

Module Key Terms

Activities of daily living

The things that are done on a normal basis such as standing up from sitting, picking objects up from the ground, or walking up and down stairs.

Aerobic fitness

The aspect of fitness that deals with the heart and lungs to circulate oxygen to working muscles.

Body composition

What the body is made up of; generally divided into fat mass and lean mass.

Body fat mass

The portion of a person's body composition that is made up of fat.

Body Mass Index (BMI)

A ratio of a person's height to his weight.

Cardiovascular exercise

Aerobic exercise that relies upon the heart and lungs.

Circuit training

A workout that involves a variety of exercises that are done sequentially and often repeated a set number of times.

Cool-down

The end of a workout in which a person tries to return her body to a normal, resting state.

Dynamic movements

A form of warm-up in which a person moves his muscles through an extended range of motion intended to elevate body temperature and loosen up in preparation for a workout.

FITT

The four principles of a fitness program: frequency, intensity, time, and type.

Flexibility

A measurement of how much a joint can move as measured by its range of motion

Functional fitness training

Training that is designed to enhance a person's ability to perform activities of daily living.

Health-related fitness

Fitness training that centers around improving a person's health and well-being as opposed to performance.

Lean body mass

The portion of a person's weight that's comprised of things other than body fat such as muscle and bone.

Maximum Heart Rate (MHR)

The peak rate at which the heart can beat; expressed in beats per minute.

Motor skills

Abilities which includes things such as balance, agility, and coordination.

Muscular endurance

The ability of a muscle to sustain repeated submaximal contractions.

Muscular strength

The ability of a muscle to exert maximal levels of force.

Natural waist

The smallest portion of the midsection, generally located between the bottom of the ribcage and navel.

Obese

A dangerous health condition in which body fat levels are considered to be detrimental to health. A BMI over 30.

One-repetition maximum (1RM)

A strength assessment that determines the most weight a person can lift in a given exercise.

Overload

Exercising at a level that is a little greater than what the body is accustomed to with the intent of causing it to adapt to a higher level of fitness.

Overweight

A medical condition slightly less serious than obesity in which a person's body fat level is higher than optimal.

Performance-related fitness

Fitness levels that are related to the ability to perform a specific sports skill. This level of fitness goes beyond health-related fitness to the point at which it may be effective for sport, but may ignore other aspects of health.

Progression

The process by which a person challenges himself to do a little bit more each workout over a long period of time in order to elicit positive adaptations. This represents the long-term version of overload.

Range of Motion (ROM)

An assessment of how far a joint can move when stretched.

Rating of Perceived Exertion (RPE)

A subjective measurement tool that allows a person to determine their level of effort in an aerobic exercise session.

Reliability

A measure of the trustworthiness an assessment; determines how consistent the results would be if the same test were repeated.

Specificity

A principle of training that states that adaptations will occur primarily based upon the exercises that are performed.

Validity

A determination of whether or not a test actually measures what it is supposed to measure.

Warm-up

The beginning of a workout session in which the participant attempts to ready his body for exercise.

Section 1: “Components of Health Related Fitness”

Can you think of a sport whose athletes aren't what you would consider 'healthy?' The first that may come to your mind is Sumo Wrestling, a sport which regularly features men that weigh in excess of 400 pounds who try to throw their opponent to the ground or out of the ring. You can imagine that carrying around all that weight can lead to heart disease and diabetes. Is this what makes these athletes unhealthy?

Now picture a marathoner. This athlete is much less likely to have the same health issues as a sumo wrestler because most long-distance runners are quite lean. Does this automatically qualify this athlete as healthy? Not necessarily. For example, are you aware that some of the most inflexible athletes are endurance athletes: runners and cyclists? In light of the fact that these sports involve the repetition of a fixed pattern of movement for miles and miles, these athletes can suffer from debilitating joint pain, excessive muscular soreness, and even broken bones in the form of stress fractures. Are you still viewing your marathoner as the 'picture of health'?

The point is that most sports rely on an individual becoming very good at a few things while neglecting others. A gymnast is very flexible and strong, but may have poor cardiovascular endurance. Further, a baseball player may have excellent hand-eye coordination but lack muscular endurance.

By identifying the relative strengths and weakness of the above athletes, you have seen what are known as the *components of health-related fitness*. They are:

1. Aerobic fitness
2. Muscular strength
3. Muscular endurance
4. Flexibility
5. Body composition

For you to enjoy a lifetime of good health, it's best to incorporate a variety of physical activities that address all of these components. While it's unlikely that there is one, best activity that does all of these things (who would want to do the same thing all the time, anyway?), you can easily address one or two items with one activity in one workout session and then choose a different activity to target different components during a different session. Think of these components as you would your options at a salad bar: the most satisfying salads include a *variety* of different ingredients, not just one thing.

Before moving further, let's define the health-related fitness components as stated above. Specific recommendations and example of exercises that target each of these will be presented later in this chapter.

