

**ACE-
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RESEARCH
STUDY**

Function Follows Fitness

BY MARK ANDERS

News Flash: You're not getting any younger. And you're not alone. As a population, the number of older adults in the United States has grown to more than 36 million—that means one in every eight people is over the age of 65. By 2010, that number is expected to jump to more than 40 million. Couple that with the fact that Americans are more sedentary than ever before and we've got a problem. A big one.

As inactive people grow older they lose strength, mobility and balance, and it becomes tougher for them to accomplish what exercise scientists call activities of daily living or ADL. These seemingly simple things like getting up from a chair, carrying groceries or putting away dishes are obviously essential for good physical—and mental—health for all people.

Within the last five years or so, many fitness professionals have been promoting functional fitness programs as a way for older adults to remain active and independent as they age. Although anecdotally many are convinced these programs are effective, very little scientific research has been conducted to prove it. "There have been a number of studies that look at traditional weight training and the carryover to activities of daily living, but only a couple small studies have looked at functional training specifically," notes John Porcari, Ph.D., of the University of Wisconsin, La Crosse. "Our goal was to find out if older adults see improvements from functional fitness programs in a short period of time."

The inspiration behind this American Council on Exercise-sponsored study was the hope that if researchers could prove that functional fitness works, and that most will see real-world benefits relatively quickly, then more older adults would be willing to try functional exercise programs and be more likely to stick with them.

The Study

Led by Porcari and Denise Milton, M.S., a physical therapist with the U.S. military, a team of exercise scientists at the University of Wisconsin, La Crosse Exercise and Health Program recruited 24 male and female volunteers, ages 58 to 78 years. Each of the test subjects had some form of cardiac, metabolic or orthopedic

**New ACE research
that shows older
adults can expect
quick benefits
from functional
fitness programs**

**Table 1.
Functional exercises used
by the experimental group.**

- Unilateral balance: standing on one leg
- Golfer's lift: like picking up a golf ball
- Squat with arms forward
- Wall push-ups
- Lateral squats
- Forward/backward leans
- Squat with diagonal reach
- Walk-around obstacle
- Overhead press
- Rotation lunges
- Lunge and chop
- Stairclimb

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condition and all were already actively participating in the university's La Crosse Exercise and Health Program.

"A lot of [the subjects] have been in our program for a long time, doing pretty traditional exercise, things like walking and aerobic dance, but we're seeing people getting older and they're having more and more trouble doing things in everyday life," says Porcari, illustrating that the study participants were prime candidates for testing the validity of functional fitness. Each subject was randomly assigned to either the experimental group (which would do functional exercises) or a control group (which would stick with a traditional exercise program). Before the training period began, both groups were given the Functional Fitness Test for Older Adults, which consists of six components designed to evaluate things like strength, endurance, flexibility, balance and agility.

Once a baseline was established, it was time to start the exercise program. The experimental group participated in functional exercise sessions three times weekly for four consecutive weeks. Each session consisted of a five-minute warm-up, a circuit of 12 functional exercises, including moves like the wall push-ups, lunge and chop, and squat with diagonal reach (Table 1), followed by a 10-minute cool-down. Subjects were instructed to work at a moderate-intensity level while performing each of the exercises, one minute per move with a 15-second transition between each.

Researchers used sand-filled milk jugs (from 0.5 to 10 pounds) to simulate the weights of common household items. Similarly, the reaching and bending exercises mimicked the postures used in many common ADL. As the exercises became easier for the subjects, resistance was added and modifications were made to ensure that the exercisers maintained a moderate level of intensity throughout the test period.

After four weeks of exercise training, the research team once again administered the Functional Fitness Test for Older Adults to gauge the physical improvements of both the experimental group and the control group.

