



★ THE ROAD TO ★ RESILIENCE



PHYSICAL PERFORMANCE FUNDAMENTALS



INTRODUCTION

What Is a Time Critical Athlete™?

The Road to Resilience was developed with the Time Critical Athlete™ in mind.

The Time Critical Athlete™ maintains an acute awareness in crisis environments, makes decisions based on training, and takes decisive actions which contribute to mission success. They move, think, and act in a time critical fashion to save lives and property and bring the most of themselves to every moment.

Our spiritual resilience program lays the foundation for Time Critical Athlete™ to build and enhance their performance in these three areas:

- Character Development- We build communities of character, resilient leaders, and courageous followers who make decisions based on duty, integrity, respect, and courage.
- Physical Performance- We build physical performance into two main areas: physical fitness and nutrition. Physical fitness builds off of foundational movement awareness and strengthening exercises necessary for a strong and safe response to crisis environments. Our nutrition program builds off the stalwart of hydration and the elements of your daily nutrition vital for keeping you hydrated for optimal performance.
- Mental Performance- Our Core Four process of visualization, goal-setting, positive self-talk, and breathing was developed by British Special forces and helps the Time Critical Athlete™ bring the most of themselves to every situation.

The Road to Resilience program creates a foundation of spiritual resilience upon which the Time Critical Athlete™ and their teams can build the character, physical, and mental attributes necessary to step into unknown environments with the best of themselves.

MOBILITY & FLEXIBILITY

Intro to Mobility

Mobility by definition is the ability to move or be moved freely and easily. This ability is imperative in day-to-day life and activities. In some cases must move from one position to another in rapid succession. From physical activity, sports, hobbies, work, and home life, your body needs to move freely in a multitude of different positions.

Having the proper positioning to perform each operation greatly reduces the stress on your body and joints and increases your ease of operations. The more you become efficient in

positioning your body, you won't need to produce as much energy (aerobic, lactic or alactic) to meet your muscle needs and so your capacity for energy production will increase because you can make it last longer. Think of mobility as a tool that improves your position and the corresponding efficiencies that come along with it.

Conversely, if you physically can't get into the correct position required for efficient movement, for example, you don't have full range of motion, it will become increasingly harder to perform and you increase your risk of injury at the same time. Put another way, your limited range of motion prevents you from setting up, transitioning, or completing a movement in an ideal position. As a result, your body has no choice but to find stability elsewhere and that elsewhere might not be designed to handle the responsibility, which is how injuries occur.

For example, if you spend a prolonged period of your day in the sitting position, you are basically stuck in a flexed position. If you don't take the time to move around or stretch between long sitting sessions, your hip flexors will become adaptively short and stiff, and it will greatly impact your range of motion. Remember, the positions you spend your days in and the activities you perform impact your range of motion. If you're missing range of motion establishing the ideal position for efficient movement is impossible. Perform the movement with enough intensity, load, and volume, and injury is inevitable. To fix your position, you have to address muscle stiffness and restore normal range to your tissues. Remember, mobility is the only attribute that can improve position. The better your position, the more efficiently you move, and the less likely you are to sustain injury. So, you can see that it all starts with proper mobility.

MIDLINE STABILIZATION

At the epicenter of mobility is the concept known as midline stabilization: tightening the body, bracing the abdomen, and stabilizing the trunk. While you may have different positions you get into or out of for each movement, they all start and end with the idea of midline stabilization. Our limbs are designed to work around a stable body. Stabilize your spine and maintain a neutral posture before you start moving through your extremities. This is sometimes referred to as "core to extremity".

If you don't organize your spine optimally, you can't stabilize and transmit force to the primary engines of your hips and shoulders. Think of a car that is out of alignment. It causes problems handling, improper wear on the tires, and poor gas mileage. If you don't organize your spine optimally, you will lose stability force and power. Even worse, it can cause injury. Moving incorrectly develops and reinforces faulty body mechanics that will lead to injury as you perform more complex movements.

A vast majority of postural faults stem from a weak core and failing to create a position of stability before, during, or at the end of a specific movement. So, if your midline is not engaged and your spine is not stabilized before executing a specific movement, you will never enable a strong and safe position once motion is created.

