

The Functional Aging Training™ Model

Learning Objectives

1. Describe the characteristics of functional training.
2. Recall the Four Cornerstones of the Functional Aging Training model
3. Describe the Two Pillars (specificity and progressive overload) of the Functional Aging Training model
4. List and describe the seven Key Principles of the Functional Aging Training model

Introduction

Recently, novel methods of training have been developed and evaluated for their ability to improve functional outcomes rather than intermediate measures of fitness (i.e. muscle strength) in older populations since this is often the ultimate result that is being sought. Often referred to as multicomponent or functional task training, these programs are based on the concept of specificity and typically focus more on the replication of daily tasks with a much greater emphasis on including a broader range of functional components. Special attention is often given to challenging motor control and coordination. There is a recognition that, as one researcher stated, there is a “complex interplay of cognitive, perceptual and motor functions that are involved in the performance of daily tasks” [22]. Functional task challenges are accomplished by using whole-body movements, often with environmental manipulations, and few, if any, traditional isolation-type exercises. While there is still a lot of investigation to do in this area the initial research appears very promising with several studies concluding that functional task training is more effective than traditional resistance exercise training for improving function. Given the wide variety of training protocols and outcome measures that have been used it is difficult to determine an optimal exercise prescription for maximizing functional outcomes. Since individuals also vary widely in their needs and abilities an individualized approach is warranted. The Functional Aging Training™ Model has been developed based on the current research to help fitness professionals adopt a more functionally relevant approach with their mature clients.

The Four Cornerstones

Any credible system must have a strong foundation. NGO (Never Grow Old Fitness Program) has four cornerstones that together form an incredibly stable foundation for the rest of the program. Each of these alone is good but when joined together they create an incredible synergy that magnifies their impact. Briefly they are:

1. An in-depth UNDERSTANDING of the aging process and its implications for exercise.
2. A RECOGNITION of the desires, goals and aspirations that accompany the third age.
3. A strong BELIEF that people can be fit, healthy, vibrant and functional at any age.
4. An APPROACH to exercise that is grounded in evidence and honed with experience.

The 4 Pillars

The foundation supports two key pillars that form the core of the FTA system and which many programs miss entirely. These pillars are the concepts of specificity and progressive overload. A good understanding of these concepts will enable you to get the most out of the program.

The Pillar of Specificity states that how a person trains determines the type of gains they make. As I like to tell my students, “How you train is how you gain”. In other words, the kinds of exercises that a person performs, and how they perform them will determine the type and magnitude of results that the person sees. This principle is obvious when we consider someone who starts a walking program because they want to improve the strength of their arms. Even to the untrained eye this doesn’t make sense. Walking may be a good choice for improving cardiovascular endurance and decreasing health risk but it has virtually no impact at all on arm strength. It is the wrong type of program for the desired results.

Most mature adults would say that one of the most important results that they would like to get from exercise is increased physical function. They want to be able to move better and easier with less discomfort and pain. Whether that means playing golf or tennis, traveling, enjoying hobbies, playing with grandchildren, performing yard work, or whatever it is that is important and enjoyable to them. You probably have similar goals. This program is focused very specifically on increasing physical function. Therefore, every technique, every method, every exercise has been included so

that you get to that goal.

The Pillar of Progressive Overload states that the body must continually be challenged with more difficult tasks or exercises in order for it to continue to adapt and grow. The body will adapt only to the level of challenge that you give it and will not improve any more until it is given a greater challenge. There are lots of ways to progressively overload the body such as lifting heavier weights, completing more repetitions, performing the exercise for a longer period of time (e.g. jogging for 30 minutes instead of 20), increasing the intensity, or making a movement more complex. This program uses a myriad of methods, many of which you will rarely see used by even “expert” trainers, to continually overload the body’s systems so that you continue to make improvements.

I have worked with hundreds of clients who have missed this principle completely. They either think that what they are doing is “good enough” for a person their age or believe that working out harder will be dangerous for them. I don’t know how many times I have followed up with a client or member that has been working out for several months only to find out that they haven’t changed their program at all since day one. Their program was kind of tough the first couple weeks and then it became pretty easy after that because their body adapted. Sometimes this can go on for years or even decades.