The Results

The experimental group, which underwent the functional fitness training, showed greater physical improvements than the control group (Table 2). In particular, improvements were seen in lower-body strength (13% improvement), upper-body strength (14%), cardiorespiratory endurance (7%), agility/dynamic balance (13%) and shoulder flexibility (43%). The researchers concluded that the functional fitness program was superior to conventional exercise for improving the subjects' abilities to complete most ADL.

Though the efficacy of functional training was no surprise to the researchers, Porcari finds it encouraging that the test subjects showed significant improvements in as little as four weeks. What makes these findings even more significant is that researchers weren't simply starting with totally inactive subjects and seeing big benefits—all subjects in the study were already regular exercisers.

Beyond the Science

Obviously the take-home message here is: Functional fitness really works. Even the simplest exercise regimen, like the one employed by our researchers using inexpensive equipment like sand-filled plastic jugs, is effective enough for older adults to reap significant benefits in less than a month.

Though this study did not assess the psychological consequences of the increase in functional fitness, anecdotal comments from subjects in the experimental group suggested they were encouraged by the subsequent benefits they experienced while performing everyday tasks. Researchers asked each of the subjects if they noticed any improvement in their ADL. The responses were generally positive, but Porcari recalls one woman in particular:

"At first she said, 'No.' Then she called me back and said, 'When I reach for stuff in the cupboards it's a lot easier than it used to be. Or when I'm in my car, it's a lot easier for me to turn around and look behind me when I'm backing up,'" says Porcari. "It just brings a smile to my face to hear the anecdotal comments that it does work in everyday life. Sure, it's nice to do this kind of bench research, but it's much more gratifying when you see people actually getting benefits."

Table 2.
Changes in FFT scores over the course of the study.

VARIABLE GROUP	PRE-TESTING	POST-TESTING	CHANGE
Chair Sit-to-Stand (reps)			
Control	15.0±3.7	14.9±3.4	-0.1
Experimental	13.8±3.1	15.6±2.6*	1.8
Biceps Curls (reps)			
Control	15.1±2.7	14.6±3.4	-0.5
Experimental	13.8±2.6	15.7±3.1*	1.9
6-Minute Walk (yds)			
Control	641±79.1	643±83.9	2.0
Experimental	618±62.4	661±67.1*	43.0
Chair Sit-and-Reach (in)			
Control	-4.8±3.5	-4.4±3.9	0.4
Experimental	-5.3±4.8	-4.1±3.9	1.2
Back Scratch (in)			
Control	-2.6±3.4	-2.7±3.6	0.1
Experimental	-3.7±5.8	-2.1±4.9*	1.6
8 Foot Up-and-Go (sec)			
Control	5.1±0.53	5.1±0.75	0.0
Experimental	5.5±0.77	4.8±0.50*	-0.7

* Significantly different than pretesting ($p < 0.5$)

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The Workout

Fabio Comana, ACE consultant and exercise physiologist, created the following functional fitness circuit workout based on the findings of this research. This 30-minute circuit requires no special equipment and can be done just about anywhere. Do it two or more times per week and you'll improve your balance, agility and cardiovascular fitness, as well as flexibility and strength in your lower and upper body. For best results, complete each exercise as shown here and then repeat the circuit a second time.

Station 1: Standing Balance

Week 1: Stand with feet hip-width apart, eyes closed and attempt to maintain balance for 15 seconds (use supports as necessary). Do four reps of 15 seconds each.

Week 2: Progress the exercise by extending your arms out in front and then out to your sides while reaching 6 inches in each direction without losing balance or moving your feet (eyes open or closed). Do five reps in each direction (forward, left and right).

Week 3: Progress the exercise again by standing on one leg while lifting the opposite leg as high as possible. Attempt to maintain balance for 15 seconds. Relax and repeat three more times with each leg.



Station 2: Step Overs

Week 1: Place a 6-inch-tall vegetable can (or cone) on the floor and stand approximately 6 inches behind it with both feet facing forward. Slowly lift your right leg and—while maintaining your balance—step over the can. Shift your weight to balance on your front leg and lift your left leg up and over. Return to the starting position by stepping back over the item. Do 10 reps.