Aerobic fitness refers to the ability of your heart, lungs, and related blood vessels to distribute oxygen efficiently to working muscles. You have likely heard the term 'cardiovascular exercise.' Aerobic means with oxygen, and this term is largely interchangeable with cardiovascular. Workouts that improve this component of health generally have a low level of intensity, but last for a lengthy period of time.

The components **muscular strength** and **muscular endurance** are similar, but it's possible for a person to target one versus the other, or for a person to have an adequate level of one but not the other. Muscular strength, very simply, considers the *maximal* amount of force your muscles can produce over a very short period of time. Muscular endurance, on the other hand, measures your ability to maintain a *submaximal* level of force over an extended period of time. To put these into context: if you are carrying groceries from your car to your home, you can choose to grab all of the bags and make one trip (a measure of your muscular strength) or you can do it one bag at a time, making several trips (muscular endurance). In both cases you have lifted the same total of weight, but you have achieved this in different ways and both can be challenging in their own regard.

Your **flexibility** is measured by how far you can move a body's joint, also known as *range of motion* (often abbreviated as ROM). At first it may seem strange that flexibility is a component of health-related fitness, as it's not readily apparent how being inflexible can cause serious problems. But many forms of joint pain and muscular soreness derive from inflexibility, with low back pain being one of the primary examples.

The final component is **body composition**, which, more or less, boils down to what percentage of your body's mass is comprised of *body fat mass* and how much is *lean body mass*. High body fat levels are correlated with many health risks including heart disease, cancer, and diabetes, making this component an important one to consider in any health-related fitness program.

An athlete may have an interest in some of these things, but he or she is also concerned with *performance-related fitness* aspects which can include such things as agility, power, balance, and reaction time. While these attributes may be useful on a daily basis, they don't directly contribute to the health of an individual. The purpose of this chapter, therefore, is to focus on the health-related fitness objectives, or, in other words, to coin a phrase by the American College of Sports Medicine (ACSM) and the American Medical Association (AMA): Exercise is Medicine™.

Section 2: “Physical Activity: Benefits and Recommendations”

It may be difficult for you to appreciate the idea that inadequate levels of physical activity can have severe health repercussions since it’s likely that you view yourself as being fairly active or that you are not many years removed from when you were active. Also, you may consider yourself healthy. So, instead, consider an older adult that you know fairly well – maybe a parent, aunt, uncle, or grandparent. Do you consider this person healthy? How physically active is this person? If this person is like most in the United States, he or she does not get the recommended amount of daily exercise according to the U.S. Government’s Centers for Disease Control and Prevention (CDC). Since many diseases and conditions are strongly linked to physical inactivity, it’s not difficult to see why so many Americans are unhealthy.

The question then becomes: if you feel that you are healthy now, what will you do to maintain this level of fitness as you grow older? Or, if you don’t consider yourself healthy, what can you do to become healthy? Some college students who are inactive believe they will become more active upon graduation when they have more time and income to spend health club memberships, etc. Unfortunately, data from the CDC does not bear this out (INSERT 2007 National Average of Americans Achieving Recommended Physical Activity by Age chart):

As the chart indicates, the percentage of Americans who get the recommended amount of physical activity goes *down* as they age while those who are inactive and do not participate in any leisure-time physical activity goes *up*.

So, how much physical activity is recommended? This answer is deceptive, because defining what actually constitutes physical activity seems to always be changing. Additionally, these guidelines change depending upon your age and your health status. Before revealing these guidelines, ask yourself again if you think you get an adequate amount of exercise.

The recommendations and associated benefits below come from a 2011 *position stand* by the American College of Sports Medicine (see sidebar about the ACSM) and are grouped into a variety of categories that, in large part, reflect the different components of health-related fitness described in the previous section. Note that these recommendations involve including *each* element into your weekly routine:

Aerobic Exercise

- Benefits: primarily revolve around a reduction of the risk of cardiovascular disease (heart attack, stroke, etc.)
- At least 150 minutes of moderate-intensity exercise per week met through **either**:
 - 30-60 minutes of moderate-intensity exercise five days per week
 - OR 20-60 minutes of vigorous-intensity exercise three days per week

Resistance Exercise (Strength Training)

- Benefits: health benefits involve increases bone mineral density (reducing the risk of fractures from falls, especially in older adults) and improvements in body composition
- Train each major muscle group two or three days per week using a variety of exercises and equipment
 - Your strength training program will change depending upon your specific goals which will be covered in the next section

Flexibility Exercise

- Benefits: improvements happen quickly and can result in an improvement in posture and balance
- To improve range of motion, train two or three days per week
 - Best to stretch warm muscles, so this is a natural fit to conclude an aerobic training session

Functional Fitness Training

- Benefits: especially intended to reduce the risk of falls and improve physical function in older adults, but younger, active individuals can easily train in this area too.
 - Includes activities to improve basic motor skills (balance, agility, and coordination)
 - 20-30 minutes two or three days per week

When you add all of these categories together, it's easy to see how adopting a healthy, active lifestyle takes commitment. Additionally, the wide range of activities necessary to adopt a healthy lifestyle is broader than many people think. You may know a friend, for example, who likes to run, but doesn't stretch or lift weights. Or, you may know someone who enjoys strength training but doesn't engage in any aerobic exercise. By ignoring certain components of health-related fitness, these individuals miss out on their benefits. Additionally, when combined, these components build off of one another. For example, body composition is best enhanced when one combines strength training and aerobic exercise and balance is most positively influenced when one stretches, lifts weights, and does functional fitness training.