A Solid Structure: The Seven Key Principles

The final components of the Functional Aging Training model are the seven key principles. These principles have been distilled from hundreds of research studies as well as years of experience training thousands of clients of all ages and abilities.

The Seven Key Principles

1. Assess, prioritize and train ALL components of function
2. Make purposeful decisions for every aspect of training
3. Integrate movement patterns (train in all 3 planes) to prepare for functional demands
4. Include isolation-type exercise movements as supplementary and complementary rather than the primary component of the routine
5. Perform exercise movements in a seated position only when absolutely necessary or when it serves a specific purpose
6. Order the session according to energy level with more complicated, multi-component movements occurring earlier and less complicated, isolation-type movements occurring later
7. Maximize client safety and success by taking a holistic approach to training

Let's take a closer look at each one of these important principles.

Principle #1: Assess, prioritize and train all components of function

Mature adults have a desire and need for improving or maintaining their functional abilities. However, it appears that traditional training methods, such as resistance training, may not be as effective as most believe. In 2001 Keysor and Jette published a paper with the provocative title "Have we oversold the benefit of late-life exercise?" They critically reviewed 31 studies that assessed the effects of exercise interventions (strength, aerobic, flexibility) in older subjects. Their analyses demonstrated a very strong improvement in impairment-level factors such as strength, joint range of motion, aerobic capacity, body composition, etc. following training. However, the effects on measures of function such as gait speed, chair rise time, stair climbing, balance and weighted lifting tasks was not as strong and rather inconsistent. The authors specifically noted that subjects who improved the most on the impairment level factors were not necessarily the ones who improved the most on the functional measures.

Latham and colleagues (2004) took this approach one step further and analyzed only randomized controlled trials with subjects aged 60 and above using progressive resistance strength training (the gold standard in many ways) as the intervention. The findings further confirmed what Keysor and Jette suggested a few years earlier. While there was a large positive effect on muscular strength following progressive resistance

training the effect on functional ability was small to moderate. It appeared from their analysis that strength gains do not equate to similar functional gains.

More recently, an extensive review of the literature (Orr et al. 2008) determined that there is limited evidence to show that PRT as a single intervention is able to improve balance performance in older adults. For many, these findings may be surprising. However, an adequate understanding of function can help to put these findings into perspective. Strength is not function. Strength is merely one component (albeit an important component) of many that contributes to functional ability. Consider the evidence for muscular power. The data for muscle power consistently shows that it has a closer relationship with functional performance than muscular strength (Sayers 2008, Hazell et al 2007, Porter 2006) and that power training is a potentially more effective intervention than PRT (Sayers 2008, Hazell et al 2007, Porter 2006) for improving function. It has been suggested that this is due to two reasons: 1) Many daily tasks rely on power for successful completion (e.g. stair climbing, rising from a chair); and 2) Power is a combination of two functional components (strength and contractile velocity).

It appears logical to deduce from the evidence that in order to significantly improve the functional performance capacity of older clients it is very likely that multiple components need to be addressed simultaneously according to the individual's needs. It is difficult to address a client's individual needs without first assessing them appropriately. Therefore programs should begin with a thorough assessment of the client's needs and goals. The results will then determine which functional components need to

be addressed first and these can then be prioritized within the training routine. Don't fall into the trap of believing that your goal is to develop a "well-rounded" exercise routine for your clients. Well-rounded routines might be fine for many populations but older adults need a focused and prioritized routine. This is the "Big Rocks" principle of prioritization drawn from a well-known story.

The story goes that there was a business professor who wanted to make an impression to his graduating class of students. He placed a large empty mason jar on the table in front of the class and proceeded to fill it with baseball sized rocks. He took several minutes maneuvering the rocks into the jar in just the right way so that no more rocks could fit. He then held up the jar and asked the students if the jar was full. The students replied "yes" wholeheartedly. The professor pulled out another box of smaller pebbles and slowly poured them into the jar. The pebbles slowly filled in the empty spaces in between the larger rocks. Again, he took several minutes to pour, shake and maneuver the pebbles into no more could fit. He again held up the jar and asked if the jar was full. The students hesitantly replied "yes?". The professor then pulled out a pitcher of water and slowly poured the water into the jar. The water slowly filled in all of the small spaces in between the pebbles. When the water reached the top of the jar he put the pitcher down and asked the class "What was the point of this demonstration?". Being eager business students ready to make their fortunes in the world many replied with comments such as: "No matter how full the jar is you can always fit more into it" and "However productive you might be you can always be more productive". "No", said the professor, "the point is to always put the big rocks in first". His point is

not only great advice for life but can also be applied to exercise program design for mature adults. As you will learn later on, it is critical to prioritize the many components of a training program so that the mature client has their most glaring needs addressed first.

