A VISIT TO A LOCAL FITNESS center or weight room will reveal some drastic changes in the population of individuals who are exercising. In the past, individuals who typically trained with weights were middle-age and younger. They undertook resistance training to gain muscle strength and fitness and to enhance their appearance. Today, however, more and more individuals over the age of 60 are seeking to improve their health and quality of life through some form of resistance exercise.

The number of older adults in the U.S. is rising because of lower birthrates and reduced mortality. The Bureau of the Census (1) estimates that by the year 2050 there will be approximately 80 million Americans over 65 and 19 million over 85. Thus there may well come a day when a high percentage of persons who participate in resistance training are in this older age group.

Successful aging requires preparation, and individuals need to develop health habits that include regular exercise (11). It is important that older individuals be aware of the need to stimulate their muscles in order to increase bone and muscle mass, improve strength and range of motion, and maintain and improve ambulatory capacities.

Recent research indicates that a well-designed, progressive weight training program will increase overall fitness and provide greater functional mobility (3, 5). Better fitness will improve quality of life and make daily routines and recreational activities more enjoyable. With an abundance of free time and adequate resources, older Americans will increasingly seek facilities to help them accomplish their health goals so that they can remain independent and productive.

The purposes of this article, then, are to (a) discuss the latest research on the benefits of weight training for older adults, and (b) explain our own personal philosophies about designing a weight training program for this group.

## Weight Training Benefits

There is considerable evidence that weight training has many positive effects for individuals over 60. For example, Frontera et al. (4) examined the effects of a 12-week weight training program on 12 untrained men, ages 60 to 72. The men trained 3 times a week and performed 3 sets of 8 repetitions for knee extension and knee flexion at 80% of their one-repetition maximum (1-RM). The 1-RM was assessed every week and the weight was progressively increased.

At the end of the 12-week program, test results indicated that extensor strength had improved an average 107.4% and flexor strength had improved as much as 226.7%. Thigh composition analysis revealed a 4.8% increase in total thigh girth with an 11.4% increase in muscle mass. It was clear that older men can make significant gains in strength and muscle mass.

In another investigation, Grimly et al. (5) studied the effects of concentric and eccentric knee extensions on maximum torque and muscle hypertrophy. Their

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subjects, 9 men between the ages of 78 and 84, trained 3 times a week for 25 sessions. The results indicated that these older men had a dramatic increase in strength and a 3% increase in total quadriceps cross-section.

Fiatarone et al. (3) conducted a year-long study on 100 nursing home residents and found that high-intensity resistance training was a feasible and effective means of counteracting muscle weakness and physical frailty.

The training program included a regimen of resistance exercise for the hip and knee extensor muscle groups 3 days a week. Resistance was set at 80% of the 1-RM, and training sessions lasted 30 minutes. The 52 weeks of training led to significant increases in strength, muscle size, and stair-climbing power.

A major concern for older women is the rate of bone mineral loss after menopause (2). The effects can be devastating and can place tremendous stress on the public health system as well. Research by Munnings (8) indicates that osteoporosis is responsible for 1.3 million bone fractures each year. One third of women over the age of 65 will suffer a spinal fracture and 15% will suffer a hip fracture.

A study by Dalsky et al. (2) indicates that women can eventually lose 20 to 30% of their total bone mass. However, weight-bearing and weight training exercises can retard or prevent this process.

Notelovitz et al. (9) conducted research on the effects of variable resistance weight training and estrogen replacement therapy on bone mass in surgically menopausal women. They compared women who, for a year, took estrogen only and women who took estrogen in conjunction with a regular weight training program.

Results indicated that the exercise group had an 8% greater increase in bone density. No significant changes occurred in the women who only took estrogen. Notelovitz et al. concluded that weight training helps stimulate the bone to remodel and combat osteoporotic fractures by strengthening the bones and reducing the likelihood of falls.

From a review of the literature, then, it can be surmised that active individuals who are engaged in strength training will maintain a higher level of muscular strength, muscular endurance, and bone mineral content than those who are inactive.

Many individuals over 60 have been inactive for years or may never have been involved in any type of exercise (12). They might have fears and misconceptions about exercise that need to be addressed. Some are convinced that it is too late to begin an exercise program or too dangerous for them to exercise.

Strength and conditioning professionals may eventually encounter situations in which they will have to design and prescribe a weight training program for persons over 60. The remainder of this article will focus on guidelines for developing a safe and systematic method of introducing this valuable form of exercise to this very important population.

■ Program Guidelines

Initial Meeting

During this first phase of the program, it is recommended that you as the strength and conditioning professional make individual appointments or conduct group seminars in order to:
• Introduce your older clients to the weight room environment.
• Let them see there are other older individuals who enjoy and benefit from exercise.
• Briefly describe the physical and psychological benefits of weight training.
• Provide a tour of the facilities and equipment.
• Demonstrate a few exercises and let them experiment with a very light weight.