To create midline stabilization you will need to move through a progression known as bracing your spine.

The Bracing Sequence

STEP 1

Squeeze your butt as hard as you can.

The first thing you need to do is set your pelvis in a neutral position. To accomplish this, position your feet directly under your hips—keeping your feet parallel to each other— plant your feet into the ground and squeeze your glutes (buttocks muscles) as hard as you can. Don't think about tilting your pelvis. Just squeeze your glutes. You will always end up in the right position because your glutes were engineered specifically for your pelvis and spine. We will set the abdominal muscles further down.

STEP 2

Pull your ribcage down.

Next, pull your lower ribs in, balancing your ribcage over your pelvis. The idea is to keep your pelvis and ribcage aligned. You can be in a braced neutral position and hinge at the hips forward or backward.

STEP 3

Get your abdominal muscles (abs) tight.

The next step is to lock your pelvis and ribcage in place with your abdominals. Think about it like this: Glutes set position, abs brace position. To correctly execute this step, continue squeezing your glutes, take in a big breath of air, and then exhale. As you let the air out, engage your abs and get your belly tight. With your spine neutral, butt squeezed, and your belly tight (stiffening as you exhale). Now you can breathe into that tight space the key is to keep that firm tight space.

STEP 4

Set your head in a neutral position and move your shoulders into a stable position.

Lastly, center your head over your shoulders, and gaze forward. Think about aligning your ears over your shoulders, hips, and ankles. As you do this, draw the heads of your arms back, spreading your collarbones wide, and release your shoulders down. Keep your thumbs pointed

forward and think about aligning. Note: You don't need to squeeze your shoulder blades together; just feel the tips of your shoulder blades reaching toward your hips. This puts you in a stable position and represents a stable shoulder position.

Again, creating this neutral but firm posture will play into and out of every movement we do. Midline stabilization is what allows us to transition from one position to the next without injury. The other important item here is the stronger your core strength, the stronger your midline stability will be. The weaker your core, the faster you lose form, causing you to lose power, speed, and stamina.

Warm Up, Cool Down, and Mobility

Another often overlooked part of mobility is a proper warm-up and cool down. Obviously, this is something that is more gym and training specific, not necessarily something you might do before going on a grocery run or walking the dog. Either way, it deserves to be mentioned and hopefully embraced as something that should be a habit. Warming up and cooling down are critical to staying injury-free and promoting performance gains in your training. A common mistake people make is to rush through a warm-up, charge directly into a hard workout, and then skip the cool-down. That is a recipe for poor performance and even worse, injury. Here's a good general rule to follow: The shorter and more intense the effort, the longer your warm-up; the longer the effort the shorter your warm-up. Depending on the intensity of your effort, your warm-up and cool-down should constitute 40 to 50 minutes of your workout.

Along these same lines, you should cool off or end your workout by lengthening the tissues that have been exhausted or shortened (i.e., contracted) during the training session. So if you went out for a hard ride, the front of your hips and your upper back are going to need your attention the moment you finish your ride. Similarly, if there are areas that you know need extra work, taking the time to mobilize these spots is the best way to elicit lasting change. The bottom line is that in order to reduce your chances of injury, improve positions of stability, or accelerate recovery following an injury, you have to take a systematic approach to your warm-up, and cool-down. It needs to be part of your weekly workout program.

Stability Translates to Mobility

Remember that stability is the baseline key to having good mobility. Most strains and sprains result from a weak core and failing to create a position of stability before, during, or at the end of the prescribed movement. The only way you can perform any lifting, weight-barring, or movements under load correctly is if you stabilize your spine and maintain a neutral posture before you start moving through your extremities. Your wheelhouse is your midline stabilization, and it will help you generate power, speed, strength, and stability through all of your other movements.