Likewise, when it comes to assessment, a basic PAR-Q might be sufficient for a 20 or 30 year old client but for a mature client over the age of 50, and especially over 70, a more thorough health history should be performed followed by a discussion of their medical issues and training goals. This will inform you as to the appropriate battery of functional assessments that should be performed. Refer to Module #4 for a list of assessments that are available. Suffice it to say that the trainer should have knowledge and skill for many different kinds of assessments that address many different components of function. This is an area that is continuously developing as new assessments are validated such as the seated medicine ball throw as a test of upper-body power (Harris et al. 2011)

Functional Components (not exhaustive)

- Muscle Strength
 - Concentric
 - Eccentric
 - Isometric
- Muscle Endurance
- Muscle Power

Principle #2: Make purposeful decisions for every aspect of training

Fitness professionals today have more training options than ever before and therefore must be prudent in selecting training methods, techniques, specific exercises, progressions, equipment and environment for their clients. If a proper and thorough assessment has been conducted then this task becomes significantly easier. As mentioned in Principle #1, the myth of the well-rounded routine is entrenched in our minds. It creates feelings akin to guilt if we don't include exercises for "every major muscle group" or we include exercises for a muscle without also including exercises for its corresponding antagonist (e.g. bicep and tricep). There is a limited amount of time that the client is going to commit to exercising. Why waste it by including exercise movements that do not serve a specific purpose according to the individual's needs and goals? The choices you make for your client determine (to a large extent) the potential results that they will realize. While there are definitely some general similarities that will exist among mature clients they are not all the same person. In fact this age group is the most heterogeneous of any age group and brings to the table a tremendous amount of diversity regarding functional abilities, chronic disease conditions, experiences, and many other factors. Therefore cookie-cutter programs are the least likely to be effective.

One of the biggest mistakes a trainer can make when working with mature adults is to stereotype them and assume they are all pretty much the same. If someone were to observe you training a client would you be able to tell them the exact reasons why you are including that particular exercise and how you are having the client per-

form it (equipment, sets, reps, resistance level, speed, body position, etc.)? Could you defend the choices you make with either evidence or sound clinical/professional reasoning?

Besides the “well-rounded routine myth” and stereotyping clients there are many other variables that can get in the way of making purposeful decisions. For example, the use of unstable surfaces such as foam pads, balance cushions, wobble boards and BOSU to make exercises “more functional” has become ubiquitous. It is the opinion of the authors that many trainers throw around terms such as “core stability” when using these toys without fully appreciating or understanding what that means. Although these devices have become very popular there is little empirical evidence to support their use with most populations and have identified several disadvantages to using them (Anderson and Brehm 2005; Anderson and Brehm 2006; Schilling et al 2009). But yet, the toys are there and so trainers use them even though often it appears that they provide “purposeless variation”. Providing variety can be beneficial but not at the expense of consistency. It is understandable that trainers want to keep their clients interested and motivated and engaged in the training session and therefore seek to “mix it up” a lot. Variation can serve an important function of improving retention and providing progressions. However, variety for the sake of variety is likely to backfire in the long term by impairing results.