Week 2: Progress the exercise by adding a stepping motion in a sideways direction. Do 10 reps.

Week 3: Progress the exercise again by gradually increasing the height of the item to 10 to 12 inches. Do 10 reps.

Station 3: Figure 8 Cone Drill

Place one cone (cone A) 10 feet in front of a chair and a second cone (cone B) 10 feet to the right of cone A. Begin the drill seated in the chair. Next, stand up and walk as quickly as possible to the left side of cone A. Turn to the right around it and walk toward the right side of Cone B. Walk completely around that cone and proceed back toward the left side of Cone A. Circle around that one as well and head back to your chair. Do three reps with 30 seconds rest between reps.

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Station 4: Chair Stands with Chest Stretch

Sit in a chair holding your torso upright off the backrest with feet flat on the floor, hip-width apart, and hands placed in your lap. Slowly rise to a stand. Try to push through your heels while extending your arms out to your sides at chest height with thumbs turned to point toward the ceiling. Squeeze your shoulder blades together and hold for one to two seconds. Next, bring your arms back to your sides and slowly sit back down. Start by doing the exercise continuously for 30 seconds, and gradually build up to 60 seconds as your strength and endurance improve.



Station 5: Standing Push-presses

Stand with feet hip-width apart holding weights (2- to 10-pound dumbbells or cans of vegetables) at shoulder height, palms facing forward with your weight on your heels. Slightly dip the knees to start the exercise, then straighten your knees and simultaneously push the weights overhead until your arms are fully extended. Avoid arching your lower back. Slowly return your arms to shoulder-level and repeat. Do this exercise continuously for 30 seconds.

Station 6: Seated Leg Extension

Sit in a chair holding your torso upright off the backrest with feet flat on the floor and hip-width apart, and hands placed in your lap. Without moving your hips or back, slowly extend your right leg, attempting to raise it until it's parallel to the floor. Hold for two seconds. Relax and return to the starting position. Do this exercise continuously for 30 seconds, then repeat with the opposite leg. If you can't quite get your leg parallel, use the backrest for support or just attempt to lift it as high as possible.



Station 7: Penny Pick Up

Start three steps away from a penny placed on the floor. Slowly walk toward the penny. Stop to lunge or squat down, pick the penny up, then stand back up and continue walking another three steps. Do five reps.



Station 8: Biceps and Triceps

Stand with your feet hip-width apart holding a 4- to 10-pound dumbbell (or can of vegetables) in your left hand. Place the opposite hand on a table edge or back of a chair for support. Standing upright, slowly do a biceps curl. Keep your elbow by your side and avoid arching your lower back. Slowly return your

arm to your side, bend your torso forward 45 degrees while supporting yourself using the opposite arm. Allow your left arm to bend at the elbow as you lean forward and slowly extend it back behind your body. Hold for one to two seconds before relaxing your arm at your side. Finally, return to an upright standing position. That's one rep. Do this exercise continuously for 30 seconds and then repeat with opposite arm.



Station 9: Treadmill Walk

Walk for a half-mile on a treadmill at a speed setting that is moderately difficult, yet slow enough that you feel confident walking. If you don't have access to a treadmill, simply take a brisk half-mile walk.



Station 10:

Standing Hamstring and Hip-flexor Stretch

Using a chair, step up with your right leg and place your foot firmly and flat on the seat. Use the backrest of the chair as a support if needed. Slowly shift your weight forward while maintaining a slight backward lean with your torso. Simultaneously extend your arm overhead (or arms, if not using the support). Hold for one to two seconds. You should feel the stretch in your groin area. Relax and slowly shift your weight backward. While bending forward at the hips, straighten your leg on the chair and reach your arms forward toward your straightened leg. Hold for one to two seconds. You should feel the stretch in your hamstrings. Slowly return to starting position. That's one rep. Do a total of three reps with each leg. 