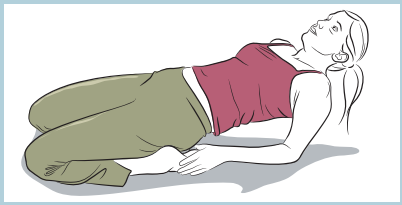
abstract



Physical activity helps to maintain function, health, and overall quality of life for older adults. It is challenging, however, for health care providers and others who work with older adults to know what type of activity to encourage older adults to engage in, and how to motivate them to initiate and adhere to physical activity and exercise over time. The purpose of this piece is to provide an overview of physical activity for older adults and provide the resources needed to evaluate older adults and help them establish safe and appropriate physical activity programs, as well as providing motivational interventions that will eliminate the barriers to exercise and optimize the benefits.

Key words: *exercise, screening, motivation, self-efficacy, outcome expectations*

Screening for and Prescribing Exercise for Older Adults

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Introduction

A substantial body of scientific evidence indicates regular physical activity can bring dramatic health benefits to people of all ages and abilities, with these benefits extending over the life course.[1–13] Physical activity offers one of the greatest opportunities to extend years of active independent life, reduce disability, and improve the quality of life for mid-life and older persons.[14–17] Older adults who engage in regular physical activity are more likely to have better health, as evidenced by research findings in many specific physical and mental health domains (Table 1). Despite these clear benefits, the majority of older adults do not engage in regular physical activity[18] and prescribing physical activity and/or specific exercise programs is not yet routine clinical practice.[18,19] To optimize physical activity among older adults, we recommend a three-step process. The first step is the screening process prior to starting an exercise program, the second is the prescriptive process, and the third is motivating the individual to initiate and adhere to the exercise program prescribed.

Screening Prior to Prescribing an Exercise Program

Ideally, the purpose of screening is to: (1) minimize injury or other serious adverse events (e.g., musculoskeletal trauma, falls, or cardiovascular events) while allowing the individual to achieve the maximum benefit from physical activity;[20] (2) identify medical problems so that exercise programs are appropriately modified for safety and optimal benefit;[21] and (3) identify functional impairments that the activity program will address.[22] Screening of older adults prior to starting an exercise program continues to be a controversial issue,[23] and beliefs about

Table 1: Health Benefits of Physical Activity for Older Adults

Health Issue	Treatment Strategy	Comments
Cardiovascular health (blood pressure/ angina/congestive heart failure[1,3,7,9,12,4,13]	Increasing physical activity with aerobic activity	– Improves myocardial performance – Increases peak diastolic filling – Increases heart muscle contractility – Reduces premature ventricular-contractions – Improves blood lipid profile – Increases aerobic capacity – Reduces systolic blood pressure – Improves diastolic blood pressure – Improves endurance – Improves muscle capillary blood flow – Decreased claudication
Body Composition/Muscle Mass[4,67]	Increasing physical activity with aerobic activity	– Decreases abdominal adipose tissue – Increases muscle mass
Metabolism[2,4]	Increasing physical activity with aerobic activity	– Increases total energy expenditure – Improves protein synthesis rate and amino acid uptake into the skeletal muscle – Reduces low-density lipoproteins – Reduces cholesterol/very low density lipoproteins – Reduces triglycerides – Increases high-density lipoproteins – Increases glucose tolerance
Bone health[39,43,68–70]	Increasing Physical Activity with weight-bearing exercise	– Slows decline in bone mineral density – Increases total body calcium, nitrogen – Decreased pain related to arthritis – Prevents additional wear and tear on damaged articular cartilage
Psychological well-being[63,71–74]	Increasing physical activity through aerobic activity	– Improves perceived well-being and happiness and vitality – Decreases levels of stress-related hormones – Improves attention span – Improves cognitive processing speed – Increases slow-wave, rapid eye movement sleep, and sleep quality – Provides sense of accomplishment – Decreases anxiety and improves overall mood
Muscle weakness and functional capacity[75–80]	Increasing physical activity through resistance and balance training	– Reduces risk of musculoskeletal disability – Improves strength and flexibility – Reduces risk of falls – Improves dynamic balance – Improves physical functional performance
Preventing falls and fear of falling[5,6,10,11,80]	Increasing physical activity through resistance, aerobic, and balance exercises	– Decreases falls and fear of falling

the benefits and disadvantages of screening vary across and within both patients and provider groups.[21] While many guidelines or protocols still strongly recommend "seeing your doctor first,"[24] a recent American College of Sports Medicine[25] best practices statement endorses the perspective that medical clearance should not be required prior to encouraging older individuals to begin a light-intensity activity program. In addition, recommending screening for older adults who simply want to engage in low to moderate level lifestyle activities such as walking, swimming, or gardening may actually be a deterrent to increasing physical activity among these individuals.