Principle #3: Integrate movement patterns (train in all 3 planes) to prepare for functional demands

Life is three-dimensional. People reach, bend, lean, turn, twist, stoop and change directions constantly throughout their day. In essence, they continually face challenges in the frontal, sagittal and transverse planes. Why then do most exercise routines for older adults appear to be so one-dimensional? It is the opinion of the authors that there are several reasons that have contributed to this: 1) We have all been heavily influenced by our body-building roots within the fitness industry. While functional training methods and tools are becoming more popular the majority of the industry still focuses on the aesthetic goals of younger members and clients. This means using machines or free weights to isolate individual muscle groups for maximum hypertrophy. 2) Sarcopenia (age-related loss of muscle mass) is still regarded by many as the primary enemy of function with advancing age. Therefore, if muscle loss is the enemy then the cure must be to maximize muscle mass gains through heavy resistance training using the aforementioned body-building methods and equipment. 3) Trainers that work with older clients may not have specialized training for this population and therefore simply transfer what they know about training younger clients to their older clients with some “common sense” modifications. Take, for example, one of our clients Ann. Ann, a slightly overweight but healthy woman in her early 60s, came to our facility after training with another personal trainer whose background was bodybuilding. We quickly discovered that Ann’s previous trainer developed a very generic, modified bodybuilding routine for her that had little to do with her individual needs

or goals. The modifications including “common sense” strategies such as doing bicep curls seated instead of standing (and with very light weights); performing crunches on an incline bench set at about 45 degrees (so that it assisted her); and incline chest press using very light dumbbells. It was obvious that this trainer had little to no knowledge, skill or experience working with older adults and therefore simply adopted what he did know (bodybuilding) to serve his client.

In his recent book, *Bending the Aging Curve* (2011), Dr. Joseph Signorile explains the importance of using multi-planar exercises and describes an intervention-al approach for turning fitness gains into functional gains. He describes the use of a periodized model in which a physiological training cycle is followed by a translational motor learning cycle. The physiological training cycle is focused on improving the primary components of fitness such as strength, flexibility and aerobic capacity using traditional methods. The translational training cycle is focused on increasing functional capacity through multi-dimensional, motor control tasks of increasing complexity. Strategies for increasing task complexity include using multiple joints; shifting to dynamic tasks; altering base of support; add object manipulation; using multiple directions; and multitasking. The basic stationary lunge can be used as an example. During the physiological training cycle the lunge can be performed in a typical manner using dumbbells for extra resistance as needed because the focus is on simply building strength in the lower extremities. During the translational motor learning cycle the stationary lunge would need to become more complex because now the goal is to improve motor control/coordination and “teach” the client how to use their new found

strength to successfully complete functional tasks. This could be accomplished by making the lunge multi-directional, requiring picking up and putting down an object with each lunge (such as a telephone book); or responding to changing verbal demands. The multi-dimensional training approach falls in line with the advice of other experts in the field such as Gary Gray, PT, Gray Cook, PT, Juan Carlos Santana and Stuart McGill, PhD (2007, 2009) who advocate for a lesser focus on traditional strength training methodologies and a greater focus on multi-planar movements that challenge the body in ways that are more beneficial to functional task performance. Given the growing evidence that PRT (Progressive Resistance Training) is not the optimal method for improving function then utilizing a multi-planar approach to improve motor control and to train additional components of function appears warranted.

Principle #4: Include isolation-type exercise movements as supplementary and complementary rather than the primary component of the routine.

Are bicep curls functional? Before reading any further think about it and make your decision. If you decided they aren't functional then bicep curls should not be a part of the training routines you develop for your mature clients. If you answered that they are functional then you should include them for all of your clients. But, some of you likely answered "maybe" and this was the prudent choice. It is tempting to consider exercises in a dichotomous way: either/or, black/white, good/bad. It is likely that at a conference or in an article you have been told that such and such an exercise is not functional and therefore should not be used. So back to the question: Are bicep curls

functional? To answer the question we need to determine whether or not the bicep muscle is important in functional tasks.

It would certainly be difficult to pull a lawnmower handle or open a door without bicep strength. Lifting a jug of milk, carrying luggage (or virtually anything for that matter), vacuuming, or even pulling on a pair of pants would become much more difficult to even impossible without an adequate amount of bicep strength. Therefore, if someone lacks adequate bicep strength to perform these or other functional tasks then yes bicep curls are functional for that person. Now what about using leg extensions to improve quadriceps strength? Or shoulder presses for deltoid strength? As discussed earlier using isolated PRT techniques for individual muscle groups offers some benefits for combatting sarcopenia, building strength and, to a lesser degree, for improving function. So it is difficult to conclude that these exercises are not functional. Rather it is better to view them along a functional continuum with some exercises having a more distant relationship to functional performance (e.g. less functional) and others having a closer relationship to functional performance (e.g. more functional).