If your midline is not engaged and your spine is not stabilized before executing a specific movement, you will never be able to reclaim a strong and safe position once motion is created. Not only that but your body will find stability in weaker positions and make up for the lack of stability by compensating in other areas. Going back to our car example, if the car is out of alignment, it will never live up to its projected power and speed output. It displaces that misalignment to other areas, poor gas mileage, bad tire wear, etc., and the car will never live up to its performance standards. Your body is exactly the same. Bad alignment can translate into bad knees or a bad back or problems with your shoulder. Overall, that translates into bad mobility for you, potentially poor performance, and even injury. A car that is properly aligned will have the speed and power when needed with minimal wear and tear on its parts.

The Demand/Need.

Think about your day-to-day. Your career, your hobbies, your passions, your activities, your tasks, chores, etc. The energy demand on your body varies throughout the day and you require more energy to complete certain tasks than others. Do you consider yourself a physically fit person? Or do you find yourself getting winded after climbing a flight of stairs? It is important that we recognize the demands placed on our bodies during each of our daily activities and the energy we will need to perform them safely, properly, and efficiently.

The topic of fitness can be vast and complex. The goal with this information is not to be immersive, but rather provide you with a foundational approach with which you should consider when constructing an overall conditioning program. What is it that lies at the center of a conditioning program? Conditioning is a measure of how well someone is able to meet the energy production demands of their muscles in order to perform their job or a certain activity. At the center of conditioning lays the three basic energy systems themselves that create the energy your muscles need to perform. These are the **aerobic**, **lactic** and **alactic** energy systems.

All serve different purposes, and as you will see all are needed to perform efficiently and effectively. Master the basics behind these three energy systems, and you have the foundation to operate at the highest level of conditioning.

The Fuel

Just like gas fuels the engine of a car, the fuel that your muscles run on is a molecule called Adenosine Triphosphate (ATP). Through a chemical reaction that breaks down ATP into two smaller molecules (ADP + P) energy is released. It is this energy that is the fuel your muscles run on. ATP is the gas that fuels your engines. If the aerobic, lactic and alactic energy systems can generate ATP fast enough and long enough, then you will have good conditioning. If they do not, well, you will have a hard time with physical activity, sports, active hobbies, and even moving through your day.

All the food you eat goes through chemical reactions that break down the food into ATP directly, or into sugars, fats and proteins that are stored so they can later be turned into ATP as needed. To perform any movement, your body must use nutrients from food-- carbohydrates, fat and protein--to create energy in the form of ATP

- Carbohydrates provide fuel for moderate to high-intensity exercise
- Fat provides fuel for low-intensity exercise
- Protein can be used as fuel (protein converted to glucose via gluconeogenesis) but it really functions primarily to repair, maintain and help facilitate the growth of the body's tissue.

Basically, ATP converts these important nutrients (carbohydrates, fat, and protein) into usable energy. The body though cannot store ATP for more than a few seconds, so you must continually create ATP in order to keep your muscles fueled and working.

Power & Capacity

Two other concepts that help drive your energy systems and your underlying conditioning are power and capacity.

Power. This is the rate of energy production. The faster your system can supply energy, the faster your muscles can work. The more power they can generate.

Capacity. This is the duration of energy production. How long can you generate power.

Aerobic Energy System

The aerobic energy system is the most important energy system in your body. It is responsible for the majority of the ATP (muscle fuel) produced in your body. It also is the underlying energy system that helps to provide the raw materials necessary to refuel your other two systems.

The aerobic system relies on oxygen for ATP regeneration. It is also the only system to break down fats. (important to note, especially if you are trying to lose weight as well.) This system is able to produce energy for very long periods of time without fatigue and it is the system that fuels your muscles and vital organs at rest.

Activities that last for more than a few minutes rely on the aerobic system, while high-intensity activities that last for up to roughly 90 seconds use your anaerobic systems (alactic system~ 10-20 seconds and lactic system from ~ 60 - 90 seconds). While the aerobic system cannot supply energy at the same rates as the other two systems, it has the greatest potential for improvement. Without being too technical it has more moving parts that can be worked on vs. the other two.

You may think you rely on or use one energy system at a time. The answer is completely wrong. All energy systems are "on" all the time, and it is the aerobic system that helps to refuel the other two systems.