Recommendation for Medical Screening

For weight training to be safe and enjoyable, a preexercise assessment of the client's health, capabilities, and limitations is necessary (12). As a strength and conditioning professional, you must require an older adult to:

• Get a blood pressure reading.
• Have body composition analyzed and evaluated.
• Provide any recent medical history that might suggest contraindications for exercise or that require more specific exercise instruction and supervision. Contraindications would include:
  - musculoskeletal injuries that may limit joint ROM;
  - total hip or knee joint replacement;
  - back or neck surgery;
  - spine injuries;
  - hip fractures;
  - shoulder surgery.
• Seek medical clearance that pays particular attention to the cardiovascular system.
• Discuss unhealthy lifestyle patterns such as smoking, poor eating habits, or heavy drinking.

Setting Goals and Objectives

Setting fitness goals requires dialogue between the instructor and the older adult. This calls for one-on-one counseling. Exercise goals will vary from the person who seeks improved performance in competitive events to the person who merely wishes to regain the ability to get up from a chair (6).

Common goals for any older client might include the following: to look and feel better; improve strength and endurance; improve work, recreational, or sports performance; improve body composition; lose weight; increase bone mass; improve functional status; reduce the risk of falls.

Teaching the Exercises

In teaching any type of resistance exercise to older adults, the instructor should always stress good form, proper body alignment, full range of motion, and slow, controlled repetitions. The instructor should use the following guidelines to ensure proper technique:

• Introduce the exercise and describe the body area affected.
• Demonstrate proper body position and handgrip.
• Demonstrate lifting technique.
• Describe what to expect in a typical circuit training workout.
• Demonstrate common errors in technique and how to correct them.
• Demonstrate spotting and safety techniques.
• Introduce proper workout procedure (e.g., begin with a warm-up phase, then the exercises, then end with a cooldown).
• Monitor the client as he or she practices the exercises.

The Exercises to Perform

Weight training exercises should isolate individual muscle groups or combine muscle groups (6). Shown on the next page are several sessions of stretching and flexibility exercises. The instructor should design a program that includes movements to stress all major muscle groups.

Strength and fitness professionals should be familiar with these basic movements and know how to teach a variety of exercises using single- and multi-station machines and light dumbbells.

Training Protocol

There are many strength training protocols from which to choose, and the program you prescribe must provide the older lifter with specific information on frequency, intensity, duration, and number of exercises to perform. A basic protocol for older adults should include the following criteria:

• Emphasize progressive involvement. Promote a program that starts the client at a low intensity and progresses slowly to a level suitable for his or her age and potential.
• Provide a program that includes 10 to 15 different exercises.
• Make sure the prescribed exercises strengthen all the muscle groups cited in the previous section.
• Clients should train 2 or 3 times a week. Training can be split if the client uses multiple exercises for certain muscle groups. Allow a 48-hr rest period between sessions to provide adequate rest for a muscle group.
• The training session should include an aerobic/stretching warm-up phase, a strength training phase, and a cool-down phase.
• Beginners should start with 2 sets of 12 reps at 30% of
EXERCISES TO PERFORM

**Leg Extensions**, to strengthen the quadriceps:
- Provide support for the lower back to maintain a normal lumbar curve.
- Limit range of motion (ROM) if the lifter reports painful knee grinding. Lifter should do single-leg extensions beginning at 90° and ending at full extension. If painful grinding occurs, the extension should end at approximately 40°.

**Leg Curls**, to strengthen the hamstrings:
- With a prone machine, have client lie over a pillow or pad in order to maintain normal lumbar curve when knees are fully bent. Consider using one leg at a time.
- With a seated machine, support the lower back to maintain normal lumbar curve.

**Leg Presses**, to strengthen the quadriceps, hamstrings, and gluteus:
- Avoid any painful range of motion.
- ROM should begin at full knee extension and flex about 60° before pressing the weight back to full extension.
- If possible, do single-leg presses.

**Heel Raises**, to strengthen the lower leg and ankle:
- Support the lower back to maintain a normal lumbar curve.
- Emphasize sufficient dorsiflexion.

**Seated Presses or Chest Flies**, to strengthen the upper torso:
- Knees should be bent and supported on the bench to limit undue stress on the lumbar spine.
- Protect the shoulders by not letting the elbows drop below shoulder level (elbows should not flex past 90°).

**Lat Pulldowns**, to strengthen the upper back:
- Client should sit erect, keep head erect, and maintain normal lumbar curve.
- Pinch in the scapula prior to the pulldown and maintain this scapular position throughout the movement.
- Do only a front pulldown (avoid a behind-neck pulldown).