While some basic, health-related benefits are listed above, people cite a variety of other benefits which are difficult to quantify. These may include an increased feeling of energy, or vigor, and improvement in mood. Exercise releases chemicals in your brain that make you feel better, reduce stress, and allow you to sleep better at night. Additionally, an improved ability to carry out *activities of daily living* is especially apparent in older adults. While you take for granted how easy it is to get up after sitting down, older adults who carry too much weight and are weak have difficulty standing.

If all this talk of exercise has you truly interested in setting up your own fitness program, we can begin by *assessing* your current level of fitness which will allow you to set some goals to address the areas in which you may need improvement. Continue on to section three...

Section3: “Assessing Fitness and Personal Goal Setting”

As mentioned in the previous sections, the components of health-related fitness include:

- Aerobic fitness
- Muscular strength
- Muscular endurance
- Flexibility
- Body composition

Additionally, you learned about recommended levels of physical activity from the ACSM. In order to create an effective workout program, it's often wise to begin with determining where your fitness currently stands. This process is called assessment and it should be done at the start of program and periodically in your training to determine your progress. Additionally, assessment is essential in goal-setting, which we'll discuss a little later.

Aerobic Fitness

So what sorts of tests, or assessments, do you think would be best for aerobic fitness? You've already learned that the component of fitness involves your heart and your lungs, so we should use a tool that takes these into consideration. It's difficult to accurately measure the work your lungs do, but, fortunately your heart rate and respiration are closely linked. That is, when your heart rate goes up, it means your lungs are working harder, too.

Try it out:

Name of test: Rockport Walk Test

What it measures: Aerobic fitness

What do you need: Stopwatch, measured one-mile track

Instructions: Complete a one-mile walk as fast as you can – you're not allowed to run on this test – and as soon as you're done, measure your heart rate for 15 seconds. After counting your pulse for this 15 second period, multiply that number by 4 to get your 1 minute heart rate, or beats per minute.

If you wanted, you could simply record the time it took you to walk the one mile and your heart rate and then re-test yourself every few weeks to see if your time decreases along with your heart rate. But, you can take this step one step further if you're willing to do some simple math. Using one of the formulas below, you can calculate the maximum amount of oxygen your body can use, known as *Maximum VO₂*.

$$88.768 + (8.892 \times \text{gender}) - (0.0957 \times \text{weight}) - (1.4537 \times \text{time}) - (0.1194 \times \text{heart rate})$$

Where:

- Gender = 0 for women, 1 for men
- Weight = your weight in pounds
- Time = walking time in minutes
- Heart rate = beats per minute

For example, let's say a male who weighs 180 pounds walks the mile in 16 minutes and 20 seconds and has a heart rate of 157:

$$88.768 + (8.892 \times 1) - (0.0957 \times 180) - (1.4537 \times 16.33) - (0.1194 \times 157)$$

* note that you divide seconds by 60 in order to get the decimal

$$88.768 + (8.892) - (17.23) - (23.74) - (18.75)$$

* 2 or three decimal places should be enough

$$VO_2 = 38$$

The Rockport Walk Test is an easy test that nearly everyone can perform. Its main limitation is that if you're in great shape, it may be too easy for you. But it's a great test for people first beginning a program that want to see where they are at, and for tracking progress during the course of a program. In order to see if you need work in this area, you can classify your results using the chart (insert Aerobic Fitness Categories for College-Aged Men and Women chart):

Muscular Strength and Muscular Endurance

Although muscular strength and muscular endurance are not the same, but they are often tested together. The reason for this is that beginning exercisers may not be familiar with the sorts of exercises that would be needed to accurately determine maximal muscular strength. These exercises typically include free weight exercises like a bench press or squat. If a person does not do these activities regularly, the results are unreliable. Additionally, when determining maximum strength, it's best to see how much weight a person can lift just once, known as a *one-repetition maximum*, and this can cause injury if a person does not build up to it properly or if he or she doesn't have a good spotter. For these reasons, a test of muscular endurance is generally used to estimate both components of health-related fitness.

Try it out: Push-up test

What it measures: Muscular strength and endurance of the upper body

What do you need: A comfortable space to do push-ups!