When you complete an intense short task, you are using the anaerobic system to provide energy. Once done, you take a few deep breaths to recover. This is where we use our aerobic system. It is in these breaths that our aerobic system removes all of the metabolic byproducts produced by the anaerobic activity and provides materials to refuel your muscles for more anaerobic activity. If your aerobic system is not operating well, you can take too long to recover or not be able to recover at all and will "fatigue" out.

So, the faster your aerobic system can produce ATP the less you have to rely on the anaerobic systems and the better your conditioning becomes. The more aerobic power you have means that the anaerobic systems can recharge much faster so they can contribute more power. This brings us to another very key term you will hear called your anaerobic threshold.

The anaerobic threshold (typically marked by a specific heart rate) represents the outer limits of your capacity for aerobic energy production and thus marks the range where your body will begin to experience fatigue because anaerobic processes start to come increasingly into play. Again, and this is key, the more you delay this from happening the better your conditioning. So, increasing aerobic conditioning that we will see the biggest dividends paid.

Improving Aerobic Conditioning

In order to dramatically improve your aerobic system of energy production you have to either:

1. Increase the oxygen supply to the working muscles. This means improving cardiac output, or how much oxygenated blood your heart pumps with each beat.
2. Increase how much oxygen the muscles themselves can use. This involves altering the metabolic properties of the muscle fibers themselves.
3. Increase the supply of raw materials your body uses to produce energy. The aerobic system relies on stores of sugar and fat to combust with oxygen in the ATP process. You run out of stored sugar and/or fats to burn your aerobic system shuts down. The larger the capacity to store these substances and the more you efficiently use them, the bigger your aerobic gas tank you'll have and the longer you'll be able to rely on aerobic metabolism.

The key is you only have to accomplish one of these not all these to increase your aerobic capacity. If you can accomplish any or all of these then your aerobic energy increases.

Improving Cardiac Capacity

Your cardiovascular system is the power plant of aerobic energy production. It does the job of pumping blood throughout miles of blood vessels in your body and delivering oxygenated blood to muscles and transporting deoxygenated blood back to the lungs. Aside from oxygen blood transports vital nutrients, hormones, gases, waste, etc. through your body so how well your cardiovascular system is developed plays a big role in not just your performance but your general health.

The cardiac capacity method is a great way to increase the amount of blood your heart can pump with each beat. It consists of longer slower training works to increase stroke volume (the volume of blood pumped out with each beat) primarily by increasing the size of the left ventricle of the heart. You might also hear this described as eccentric cardiac hypertrophy.

Cardiac Capacity Guidelines:

Exercises: Choose any low intensity, low pressure exercise. Swimming, jogging, jumping rope, etc.

HR: Try and keep your heart rate between 130 - 150

Set: Between 30 - 90 minutes per session. Try and increase volume over time

Frequency: 1 - 3 times per week.

The result is a lower resting heart rate, lower working heart rates and greater cardiac efficiency. The less work your heart has to do to pump the blood the better your aerobic energy production will be because more oxygen can get to your muscles.

Cardiac Capacity Guidelines:

Exercises: Any high intensity exercise that maximally elevates the heart rate such as sprinting or other high intensity drills.

Reps: 4, 12 rep sets

Set: Between 60 - 120 second intervals.

Rest Periods: Between 2 - 5 minutes (you want your HR down to between 120 - 130)

Frequency: 1 - 2 times per week.

Goal: Keep your heart rate up as high as possible (stay safe!)

Now we have the heart able to pump more oxygenated blood out to the muscles.

Anaerobic Energy Systems

If you need your muscles to generate a very high rate of power, they will need ATP to generate faster than the aerobic system is capable of, and you will turn to its anaerobic systems. Your body has two anaerobic systems: Anaerobic Lactic System and the Anaerobic Alactic System (aka Creatine Phosphate System). Both of these systems can generate ATP (muscle fuel) faster than the aerobic systems, but (and this is key) they lead to much more rapid fatigue. The

Anaerobic Alactic system can only produce ATP for a matter of around 10 - 12 seconds at max intensity before it can no longer regenerate ATP. The Anaerobic Lactic system can provide ATP for just over a minute or less by breaking down blood sugar or stored sugar (known as glycogen) before it leads to fatigue.