**Scapular Adduction Movements**, to strengthen the scapular stabilizers:
- A reverse pec deck movement accomplishes this objective. The client sits facing the pec deck back support and uses the levers to adduct the scapula together.
- This movement helps guard against the common condition of kyphosis.

**Arm Extensions**, to strengthen the triceps:
- Clients should maintain erect posture with head erect and normal lumbar curve.

**Arm Curls**, to strengthen the biceps:
- Clients may sit or stand, again striving for good posture.

**Abdominal Curls**, to strengthen the stomach:
- Do not place hands behind head, as this may stress the cervical vertebrae.
- Do not hook the feet under a bar, as this results in too much hip flexor involvement.

**Back Extensions**, to strengthen the lower back muscles:
- Clients should use a light weight and perform slow repetitions.
1-RM, then gradually progress to 2 sets of 12 reps at 70% 1-RM. Periodically reestablish a 1-RM (7).

- Limit training sessions to 30 minutes.

**Warm-up and Stretching**

Proper warm-up and stretching cannot be overemphasized in a resistance training program. Older persons have reduced range of motion in many joints, thus stretching before weight training exercises will eliminate a great deal of soreness and help prevent injury (6).

When teaching warm-up and stretching procedures, keep these two points in mind: (a) Begin the warm-up with a very low-intensity, whole-body activity (walking, riding a stationary bike, etc.) for 5 to 10 minutes. (b) Use static stretches for the knee, hip, ankle, hamstrings, hip flexors, and shoulders for 10 minutes.

**Teach Proper Breathing Technique**

A potentially dangerous situation during weight training exercises relates to holding one’s breath while lifting. This increases the intrathoracic pressure and is referred to as the valsalva effect (10). The increased pressure on the chest may be enough to slow or inhibit the blood flow from the veins to the heart, possibly resulting in increased blood pressure and/or syncope. To guard against the valsalva effect, teach and emphasize proper breathing.

Strength and fitness professionals who are knowledgeable about proper breathing usually instruct their clients to inhale during the lowering (negative) phase of the lifting repetition and exhale during the concentric (positive) phase. But this may be difficult for novices to remember. Therefore, to ensure safety in lifting, here are a few points to remember:

- Stress the importance of constant, regular breathing during an exercise set.
- Instruct the lifter to never hold his or her breath during the entire exercise repetition.
- Have the lifter talk, count, or say the ABCs out loud to encourage a regular breathing pattern.
- If the lifter has to hold his or her breath to perform the final repetitions, this means the weight is too heavy and a lower weight should be used.

**Machines vs. Free Weights**

Older persons can benefit from weight training by using either resistance machines or free weights (barbells and dumbbells); each has its advantages and disadvantages. Most facilities today are equipped with a variety of both, and most professionals feel that machines and free weights are best when used in combination.

The major advantages of machines is that they usually provide adequate back support, eliminate certain physical dangers, typically provide the lifter with a definite range of motion, and probably help clients reach exercise independence sooner.

Free weights require balance and better lifting technique. Therefore it may be best to introduce older subjects to resistance training via machines before suggesting free weights. One exception would be to include very light dumbbell exercises for selected arm movements.
Initial Monitoring

It should be every strength coach or fitness professional’s goal to impart enough knowledge to an older lifter so he or she can gain the skill and confidence needed to become an independent exerciser. This will not occur after the first few sessions. It takes time for lifters to remember how to do the exercises correctly. Therefore the instructor should:

- Be available and observant when inexperienced lifters begin their daily workout.
- Keep good records on individual exercise programs for all clients.
- Recognize and correct any problems with lifting technique or other safety issues.
- Observe clients’ lifting technique before making incremental weight increases.
- Encourage clients to ask questions when there are problems.
- Encourage clients to interact with other lifters who may be more knowledgeable and willing to offer help and advice.

Summary

The over-65 age group represents the fastest growing segment of our population. These individuals are increasingly concerned with their overall fitness and wish to remain independent and ambulatory for as long as possible.

Research has indicated that low muscle mass and muscle weakness are strongly related to impaired mobility. This relationship is often independent of the effects of chronic disease, dementia, depression, and other maladies.

Research also indicates that the aging musculoskeletal system retains and improves its responsiveness when exposed to a regular, progressive resistance regimen (11). More important, resistance training significantly improves functional mobility and overall activity in older persons (3).

Strength training in older adults can reverse the age- or inactivity-related declines in muscle mass and strength. Older persons adapt to strength training much as younger people do. When older persons increase the strength of their muscles, bones, and joints, they can improve their capacity to carry out activities of daily living (11). ▲

References


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