Instructions: In order for your results to be *reliable* you need to make sure that each push-up is a full push-up. Additionally, the technique for this test is different for men and women: men will perform 'traditional' push-ups while women will do 'modified' push-ups – from their knees. In both cases a full push-up involves going down to where your chin *very nearly* touches the floor and going up until the arms are straight. Additionally, you need to keep your body straight as a board – don't bend at the waist. Finally, you are not allowed to rest in between repetitions, you want to see how many *consecutive* push-ups you can perform. Remember: if you allow yourself to count repetitions in which you *didn't really do it right* then you will not be able to accurately track your progress. So be strict and only count full push-ups. There is no time-limit for this test, but, remember that you aren't allowed to rest in between repetitions!

Consult the chart to determine your classification (Insert Fitness Categories by Age Group and Gender for Push-Ups chart):

Flexibility

As you might suspect, any test of strength or flexibility is only *valid* for the muscle groups that are being measured. In the push-up test above, a person may score very high, indicating good strength and endurance of the upper body, but this does not necessarily indicate that the same could be said of his or her lower body. Resources are provided for you at the end of this module that will permit you to see other tests available.

With that being said, flexibility can be more difficult to measure because it often requires more sophisticated tools in order to quantify things. You've seen that with aerobic endurance we could simply time ourselves and take our pulse.

For the strength test all you had to do was count. For a flexibility test with actual numbers you would need a specialized device such as a tape measure. To complicate things, it's not easy to do self-assessments with flexibility like it was for the other tests. So let's look at a very simple flexibility test:

Try it: Shoulder stretch test

What it measures: Flexibility of the upper body

What do you need: Nothing!

Instructions: The shoulder stretch test is very easy and you determine your 'score' by answering a simple 'yes/no' question. Lift your left arm above your head and reach it down your back as if you were trying to pull-up a zipper on your back. Now, take your right hand and put it behind your back as if you're reaching for your back pocket. With your right palm facing out, slide the back of your hand up your back in an effort to touch the fingertips of your left hand. Be careful not to stretch to the point of pain. Were you able to make your hands touch? Now reverse your arms and see if you can do it on the other side.

There's no chart to consult on this one – either you can touch your hands on each side or you cannot! If you want a more precise measurement, you could have a friend measure how far away your hands are and record this value as a negative number (if they couldn't reach), or measure how much overlap you are able to achieve (and record this as a positive number). You can then take the average of these two numbers and compare it to this chart (Insert shoulder flexibility table):

Body Composition

Self-assessments for body composition are not possible without additional equipment and/or training. However, an easy calculation can give you some idea of your health risk based upon your weight and height. Note that this calculation does not *really* tell you what your body composition is, but rather it's simply a *ratio* of your height and weight. The number you determine is not your percent body fat and should not be treated as such.

Try it: Body Mass Index (BMI)

What it measures: BMI is a ratio of your weight to your height which gives some indication of health risk.

What do you need: You'll need to measure your height in meters and your weight in Kilograms; additionally you'll want a calculator to do the calculation.

Instructions: Divide your weight in Kilograms by your height in meters squared

To convert your weight in pounds to Kilograms, divide by 2.2. To convert your height in inches to meters, multiply by 0.0254. For example, a person who weighs 135 pounds and is 5 feet 6 inches tall:

Begin by converting units:

$$135 \text{ pounds} \div 2.2 = 61.36 \text{ Kilograms}$$

$$5'6'' = (12 \times 5) + 6 = 66 \text{ inches}$$

$$66 \text{ inches} \times 0.0254 = 1.676$$

To calculate BMI:

$$61.36 \div 1.672^2$$

$$61.36 \div 2.795$$

$$\text{BMI} = 21.95$$

Again, this value, 21.95 is nothing more than the ratio of this person's weight to height – it is not *actually* measuring body composition. Also note that you only have direct control over one of these variables, your weight. The real limitation, however, with BMI is that a person who is muscular may appear to be *overweight* even though the body weight he or she is carrying is 'good' weight – in that it's not excess body fat which could lead to chronic diseases. For this reason, BMI is not as reliable in active, athletic populations. A BMI over 25 classifies a person as *overweight* while a BMI over 30 is considered *obese*.

So, what are you to do? Fortunately there are a variety of other methods to actually determine body composition, but not many are easily done by yourself or without sophisticated equipment. If you're willing to have someone help you, you can do a measurement that may be more useful than BMI.

Try it: Waist circumference

What it measures: The size of your midsection at its smallest point. This gives a more accurate idea of your body composition than BMI and may more accurately assess risk, since an accumulation of body fat around the midsection is more dangerous than having it distributed in other parts of your body

What you need: You'll need a tape measure

Instructions: You are trying to measure the *smallest* circumference in the area between the bottom of your ribs and your navel. This is where having someone help you can make for a more accurate measurement. You should pull your shirt up so your assistant can see your midsection and determine your *natural waist*. A couple of measurements may be necessary to ensure the smallest value is achieved. Try to breathe normally and remain relaxed while the measurement is taken.