While high-intensity activities that last for up to roughly 90 seconds are predominately using our anaerobic systems, the underlying aerobic system is also working hard to deliver the necessary raw materials for them to function properly. But it is important to note that when you are working hard during a short high-intensity activity, you rely heavily on the anaerobic system for energy and can fatigue much more rapidly.

Your conditioning comes down to how quickly your body can produce ATP, how long it can produce it, and how efficiently you use it. Then it should make sense that the balance between aerobic and anaerobic systems represents the tradeoff between power (how quickly you can produce it) and capacity(how long you can produce it for). One last vital key to these two systems is that you will never have the capacity to be able to provide energy for anywhere even remotely close as long as your aerobic system.

Anaerobic Lactic System

The anaerobic lactic energy system acts as an energy bridge between the aerobic and anaerobic systems and is vital to your performance. Without lactate you would fatigue much more rapidly and anaerobic metabolism would fail very quickly. The anaerobic lactic (and alactic) systems don't rely on oxygen production and use few chemicals to produce ATP. The lactic energy system gives you energy gives you the power over short burst of time (~ 90 seconds), emphasis on short bursts. Remember the aerobic system is not capable of generating the same rate of energy as the anaerobic systems, but the energy from this system doesn't last as long.

Improving Lactic Conditioning

Because there are fewer "moving parts" parts to this system compared to the aerobic system, there are fewer factors that can be improved. We can train to increase how long you can sustain energy production, but the total amount this ability can be improved is relatively small and largely genetic. Obviously, you should train this system as hard as possible, but understand that it is "easier" to make advances in your aerobic conditioning more so than anaerobic.

Lactic Power Intervals

We want to work to increase the amount of power your lactic system can generate. The power side basically comes from having a lot of muscle tissue that's glycolytic meaning that it predominantly relies on anaerobic metabolism for its ATP and a high level of enzymes that are necessary to break down glucose. The key here is to train at maximum intensity and the highest rate possible.

Lactic Power Guidelines:

Exercises: A wide range work here. Squats, sprints, explosive squats, etc.

Reps: Max intensity & Speed, each rep should be 20 - 40 seconds, 1 - 3 minutes of rest in between (recover as much as possible)

Set: 2 - 4 sets of 3 reps

Rest Periods: Between 8 - 15 minutes (active rest is best, light jog, jumping rope)

Frequency: 1 - 2 times per week.

Goal : Keep your heart rate up as high as possible (stay safe!)

Key: Try to use different exercises for each set.

Lactic Capacity Intervals

Similar to power intervals, but with different work to rest intervals focused on increasing how long you can maintain lactic power rather than your max power output. Longer work intervals are used and less rest is allowed. The capacity side basically comes down to how well the body can tolerate the buildup of metabolic byproducts that are responsible for muscular fatigue. Using this method will increase how long your body can produce energy for using the lactic system before it completely fatigues.

Lactic Capacity Guidelines:

Exercises: A wide range work here. Squats, sprints, explosive squats, etc.

Reps: Max intensity & Speed, each rep should be 90- 120 seconds, 1 - 2 minutes of rest in between reps

Set: 2 - 4 sets of 3 reps

Rest Periods: Between 8 - 15 minutes (incomplete, active rest is best, light jog, jumping rope)

Frequency: 1 - 2 times per week.

Goal: Should be complete fatigue (stay safe!)

The lactic system can be trained to deliver more power and/or produce more power for longer. Again, these adaptations are fairly limited compared to the aerobic system. To increase the power of the system, it's necessary to do shorter bouts of work at maximum intensity with longer rest periods in between repetitions. Increasing capacity requires longer periods of work with shorter more incomplete rest periods. The big takeaway here is balance. Too little lactic

system development and you will be lacking the ability to be powerful and explosive. Too much development and you will be powerful and explosive but you won't last as long.