While individual needs must always be considered the evidence seems to point to the use of multi-dimensional exercises that address multiple components of function as the primary focus of an exercise routine for mature clients. To say it another way, isolation-type movements are best at improving the strength of the targeted muscle group yet strength is only one component of function that needs to be addressed and significant improvements in muscle strength does not necessarily equate to similar improvements in functional performance (Latham et al 2004). Therefore, it is advisable

to use isolation-type movements when indicated with a client. For example, a client that struggles (or is unable) to rise from a chair independently is likely suffering from a lower-extremity strength deficit. In this case it would be advisable to perform some isolation-type exercise movements to build strength in the quadriceps, glutes, hamstrings and calves (although improving muscle power would be more appropriate) for a short period of time. However, as soon as possible this individual needs to engage in exercises that develop proprioception, balance, center of gravity control, postural stability and visual and somatosensory feedback which are also likely limiting factors in performing the task of rising from a chair. Take past client Bill for example. As a taller than average male in his late 60's you would be impressed to see him perform his sets on the leg press with the full weight stack (around 500 lbs). However, once he got off you would notice something completely different – he could barely walk. Bill took small shuffling steps, used a cane, held on to objects around him for support and paused frequently to regain his sense of balance. Bill suffered from Parkinson's disease which had very little effect on his leg press performance but large effects on his functional task performance. Muscle strength was not his issue.

Principle #5: Perform exercise movements in the seated position only when absolutely necessary or when it serves a specific purpose.

It is frustrating to observe participants walk into an exercise class for “seniors” only to perform 30 min of “gentle” exercises while seated in a chair. Seated exercise interventions have been shown to be inferior to standing (weight-bearing) exercise

interventions in several areas including balance and mobility (Vogler et al 2009). Mobility is a critical component for the continued health and longevity of mature adults. Loss of mobility can lead to a downward “death spiral” of declining health and activity levels. But it is also a critical component of life satisfaction for many mature adults.

Loss of mobility usually means loss of independence. Related to this is risk of falling. Falls are a significant threat to the mature population often leading to hospitalization, the need for long-term care or death. Therefore it seems appropriate to perform exercises in a standing, weight-bearing position whenever possible in order to improve mobility and reduce fall risk. Let's take a look at just some of the many advantages that standing exercises offer over seated exercises. Standing utilizes many more muscle groups than sitting and is a more complex neuromuscular challenge that requires greater degrees of strength, proprioception, center of gravity control and postural stability. A recent literature review on effective balance training protocols (Sherington et al 2011) recommended as best practice: 1) training and challenging base of support (e.g. narrow stance, tandem stance, one-foot); 2) training center of gravity control; and 3) modifying or reducing the use of the upper body (such as hands). Of these three, training center of gravity control is the only one that can be addressed in a seated position although only at a much lower level of challenge. This isn't to say that seated exercise doesn't have its place. Like any other tool it needs to be used judiciously to address the individual's needs.

Seated exercise may be purposeful when:

- a. The client is becoming fatigued
- b. The client is not yet ready for higher-level progressions involving postural position or they cannot adequately control center of gravity (e.g. seated marches or forward leans)
- c. The movement involves sit-to-stand transitions
- d. You want to remove postural or other variables for teaching/instructional purposes or to maximize force production (e.g. strength and power gains)
- e. The client is frail and/or at the lowest end of the functional spectrum (e.g. rehabilitation, nursing homes) (Baum et al 2003)
- f. The trainer/instructor cannot adequately spot an individual with mobility impairments (such as in a group exercise setting)
- g. The client has a lower-extremity impairment precluding them from performing exercises in a standing position

Principle # 6: Order the session according to energy level with more complicated, multi-component movements occurring earlier and less complicated, isolation-type movements occurring later.