Note that neither BMI nor a waist circumference measurement actually tells you what your percent body fat is. But by combining the results of both of these tests, it can give a person a general idea of his or her risk factors for diseases associated with obesity (type 2 diabetes, hypertension, and cardiovascular diseases).

If, for example, a person has a normal waist circumference (for men this is less than 102 cm and for women less than 88 cm) and a BMI level of 26 (overweight, but not obese), his risk classification is 'Increased.' If, at this same BMI level of 26, the waist circumference is *above* 102 cm or 88 cm, his risk is considered 'high' which is more severe. In short: it's not how much you weight, but where your weight is distributed and what makes up your weight (muscle vs. fat) that truly determines health status.

Once you know where you stand in each component of fitness you should consider setting some goals for yourself. One of the biggest mistakes people make is to set unrealistic goals or to set goals that can't be easily monitored. For example, if I don't do well in a test of aerobic endurance and state that I want to double my score within two weeks, that's unrealistic as it takes time for the body to adapt to a training program. Additionally, vague statements like: 'I want to get leaner,' or 'I need to get stronger' don't help because there's no way to determine if I'm making progress towards my goal.

The best goals should be realistic and specific. In addition, if you have a friend that you can confide in regarding your goals this helps, too, because he or she can help motivate you by holding you responsible to want you want to achieve.

In many cases goals that are based on an outcome, such as being able to perform 20 additional push-ups, while specific, may be difficult to achieve because it's not always known exactly how your body will respond to a workout routine. Instead, if you pledge to incorporate push-ups into your training program two days per week for the next six weeks, this is an example of a goal you have more direct control over: either you will do what you say or you won't – the outcome doesn't necessarily matter. One can assume that if you were to follow-through on your pledge that your push-up total (meaning your strength and endurance) would increase.

So consider making goals based upon what you want to do in your workout by being specific about what activities you will do and how often you will do them. The outcome will take care of itself. Having a friend keep you on track by asking you how you are doing or (better yet) working out with you, will keep you moving forward.

Section 4: “Getting Fit: Guidelines and Principles”

Section 2 introduced the idea that there are some basic guidelines surrounding how much activity you should get each week. The sorts of activities you do should involve aerobic exercise, resistance training, flexibility training, and functional fitness training. But simply knowing how much time should be dedicated to these things doesn't really help you determine *what* exactly you should be doing. That's where the FITT principle of exercise *prescription* comes in.

Prescription? It sounds like you're taking medicine, doesn't it? Well, as stated earlier, it's the position of both the American College of Sports Medicine and the American Medical Association that exercise *is* medicine. By engaging in regular physical activity you are preventing disease and increasing your quality of life. So what is FITT?

FITT is an acronym that stands for:

- FREQUENCY: how often each week you work out
- INTENSITY: a measurement of how *hard* you work out
- TIME: how long an exercise session lasts
- TYPE: what exercises you perform when you work out

Your exercise prescription should involve applying the FITT principle of training to each type of activity listed above. If everyone were exactly the same, it would make doing this *much* easier, but the reality is that people have different activity levels, different likes and dislikes, and different goals. So your prescription might be very different than your friend's. It's not a one-size-fits-all sort of a thing. Let's look at aerobic exercise first and apply our FITT principle of training.

Aerobic Exercise

FREQUENCY: this one is pretty easy because no matter if you are completely sedentary or if you are accustomed to high amounts of physical activity, you should strive for 3-5 days a week of aerobic exercise.

INTENSITY: a big difference exists here depending up your current activity level. If you're just getting started, it makes sense that you should work out at an easier level than someone who runs marathons. But how do you measure your intensity? There are two basic ways: you can be very objective and measure your heart rate or you can be more subjective and simply ask yourself how you *perceive* the workout to feel. Let's start with heart rate.

As you get older, your maximum heart rate goes down. So a person in her 20's could have a heart rate of 160 beats per minute when working out and feel pretty good, but a woman in her 70's would have difficulty even *achieving* a heart rate that high. Use this simple formula to estimate your maximum heart rate:

$$\text{Maximum Heart Rate (MHR)} = 220 - \text{age}$$

Our 20-year old has an estimated MHR of 200 beats per minute while our 70-year old is at 150. So your age is one factor in determining how high your heart rate should get when you exercise. The other factor, as mentioned previously, is your current physical activity level. In general, beginning exercisers should strive to have their heart rate only reach about 60% of their max heart rate. This would be 120 beats per minute (60% x 200) for our 20-year old and 90 beats per minute (60% x 150) for the 70-year old.

If our exercisers are not beginners and are in good physical condition, they should work out at a higher intensity, about 85% of their maximum heart rate. Note that this is 170 beats per minute and 128 for our younger and older exercisers.