Screening to Prevent Cardiovascular Risk Associated with Exercise

Traditionally, screening guidelines recommended rigorous cardiac testing. It is now noted[26–28] that there is minimal cardiovascular risk to engaging in physical activity and a much greater risk to maintaining a sedentary lifestyle. The United States Preventive Services Task Force recently recommended against the use of exercise stress tests for the screening of low-risk, asymptomatic individuals prior to starting a physical activity program.[29] This recommendation receives strong support from editorials and articles that question the value of exercise stress tests and pre-enrollment screening questionnaires.[24,26,30–32] In addition, an American College of Cardiology and the American Heart Association (AHA-ACC) Consensus panel recently re-examined their own recommendation that asymptomatic persons without known coronary artery disease undergo routine exercise testing prior to initiating physical activity.[33] After reviewing the available scientific evidence and assessing the magnitude of the net benefit, the AHA-ACC consensus panel concluded that the current recommendation requiring exercise testing is considered not useful and/or potentially harmful.

Cardiovascular events in response to physical activity are both rare and unpredictable. Neither stress tests nor screening instruments such as the Revised Physical Activity Readiness Questionnaire (PAR-Q) 34 effectively identify the extremely small subset of individuals at risk for these events.[32,35] At the same time, there is significant risk associated with screening for physical activity through traditional graded exercise testing. Approximately 20% of older individuals will have a positive stress test and consequently will be exposed to more invasive testing.[36,37] Both stress tests and preactivity questionnaires are associated with unacceptably high false positive and false negative results.[35] Moreover, there is no prognostic value of exercise testing in asymptomatic individuals with regard to cardiovascular events.[38]

Screening to Prevent Musculoskeletal Risk of Exercise

Physical therapy and exercise have been shown to be beneficial to older adults with arthritis.[39–44] Table 2 provides an overview of the current recommendations

Table 2: Exercise Materials Readily Available for Adults

Resource	Web Address
AgePage: Exercise: Feeling Fit for Life	www.niapublications.org/agepages/exercise.asp
International Counsel on Active Aging	www.icaa.cc/PressInfo/onehouradayrelease.htm
International Society for Aging and Physical Activity	www.isapa.org/ISAPA_Newsletter/
National Blueprint: Increasing Physical Activity Among Adults Age 50 and Older	www.agingblueprint.org/tips.cfm
National Institute of Aging: Exercise: A Guide from the National Institute of Aging	www.nia.nih.gov/exercisebook/exercisebook.asp
Novartis Health and Age	www.healthandage.org/Home/gc=2!gid1=4304
President's Council on Physical Fitness and Sports	www.fitness.gov/
YMCA Programs such as AOA (Active Older Adults)	www.ymca-austin.org/aoa.htm
The Canadian Centre for Activity and Aging's Home Support Exercise Program. *Geriatrics & Aging*	www.geriatricsandaging.ca/PDF/PDFJuly2003/0607homesupport.pdf
American Heart Association	www.americanheart.org
Fitness Past 50 materials	www.fitnesspastfifty.com/articles.html
Keep Active – Safe at Any Age – (American Academy of Orthopaedic Surgeons)	orthoinfo.aaos.org/brochure/thr_report.cfm?Thread_ID=22&topcategory=Wellness
First Step to Active Health	www.firsteptoactivehealth.com

