement from the American Heart Association; p. 2259-79. This review provides very useful information, including a decision matrix and table, to allow professionals to make a goal-specific selection of a meaningful physical activity assessment method
37. Bravata DM, Smith-Spangler C, Sundaram V, Gienger AL, Lin N, Lewis R, et al. Using pedometers to increase physical activity and improve health: a systematic review. *JAMA.* 2007; 298(19):2296–304. [PubMed: 18029834]
38. Izawa KP, Watanabe S, Omiya K, Hirano Y, Oka K, Osada N, et al. Effect of the self-monitoring approach on exercise maintenance during cardiac rehabilitation: a randomized, controlled trial. *Am J Phys Med Rehabil.* 2005; 84(5):313–21. [PubMed: 15829777]
39. Butler L, Furber S, Phongsavan P, Mark A, Bauman A. Effects of a pedometer-based intervention on physical activity levels after cardiac rehabilitation: a randomized controlled trial. *J Cardiopulm Rehabil Prev.* 2009; 29(2):105–14. [PubMed: 19305235]
- 40•. Ayabe M, Brubaker PH. Self-Monitoring Moderate-Vigorous Physical Activity Versus Steps/Day Is More Effective in Chronic Disease Exercise Programs. *J Cardiopulm Rehabil Prev.* 2010; 30(2):111–5. A small but important intervention study demonstrated that self-monitoring PA with accelerometers leads to a greater increase in mod-vig. PA than self-monitoring with pedometers in chronic disease patients. [PubMed: 19952772]
41. Martin JE, Dubbert PM, Katell AD, et al. Behavioral control of exercise in sedentary adults: studies 1 through 6. *J Consult Clin Psychol.* 1984; 52(5):795–811. [PubMed: 6501665]
- 42•. Stanford FC, Durkin MW, Stallworth JR, Powell CK, Poston MB, Blair SN. Factors that influence physicians' and medical students' confidence in counseling patients about physical activity. *J Prim Prev.* 2014; 35(3):193–201. Through the use of questionnaires, this study found after adjusting for BMI, that physicians and medical students who met USDHHS guidelines for vigorous activity were more than twice as likely to provide exercise counseling than physicians who did not meet these guidelines. [PubMed: 24682887]
43. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot.* 1997; 12(1):38–48. [PubMed: 10170434]
44. Pinto BM, Goldstein MG, Marcus BH. Activity counseling by primary care physicians. *Prev Med.* 1998; 27(4):306–13.

Table 1
Suggested strategies by states of motivational readiness for change

Stage of Change	Goal	Specific Strategies
Precontemplation	To get your client thinking about physical activity	• Encourage your client to learn more about physical activity • Read articles, watch videos, and talk to others (physician) about physical activity • Make a list of potential benefits to becoming physically active, then assess how important these benefits are to him or her
Contemplation	To encourage your client to start being physically active	• Have client observe an aerobics class or take a tour of a gym to build familiarity and confidence • Identify barriers to getting started (lack of time) and strategies for overcoming them (walking during lunch break) • Develop a plan for getting started (when, where, what activity, with whom?) • Set a small goal (5 minutes of walking) and commit to it
Preparation	To encourage your client to be regularly physically active	• Have client use a pedometer and/or activity logs to self-monitor physical activity and track progress toward goals • Encourage client to reward him/herself for meeting the goal of increased physical activity • Leave reminders to exercise everywhere (walking shoes by the door)
Action	To help your client maintain this physical activity habit over time	• Identify any obstacles that might interfere with being active in the future, then develop a plan for how to overcome them • Help client train for an event in the future (fun walk, 5 K)
Maintenance	To help the client prepare for any future setbacks and increase enjoyment of physical activity	• Discuss how to get back on track after a break in physical activity • Make physical activity fun: try new activities (kickboxing!); listen to music or watch TV while on treadmill; walk with a friend • Encourage your client to mentor someone else who is interested in becoming more physically active

From: Pekmezi D, Brooke B, Marcus B. Using the transtheoretical model to promote physical activity. *ACSM's Health Fitness J.* 2010;14(4):8–13, with permission from Wolters Kluwer Health