If you don't want to bother with calculating your max heart rate or don't want to measure it every time you work out, you can also do a simple, more subjective test called the *Borg Rating of Perceived Exertion* (or RPE) named after its

creator, a Swedish scientist. See the chart at the end of this section. One thing that's interesting about the chart is that you'll notice there are numbers in addition to the words describing how the activity feels. The odd thing is that the numbers go from 6-20. The reason for this is that for many people their heart rate will correlate to 10 times that number. For example, if you perceive your intensity to be 13 (somewhat hard), your actual heart rate, if you were to take it, would be pretty close to 130 (13 x 10).

As you might guess, beginning exercises should remain in the 'Light' ranges while regular exercisers should be in the 'Hard' ranges.

TIME: beginners are encouraged to exercise about 20-30 minutes each day while regular exercisers should go longer, 30-90 minutes. In addition to time, you could also measure your steps using a pedometer (if you are running or walking), which are relatively inexpensive. Beginners should look to achieve about 3000 steps and more fit people can get up to 4000.

TYPE: much of your decision for what you would like to do is based upon your personal preference. If you like to walk, you can do that. If you'd rather run, bike, swim, use an elliptical trainer, or work out in an Indoor Cycling class, you can go that route. In general, you want to pick something that you like doing and feel free to change it up. Workout that are *always* the same get boring and people tend to lose interest and quit. You could, for example, walk on a treadmill one day and on another day walk around a park. Even though your 'TYPE' of training hasn't technically changed, it's giving you and your body slightly different challenges which keep things interesting.

Resistance Training

FREQUENCY: because strength training is harder on our muscles and aerobic training, it's important to consider the rest periods between workout days. For example, it's perfectly ok to walk on Monday and then go for a run on Tuesday. But it is not advisable to do a workout for your legs (like squats or a leg press) on Monday and then do more leg exercises (lunges and step ups) on Tuesday – you simply need to let your muscle recover. For this reason, the frequency of training is typically 2 days per week per muscle group for beginners and maybe up to 3 days per week for advanced exercisers.

INTENSITY: it's a little beyond the scope of this chapter to get really deep into determining proper training intensity for strength training, but the principle is similar to aerobic training. In aerobic training, you can measure the intensity of your workout against your maximum heart rate. In resistance training you measure your intensity versus the most amount of weight you can lift in a given exercise, which is known as your *one-repetition maximum*, or 1-RM. The closer you are to your 1-RM, the more intense the exercise is. In general, beginners should work out at a low intensity level to ensure they are performing the lift correctly and do not injure themselves. This equates to a level that may be just 50-60% of their 1-RM which will allow for 10 or more repetitions to be performed comfortably. Advanced lifters will often work up to 90% or even 100% of their 1-RM if their goal is to increase strength.

TIME: because a strength training workout is not attempting to provide the same kind of results as an aerobic workout, time is not as much of a concern. You simply take as much time as you need to do all the exercises you want to do! But a general rule of thumb is that a strength training workout should not last longer than 60 minutes. Beginners will often tire long before this and it's not uncommon to engage in a strength training session that is as short as 10 or 20 minutes.

TYPE: strength training, even more than aerobic training provides for a nearly unlimited number of options. But all strength training exercises can be divided up into a couple of categories: free weights vs. machine weights and multi-joint vs. single joint. Most advanced lifters prefer free weights over machines because they work muscles more fully because they require the lifter to balance the weight. In contrast, many beginners start with machine weights because they are easier to learn. Both types of lifters, however, should look to use multi-joint lifts, primarily. A bench press

exercise or squat exercise are both examples of a multi-joint exercise while an arm curl or calf raise are single-joint exercises. Multi-joint exercises allow the lifter to get more 'bang for his buck' in that they work many muscles at the same time while single-joint exercises typically target just one main muscle.

Flexibility Training and Functional Fitness Training

Both of these types of training are designed to enhance muscular function and, as such, the recommendations for both are similar.

FREQUENCY: 2-3 days per week, generally on an every other day sort of routine is sufficient for beginners and advanced exercisers.

INTENSITY: stretches should only be held to the point of *slight* discomfort; anything more severe than this and a person risks injury the muscle. There is no objective measurement of this, but rather, a subjective feeling. Functional fitness training, which may include things like Yoga, tai chi, and Pilates stresses the same idea – the workout should be physically painful.

TIME: like resistance training, these sorts of workouts don't stress the cardiovascular system the same way aerobic training does, so time is not as much of an issue. A basic stretching routine may take just 10 minutes to complete while a Yoga class may last as long as 45 minutes or an hour.

TYPE: stretching typically takes the form of 'static' stretching, that is, holding a stretch stationary for 15-60 seconds. It's not necessary to hold a stretch any longer than 60 seconds, and, in many cases, 20-30 seconds is long enough. But stretching can also be more 'dynamic' in which it involves moving through an exaggerate range of motion in order to 'limber up' the joints. Movements help warm the muscles and allows for easier movements. Stretching typically accompanies an aerobic or strength training workout. In this case, dynamic movements such as light calisthenics (jumping jacks, toe touches, etc.) work well prior to running or lifting weights while static stretching is a good way to cool down.