Anaerobic Alactic System

It is the anaerobic alactic system that can generate the highest level of power. It also has the fewest chemical steps of any of the three energy systems and therefore it can generate ATP very quickly and is thus capable of the highest power output out of all the energy systems. It relies on very small amounts of stored ATP and phosphocreatine within the muscles themselves. It cannot provide energy for long periods because it runs out of supplies. At maximum intensity, the alactic system is only able to generate ATP for a matter of 1- 12 seconds before giving out and running out of the building blocks it needs for continued energy production. Obviously, there are moments in life where you need to be explosive for more than just 10-12 seconds. That is where aerobic and anaerobic work together. The aerobic system works to replenish the chemical building blocks and enzymes that the alactic system needs to generate its high power output. It is in this way that the aerobic system plays a large role in how well you're able to quickly recover after short explosive bursts of power.

If your aerobic system is very well developed, it is capable of clearing out the fatigue inducing products of alactic energy production and refueling it quickly so you can be explosive over and over and over again. If your aerobic system is not well developed, you will be a one-trick pony and not able to continue after exerting yourself. Remember there is always a tradeoff between maximum power and maximum endurance. You will never be able to do a movement 30 times as hard and as fast as you could just 4 or 5 times. That is because the lactic and alactic systems can both generate tremendous power, but they can only do it for a limited time. Your goal in training should be to maximize how much power your alactic system can produce while subsequently improving how fast your aerobic system can refuel for repeated use.

Improving Alactic Conditioning

Just as with the other two systems, training to improve lactic power revolves around shorter work periods of maximum intensity and power, while working to improve capacity means using shorter rest periods and longer periods of work. Because the alactic system provides energy for much less time than either of the (aerobic or lactic systems) all the methods will use the shortest and most explosive periods of work out of the three systems.

Alactic Power Intervals

An improvement in alactic power comes from an increase in specific enzymes such as creatine kinase, which is responsible for speeding up the breakdown of phosphocreatine. Just as with

the other two systems, the faster the chemical reactions involved in alactic energy production can occur, the greater the power the system can generate.

Alactic Power Guidelines:

Exercises: A wide range work here. Squats, sprints, explosive squats, etc.

Reps: Max intensity & Speed, each rep should be 7 -10 seconds, 2 - 5 minutes of rest in between (recover as much as possible)

Set: 1 -2 sets of 5 -6 reps

Rest Periods: Between 8 - 15 minutes (active rest is best, light jog, jumping rope)

Frequency: 1 - 3 times per week.

Goal: Keep your heart rate up as high as possible (stay safe!)

Key: Try to use different exercises for each set.

Alactic Capacity Intervals

Alactic capacity on the other hand, is largely the result of how much ATP and phosphocreatine the muscles themselves can store. The more they can store the greater the capacity. Capacity can best be thought of as the total duration the system can produce energy. So, to train it you have to take the alactic system to the limits of its energy production.

Alactic Capacity Guidelines:

Exercises: A wide range work here. Squats, sprints, explosive squats, etc.

Reps: Max intensity & Speed, each rep should be 10 - 15 seconds, 20 -90 seconds of rest in between reps

Set: 2 - 3 sets of 10 -12 reps

Rest Periods: Between 8 - 10 minutes (incomplete, active rest is best, light jog, jumping rope)

Frequency: 1 - 3 times per week.

Goal: Should be complete fatigue (stay safe!)

Note: Watch Form here bad form with high fatigue could lead to injury.

Alactic power is an essential component of being explosive. Training to improve alactic capacity also requires a very high level of effort and concentration. You also need shorter rest periods and slightly longer intervals of work. The alactic system works closely with the aerobic system to produce repeated bouts of high power output that take place over and over again.

Energy Systems Summary

It is important to remember that all of your energy systems are turned on at all times. They work in unison to create a well conditioned Time Critical Athlete. It is your aerobic system that is responsible for the majority of your energy production and is the foundation for your

performance. But you will never have the capacity to be able to provide energy for anywhere even remotely close to as long as your aerobic system. These energy systems always work together. Even at the highest levels of anaerobic work, the aerobic system is still contributing a great deal of the total energy production. By working this system to its fullest potential, you will greatly increase your anaerobic threshold, your conditioning, and ultimately your ability to perform.