During the course of an exercise training session it is typical for energy and focus to wane as both muscle and mental fatigue set in. For mature clients this loss of energy and focus can interact with poor functional capabilities to create potentially

dangerous scenarios and increase risk of injury (discussed further in Principle #7). The longer the session continues the more likelihood that attention and performance deficits will occur. Much of the personal training industry has moved to shorter 30 and 45-minute sessions instead of the traditional 60 minute session. This approach appears to work well with mature clients for whom 60 minute may be too long for their level of conditioning and/or their health situation.

Recognizing the decline in energy and focus it is prudent then to perform more complicated tasks earlier in the session while the person is still fresh physically and mentally. This would include dynamic balance tasks, gait variations, agility drills (ladder, dot, obstacles) and multi-planar movements. The latter parts of the session would be more appropriate for isolated strength training, seated movements and floor work. Do not confuse complexity with intensity. An isolated strength movement is not complex but it can be very intense depending upon the resistance challenge that is used. So just because a movement is performed closer to the end of the session does not mean that it is easier than ones that occurred earlier. The difference, though, is that we are systematically removing variables from the equation in order to ensure success. For example, a standing dumbbell shoulder press on a foam pad relies on the proper stabilization of the trunk and proper whole-body balance control in addition to the deltoids. However, performing the same movement in a seated position with a back rest removes most of the postural stabilization and balance control from the equation so that more focus can be given to the deltoids. It is important to note that when using unstable surfaces force production capabilities decrease because more energy is required to

stabilize the joints. As an example, performing a squat on the floor allows the client to direct the majority forces upwards and maximize the amount of weight lifted. However, when performing a squat on a balance pad energy is used to keep the knees in alignment and the center of mass over the base of support (feet) so that the amount of weight that can be lifted decreases.

Principle #7: Maximize client safety and success by taking a holistic approach to training

Taking mature clients off selectorized machines and onto the fitness floor in order to perform standing, dynamic, multi-dimensional exercises of increasing complexity inherently brings with it an increase in risk. Therefore, it is our duty to take the appropriate measures to ensure safety while maximizing the degree of success our clients achieve. As discussed in Principle #1 we should always begin with an appropriate pre-exercise evaluation that includes a thorough health history and functional assessments. Just the knowledge that Jane has had a hip replacement; George has peripheral neuropathy from diabetes; William is unstable during lateral movements; and Susan has poor vestibular input increases our chances of keeping our clients injury-free. Therefore, we already know which movements and situations may be more problematic and pose a higher risk. The primary concern that needs to be addressed is the likelihood of a fall.

Many of the movements we employ will either rely on good balance (and stability) or will purposefully challenge balance control mechanisms. A good trainer for

this population is one who is always watchful and ever diligent about monitoring for the potential of falling. Taking attention off of the client to chat with someone else or watch TV even for a moment during an exercise can lead to disastrous results. Following this the trainer should always be close enough to provide aid if needed and in the proper position/direction in which the person is most likely to fall.

For example, if a client is doing a stationary lunge with their right foot forward then the trainer needs to stand to the right side of the client because that is the direction in which they have the least resources for recovery. If they fall to the left it is easier for them to use both hands to stop their fall and they might be able to step forward with their left leg. Other physical environmental factors that are paramount include having enough space to perform the movement (including enough “stumble room” as a buffer so that they can recover from a loss of balance without tripping on something else); having adequate lighting; reducing audio and visual distractions; and not allowing other exercisers to interfere. While it is our goal to challenge the client we can minimize risk by using solid teaching and motor-learning strategies in order to maximize the likelihood that they can complete the activity successfully. One method is to break down a more complicated movement into pieces and teach those pieces to the client individually. If they are successful with the pieces then they can be put together into bigger pieces until finally the complete movement pattern is accomplished. In the experience of the authors it seems that some trainers are too eager to advance a movement without first requiring the client to master the more basic movement. Progressions that are implemented too quickly can lead to frustration, failure and, potentially, injury.

Putting It All Together

Together, the Four Cornerstones, Two Pillars and Seven Key Principles comprise the Functional Aging Training™ model. Each of these is important and must be taken into account when designing exercise programs for older adults that aim to improve functional ability. Keep in mind that these are not hard and fast “rules” that can never be broken. The specific needs and goals of the client must always come first. Experience will dictate when these recommendations need to be modified for a particular client.