In addition to the FITT principles discussed above, there are three other items worth considering in any training program: specificity, overload, and progression.

If you stretch your legs, do your arms get the benefit? If you do pull-ups, do your legs get stronger? These rhetorical questions illustrate the idea of specificity: you will get out of your workout what you put into it. If your goal is to get stronger, you should lift weights. If your goal is to increase your aerobic endurance, simply stretching your muscles everyday will do nothing for you! So consider your program carefully when you set it up to make sure you are going to get the results you want.

When you watch a gymnast perform the splits, do you ever cringe thinking that if you ever put yourself into that position you might never be able to get out of it? What about watching a powerlifter squat 500 pounds? For these athletes these feats of flexibility and strength are comparatively easy compared to what you could do (more than likely). So if you were to work out with these people, they would need to stretch a lot further and lift a lot more weight than you in order to get a workout. This is what overload is: it means forcing your body to work to its limit. If the gymnast stretched like you did, she would probably become *less* flexible because there's not enough of a stimulus to cause her to get more flexible.

Progression is similar to overload, but expressed over a longer period of time. The picture below depicts the story of Milo of Croton (Insert illustration of Milo carrying the bull) was a 6th century Greek wrestler about whom 'tall tales' have been told. One of these involves Milo pick up a newborn calf and walking with it on his shoulder every day until it reached maturity. As the calf grew larger, Milo would become stronger due to the added load her had to carry each day.

This is what progression means: you do a little bit more every day in order to cause your body to have better aerobic endurance, more strength, or more flexibility.

Along with the FITT principle, consider specificity, overload, and progression in your workout to see optimal results. And remember, the best training program is specific to YOU. (Insert RPE table)

Section 5: “Be Active: The Typical Workout”

Good bread makes the sandwich. And so it is with your workout – the stuff on the outside: the warm-up prior to the workout and the cool-down after the workout will help make it be great. This section will detail some basic guidelines for a workout by providing you with an example.

In reading through this module, you may (understandably) feel a little overwhelmed at everything that should be included in a workout. But it’s really not as hard as it sounds to get in the recommended amount of aerobic exercise, resistance training, flexibility training, and functional fitness training. The e-resources at the end of this module includes links to videos that depict some great examples and explanations of some great exercises to try out!

Warm-up

The warm-up is important because it prepares your body for the workout session. In our example, you can use *dynamic movements* to prepare your body for the workout. Try this on a track surface, gym floor, or outdoor area such as a grass field.

Start by setting up, or deciding upon two markers that are about 25 yards apart – it’s not important to be accurate, just pick two spots.

1. Start with a slow jog about 25 yards
2. Turn around and skip back to the start (25 yards)
3. Easy lunge walk forward 10 yards and then jog the remaining distance (15 yards)
4. Perform a ‘walking quad stretch’ – take a step forward, stretch the left quad (or thigh) briefly, then take another step and stretch the other leg. Do about 5 stretches on each leg and then walk back to the beginning
5. Skip 25 yards while make big ‘arm circles’ forwards and backwards to loosen up the upper body
6. Run back at a pace a little faster than a jog
7. Performing another ‘walking stretch’ – but this time hug your knee to your chest, hold it briefly, and then do the other leg – 5 on each leg, and then walk to the end
8. Perform a basketball side shuffle – squat down a little bit and then side shuffle halfway with left side facing your ‘target’ – then switch to your right side facing the target and shuffle the rest of the way
9. Run back 25 yards at a faster pace than before
10. Walking toe touches – gently swing your left leg forward with your knee straight and try to touch it with your hand, then switch to the other leg. Don’t over stretch – swing your leg gradually, if you are unable to touch it, don’t worry.

At this point, you’ve covered 250 yards, and you should feel that your breathing rate has increased and your muscles feel warm. You may have even begun to sweat a bit – that’s the idea of a dynamic warm-up: you move your muscles through a good range of motion to prepare them for your workout. At this point you could continue to do different exercises to stretch out and warm-up further, or you might feel like this is enough. When you think about it, you could make an *entire workout* that’s just a dynamic warm-up! The nice part is you don’t need much space and you don’t need any special equipment!

Workout

Once you’re warmed-up, you should feel energized, not drained. If you feel rundown, then you should look to tone down the intensity of your warm-up. Here’s an example of a workout that encompasses both an aerobic and a strength training component.

This is an example of *circuit training* in which you alternate between cardiovascular exercises and strength training exercises. The advantage of a circuit is that it allows you to train multiple muscle groups in one workout and it can prevent boredom for people who don't enjoy doing the same thing for 30 minutes or more.