Table 3: Suggested Exercise Recommendations in the Presence of Clinical Problems

Known Clinical Problem and/or Symptoms	Exercise Options to Discuss
Known cardiovascular disease such as hypertension, congestive heart failure	Rule out any new acute illness. Once acute problem is resolved start progressive activity as tolerated: • Walking at a comfortable pace for increasing distances • Resistance training at a comfortable level, increasing as tolerated • Balance and flexibility exercises
Feeling "faint" or having "spells of dizziness" or sensations of "unsteadiness"?	Rule out any new acute illness. Once acute problem is resolved start progressive activity as tolerated: • Walking at a comfortable pace for increasing distances—if unsteadiness is a concern, may want to do stepping while seated at first or find a partner to walk with • Weightlifting at a comfortable level, increasing as tolerated • Balance and flexibility exercises
Current bone, joint, or muscle problem that causes pain in your back, legs, arms, shoulder or neck or other areas?	– Avoid exercise programs that are specifically geared toward walking on a hard surface – Avoid resistance exercise activities (lifting weights or using stretchy bands) that increase pain – Discuss options with your health care provider or an exercise trainer. These options might include engaging in pool exercise programs or utilizing appropriate exercise equipment • Balance and flexibility exercises
Shortness of breath doing activities such as walking up a hill, up the stairs, or when making a bed?	Rule out any new acute illness. Once evaluated for acute problems and treatment initiated start progressive activity as tolerated: • Walking at a comfortable pace for increasing distances • Weightlifting at a comfortable level, increasing as tolerated • Balance and flexibility exercises
Frequent falls (at least twice a week)	– Begin with chair exercises – Try to have another person present during exercise activity – Emphasize balance and lower body strength exercises
Any symptom or health concern that the individual expresses as a reason why she/he should not exercise	Rule out any acute illness associated with these symptoms and stabilize underlying chronic problems. Once evaluated have the patient start progressive activity as tolerated: • Walking at a comfortable pace for increasing distances • Weightlifting at a comfortable level, increasing as tolerated • Balance and flexibility exercises

from a multidisciplinary guideline development group and examples of exercise materials that are readily available to older adults.[43] Exercise for older adults with musculoskeletal conditions such as arthritis can decrease pain and improve function, and does so with a limited risk of falls or minor adverse events (incidence rate ranging from 0–11%) such as pain.[12,39,44–52]

Screening to Appropriately Guide Older Individuals toward Safe Exercise Programs

Given the lack of clinical evidence to support the utility of traditional cardiac stress testing prior to starting a moderate level exercise program, cardiac stress testing should not routinely be recommended. Appropriate screening prior to starting a physical activity/exercise program is recommended, however, to assure that older individuals engage in safe physical activity programs that optimize function and

Table 4: Physical Activities for Nonambulatory Older Adults

Resource	Web Address
Buffalo University: A Low Intensity Physical Activity Program	codi.buffalo.edu/graph_based/.aging/.resource/.list
Video Press: University of Maryland School of Medicine: • Improving Function – Improving Life • The Nursing Assistant's Role as Cheerleader and Personal Trainer • Function – A Quality Indicator : The GNA's Role • Restorative Care: It's Mandated • Exercise Prescription: Staff Information • Exercise for Fitness of Ambulatory Elders • Exercise for Fitness of Nonambulatory Elders	www.videopress.org
Sit to be Fit – The Sitting Exercise Training Manual	www.fitnessandfreebies.com/sit2befit.html
Conditioning Exercises: Sitting	devweb3.vip.ohio-state.edu/Materials/ PDFDocs/exer-reh/physical/con-sit.pdf
Gymhome: Live exercises: a sitting exercise program	www.gymhome.com/english/ejerciciosEnVivo/ejercicio
Sitting Exercise Program for Individuals with Ataxia	www.internaf.org/ataxia/exercise.html
Leg Theraband Exercises: Sitting and Standing	devweb3.vip.ohio-state.edu/Materials/ PDFDocs/exer-reh/lower/leg-sit-stand.pdf
Stretching Exercises	www.eso.org/safety/Archive/ Exercise_sit/sitting_exercise.ppt
AAOS Online Service Fact Sheet Sitting Exercises (for persons age 60 and older):	orthoinfo.aaos.org/fact/thr_report. cfm?thread_id=27 &topcategory=wellness
Active Range of Motion Exercises	www.healthtouch.com/bin/EContent_HT/cnoteShowLfts.p?fname= 02523&title=ACTIVE+RANGE+OF+MOTION+EXERCISE
Audiology: Balance Exercises	www.dch.org.uk/atoz/audiology/audiologybalance.htm
Funcercise: Seniors exercise and rehabilitation videos	www.funcercise.com/ elderly-senior-seniors-fitness-exercise-exercises-weight-training-video-videos.html
Static Stretching Exercises	www.brianmac.demon.co.uk/stretch.htm
Stretching Exercises	www.womensheartfoundation.org/content/Exercise/stretching_exercise.asp
Shoulder exercises	www.holistic-online.com/Remedies/Arthritis/Arth_ shoulder_exercises.htm
CNS: Exercises for the Parkinson Patient	www.cnsonline.org/www/archive/parkins/park-03.html
Strong for Life	www.bu.edu/hdr/products/stronglife

overall health status and prevent injuries.[53] Unfortunately, there are no tested screening tools that have been developed expressly for this purpose. The Physical Activity Readiness Questionnaire (PAR-Q)[34] is commonly used in clinical practice or community-based programs to serve this function. The PAR-Q focuses on medical history, symptoms, and risk factors for cardiovascular events associated with exercise. It does not directly consider musculoskeletal problems nor does it guide the individual or provider toward safe exercise programs. Based on results of the screening, the individual may be required to see his or her primary health care provider, and/or have the health care provider "sign off" on a screening form before being allowed into exercise programs. Moreover, the PAR-Q has not been rigorously tested in older adult populations, despite the fact that researchers and practitioners often employ this instrument with older adults.

These types of safety screens are used to stratify individuals by risk for cardiovascular events and to establish the need for more extensive testing such as an Exercise Treadmill Test. Although the questions in the PAR-Q have been adjusted to be age appropriate,[54] this screening does not provide the guidance needed to establish an appropriate exercise program for each individual. In an attempt to establish a more appropriate method of screening of older adults prior to initiating a moderate level of physical activity, the Robert Wood Johnson Foundation supported the development of an expert panel of interdisciplinary researchers and clinicians with extensive experience working with older adults engaged in exercise programs. There was strong consensus among this group that an easy-to-use tool is needed that would enable a quick assessment of health problems, provide initial strategies for appropriate tailoring of an exercise program for different health conditions and problems, and offer safety tips to further minimize any potential health risks. This panel is currently developing such a tool (to be named EASY) that is anticipated to be available in 2006. The goal is to develop

Table 5: EASY Safety Tips for Exercise Initiation*

Exercise Safety Tips to Always Consider Prior to Starting Exercise

* Always wear comfortable, loose-fitting clothing and appropriate shoes for your activity.
* Warm up: Perform a low to moderate intensity warm-up for 5–10 minutes.
* Drink water before, during, and after your exercise session.
* When exercising outdoors, evaluate your surroundings for safety: traffic, pavement, weather, and strangers.
* Wear clothes made of fabrics that absorb sweat and remove it from your skin.
* Never wear rubber or plastic suits. These could hold the sweat on your skin and make your body overheat.
* Wear sunscreen when you exercise outdoors.

Exercise Safety Tips for When to STOP Exercising

Stop exercising right away if you:

* have pain or pressure in your chest,neck, shoulder, or arm
* feel dizzy or sick
* break out in a cold sweat
* have muscle cramps
* feel acute (not just achy) pain in your joints, feet, ankles, or legs.
* Slow down if you are out of breath

You should be able to talk while exercising without gasping for breath.

Exercise Safety Tips to Recognize Days/Times When Exercise Should NOT Be Initiated

* Do not do hard exercise for two hours after a big meal.
* Do not exercise when you have a fever and/or viral infection accompanied by muscle aches.
* Do not exercise if your systolic blood pressure is greater than 200 and your diastolic is greater than 100.
* Do not exercise if your heart rate is greater than 120.
* Do not exercise if you have a joint that you are using to exercise (such as a knee or an ankle) that is red and warm and painful.
* Stop exercising if you experience severe pain or swelling in a joint. Discomfort that persists should always be evaluated.
* Do not exercise if you have a new symptom that has not been evaluated by your health care provider such as pain in your chest, abdomen or a joint, swelling in an arm, leg or joint, difficulty catching your breath at rest, or a fluttering feeling in your chest.

* Additional safety information is provided at the National Institute of Health Web page: www.nlm.nih.gov/medlineplus/safety.html

a dynamic, web-based survey and supporting tool kit that can be used by health care providers, activity professionals, and older adults alike.

Recommendations for Exercise

To prescribe the safest and most appropriate exercise program for older patients it is important to consider the patient's medical history, focussing on both cardiovascular symptoms such as dizziness or shortness of breath, and musculoskeletal problems such as degenerative joint disease or musculoskeletal pain. If, for example, the patient has knee pain with weight-bearing activity, weight-bearing exercises may not be appropriate at that time. Table 3 provides some guidelines for what types of exercise to recommend in light of various clinical problems common in old age. In addition, it is also important to consider the personal physical activity preferences of individual patients, as well as their personal health and fitness goals and aspirations.

For general health and well-being, a well-rounded physical activity program should include endurance, strength, balance, and flexibility.[55] Endurance-related physical activity refers to continuous movement that involves large muscle groups and is sustained for a minimum of 10 minutes. Examples of endurance activity include biking, swimming, walking, and lifestyle activities that incorporate large muscle groups. Strength-related activity refers to increasing muscle strength by moving or lifting some type of resistance, such as weights or elastic bands, at a level that requires some physical effort. The amount of resistance and number of repetitions that are necessary to increase strength will vary for each individual and muscle group. In general, one to three sets of 10 to 12 repetitions are regarded as the optimal amount for increasing muscle strength. Strength training should not be performed on consecutive days to give the muscles time to recover between sessions.[56,57] Flexibility-related activity facilitates greater range of motion around the joint. These exercises should be performed a minimum of two days a week.[57] Balance is the ability to maintain control of the body over the base of support so as to avoid falling. Static balance is the ability to maintain balance without moving, while dynamic balance is the ability move without losing balance or falling.