1. 10 minutes of chosen cardiovascular exercise (i.e. running, biking, elliptical machine, etc.)
2. Upper body strength training exercises – choose 3 or 4 that you can do right after the other. An example would be:
 - a. a chest press exercise
 - b. a pull-down (or pull-up) exercise for your back
 - c. a shoulder pressing exercise
 - d. and a rowing-type exerciseNote that these exercises alternate pushing and pulling in order to give time for each muscle group to recover. You can choose to do this mini-circuit just once, or go through it 2-4 times. Choose a weight that allows you to perform 8-15 repetitions.
3. 10 minutes of another cardiovascular exercise – you may choose the same thing you did in 1, or you might try something different
4. Lower body strength training exercises alternated with trunk strengthening exercises. Examples could be:
 - a. a squat-type exercise (you may use weights such as a barbell, dumbbells, kettlebells, or just use your own body weight)
 - b. side planks – holding your body stationary on your side supported only by your elbow and feet – try to work up to 20 seconds on each side
 - c. a lunge-type exercise (again, you can use weights or just your body-weight)
 - d. hanging leg raises – hang from a pull up bar or from a specialized stand – and pull your knees up to your chestLike #2, you can repeat your circuit several times, just make sure you can do a good number of repetitions for each exercise
5. Finish with another 10 minutes of cardiovascular exercise

In less than one hour, you have done 30 minutes of cardiovascular exercise and have worked all the major muscles of your body – that's being efficient! And like the dynamic warm-up, you can mix and match different exercises as you learn and become more comfortable with them. You could add exercises that target your arms or calves or even your neck if you want!

Cool-down

The cool-down performs the opposite duty of the warm-up: it attempts to return your body to a resting state. This is important because when you work out your body sends oxygenated blood to the muscles that you're exercising – it's why you might notice your legs are flushed, or red after you run. Well, you need to get your blood flow back to the *rest of your body* when you're finished, and this is actually pretty hard on the heart. You can help it out by cooling down properly.

Fortunately, the cool-down is *really* easy. The only rule to follow is that you want to *gradually* reduce the intensity of your workout. In our example above, our exerciser could use the final 5 minutes of the aerobic workout to slow the speed down. You could go from a jog to a walk, or a vigorous bike ride to a slower ride. You could measure your heart rate, but you don't really need to, just listen to your body: has your breathing rate slowed? Do you feel your muscles relaxing?

Often times the cool-down is concluded with a brief period of stretching, and this is a good idea. It feels good and it relaxing your body and your mind. The total cool-down should last between 5-10 minutes, but you can spend more time stretching if you'd like.

If you look back at the recommendations for exercise in part two of this module, you'll notice that if you were to do a workout similar to this just three days per week, you will meet the standards.

Health-Related Fitness Personal Discovery Assessment

Overview: In this PDA you will engage in activities aimed at helping you to assess your current fitness level and determine if you get an adequate amount of physical activity each week.

In this PDA you will be required to:

- Perform a weekly recall of your physical activity
- Assess your aerobic endurance, flexibility, muscular strength and endurance, and body composition

Equipment/materials:

- Access to a measured track
- Stopwatch
- Scale and height measurement tool (stadiometer)
- Tape measure

Begin by making a list of the activities you've done each day during the week. The chart below can help you (Insert physical activity recall table):

Refer back to section 2 of this module to see if you're meeting the weekly recommendations!

The other portion of this PDA is to go through the basic assessments as outlined in section 3 of this module. Record your data in the table below (insert assessment results table):

Next, compare your results and classify them to see where you may need improvement.

Based upon your physical activity level and the results of your assessment, you can use the FITT guidelines in section 4 of this module to develop a *personalized* training program. Look at the example in section 5 to get an idea of where to start. Also, consult the e-resources at the end of the module for ideas!

Health-Related Fitness e-Resources

The following are web-based resources that you may find beneficial in completing the PDA portion of this module and will add depth to the material presented. Some links are to website while others are YouTube stations that depict proper exercise technique.

University

- Appalachian State University – University Recreation (<http://urec.appstate.edu/>)
- Appalachian State University – Outdoor Programs (<http://urec.appstate.edu/>)

Local/Community-based

- Watauga County (North Carolina) – Parks and Recreation (http://www.wataugacounty.org/main/App_Pages/Dept/ParksRec/Athletics/generalprog.aspx)
- Watauga County (North Carolina) – Health Department (http://www.apphealth.com/Watauga/Health_Promotion/Index.php)

State/Regional

- Be Active North Carolina (<http://www.beactivenc.org/>)
- Strength Training Videos posted on YouTube by the author: (<http://www.youtube.com/airickson>)
- Strength Training Videos posted on YouTube by the University of Wisconsin at La Crosse: (<http://www.youtube.com/UWLstrength>)

National/Federal

- USDA My Plate (<http://www.choosemyplate.gov/>)
- President’s Council on Physical Fitness and Sports President’s Challenge (http://www.fitness.gov/home_pres_chall.htm)
- National Strength and Conditioning Association (NSCA) Video Library of Exercise Techniques: (<http://www.nscalift.org/videos/displayvideos.asp>)