Nonambulatory patients can likewise engage in physical activity. In fact, it is these individuals who are most likely to benefit the most from an exercise program. Muscle weakness and atrophy are probably the most functionally relevant and reversible aspects to exercise in nonambulatory older adults, and attempts to reverse these deficits can have a major impact on function and quality of life. There are many available exercise programs, as shown in Table 4, for those who are nonambulatory. Depending on the resources available, aerobic activities can include water-based activities, upper extremity cycling, marching in place, and other types of activities.

Motivating Older Adults to Adhere to a Regular Exercise Program

Unfortunately, despite the many known benefits to exercise for all older adults, the majority of these individuals do not regularly exercise.[58,59] Motivational interventions should be incorporated into clinical care for not only the initiation of an exercise program but to assure ongoing adherence. The first step to motivating the older adult to exercise is educating the individual and his or her caregiver as appropriate about the benefits of exercise. It is particularly important to emphasize the immediate outcomes (e.g., benefits) that can be expected if exercise is done regularly. Many older adults repeatedly indicate that they are not interested in exercising to prolong life but only to improve current health and quality of life.[60–63]

Education should also include an "exercise prescription" that specifically delineates what exercises the individual should do on a regular basis. Because many older adults focus on immediate benefits as a source of activity motivation, it is important that the exercise prescription be tied to specific and reasonably proximal goals. For example, if the individual would like to decrease calf pain associated with claudication, a walking program should be included in his or her exercise program. If the individual would like to decrease the risk of falls, then muscle strengthening of the trunk and legs, as well as specific balance exercises should be included.[64,65] Daily goals can be written out for the individual to clarify exactly what exercise should be done on a daily basis. The long-term goal, such as decreasing pain or falls, can be placed on the daily goal sheet as a reminder to the individual of what he or she ultimately hopes to achieve through exercise. The 5 A's behavioural counselling approach[66] is a useful framework for helping clinicians know how to assess current activities, advise on specific goals, agree on collaborative goals, assist with understanding how to meet challenges and barriers, and arrange the most appropriate follow-up care.

While there is little research to support that there is a significant risk associated with exercise, many older adults may be fearful that exercise may exacerbate underlying diseases such as arthritis and therefore resist exercise. To further facilitate safe exercise activities patients should be given a list of Safety Tips (Table 5) to follow. These Safety Tips, part of the EASY tool kit, help individuals know when it may not be safe to initiate their exercise program, when they should stop exercising, and what to expect as normal at the end of an exercise session.

As with the prescription of any medication, a prescription for exercise should also include potential exercise side effects. These might be sensations associated with actually doing the exercise (e.g., shortness of breath when walking), or they may be things that can possibly occur the day after exercise (e.g., muscle soreness). Patients should be informed of these potential sensations and provided with interventions for how to prevent and/or manage them once they occur. Understanding, for example, that shortness of breath may occur during exercise can decrease the associated fear that shortness of breath is indicative of an acute medical problem.

For some older individuals seeing

others their age exercise, or hearing about others their age exercising and achieving important health benefits from that exercise, can be very motivating. Share stories with patients and provide examples of your own personal exercise activities and the benefits you find from exercise. Most importantly, don't forget to ask these individuals about their exercise programs when you see them on a subsequent visit. Knowing that you are interested in their exercise program, that you believe it is important, and that you care enough about whether or not they exercise are crucial to the ongoing maintenance of the individuals' exercise program.[63,62]

Conclusion

There is strong experimental evidence to indicate that older adults can exercise safely and that regular exercise has both physical and mental health benefits. The benefits of exercise for older adults clearly outweigh the risks. Consequently, all older adults should be provided with an exercise prescription that incorporates their own personal goals and exercise plan that will assure a safe and beneficial outcome. Utilize "screening" techniques to guide the development of the exercise program you prescribe and incorporate motivational techniques into your patient/provider interaction so that the exercise program will not only be initiated by the older individual, but he or she will adhere to that program over time. Integrating exercise prescriptions into routine care will help patients optimize function and quality of life for their remaining years of life.

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