At lower intensities of exercise, the aerobic system can meet the ATP demands of muscles and provide the vast majority of energy. As intensity increases the aerobic system needs help and this is where the anaerobic system begins to kick it up a notch. The higher the intensity goes, the greater the relative anaerobic system contributions become. The aerobic system continues to contribute at its highest levels of power even at the peak of anaerobic activities. This means there is no purely anaerobic exercise or activity, the aerobic system is always involved in some way. A highly developed aerobic system actually enables you to use your anaerobic system to a greater extent without fatigue.

Programing

As we move past energy system development, and stay on the foundational approach to conditioning, we want to address your conditioning programming. Many of you might be familiar with the F.I.T.T. principle as a way to address programming. This stands for:

- Frequency - How often to train.
- Intensity - How hard to train.
- Time (Volume) - How long to train
- Type - Which methods of training to use.

There are a multitude of workout programs or types of training available. We feel while some might have more value, that the most important factor is to find a program that they will stick with over the long term. Different types of training include:

- Circuit training involves performing a series of exercises in a special order called a circuit. Each activity takes place at a 'station'. It can be designed to improve speed, agility, coordination, balance and muscular endurance.
- Continuous training involves working for a sustained period of time without rest. It improves cardio-vascular fitness.
- Cross training involves using another sport or activity to improve your fitness. It happens when an athlete trains in a different environment. For example, a volleyball player uses the power training for that sport to help with fitness for the long jump.
- Fartlek training or 'speed play' training involves varying your speed and the type of terrain over which you run, walk, cycle or ski. It improves aerobic and anaerobic fitness.
- Interval training involves alternating between periods of hard exercise and rest. It improves speed and muscular endurance.

- Weight training uses weights to provide resistance to the muscles. It improves muscular strength (high weight, low reps), muscular endurance (low weight, high reps, many sets) and power (medium weight and reps performed quickly).
- Altitude training (AQA only) is aerobic training high above sea level, where oxygen levels are lower. It is used to increase aerobic fitness quickly.

General methods of training can be applied to specific sports. For example, continuous training might involve swimming, cycling, rowing, aerobics or running.

Another variable in the FITT principle is Frequency. While we recommend you train at least three times a week, we understand that everyone will have different frequencies of training.

That leaves us with intensity and time. These are two areas that we do want to speak to in this course as there are extremely important in creating changes in physical conditioning.

Intensity & Volume

Intensity and volume are at the very foundation of all programming, and both represent thresholds that must be crossed for the body to be stimulated into adaptation. If you don't go above a particular level of intensity or achieve a certain volume of training, nothing happens. You can walk around all day at your department or on a treadmill with a heart rate of 70 -100 and yet because the intensity is not high enough, your cardiovascular system would see little or no improvement. On the other hand, you could perform one max rep bench press and even though the intensity is high, it wouldn't be enough volume to really improve your strength.

Intensity

Intensity refers to the amount of force or power you have to exert in order to achieve the desired goal—how much work do you have to do? Intensity is almost always defined as an effort above 70 to 80 percent.

Volume

Volume relates to the distance or the amount of work that you're putting into a given training session or routine. Or another way to say it is volume is the amount of work you do in a given training schedule.

How they work together

This is generally where most programs fail, as they don't manage these two key elements properly. Both needed to be tended to in any program to achieve maximum physiological adaptations or maximum conditioning.

Within a single training session, the intensity threshold is best thought of as the primary activation point for adaptation or desired changes in your conditioning. While the volume threshold is more accurately described as a magnifier of conditioning. So, crossing the intensity

threshold means you've created a demand on your body and called its mechanisms of adaptation into action. As a result, a series of different hormones are released into the bloodstream that set off a chain reaction of chemical processes. These chemical processes then stimulate biological adaptation through the synthesis of different proteins. More simply put the addition of new muscle fibers.

Generally speaking, a higher volume will increase this signal, but only up to a certain point. At some point, higher volume can actually lead to a decrease in hormonal output (or a rise in other hormones that cause other effects) and thus the opposite of what you're trying to achieve.

When you are a beginner, you have a fairly low threshold for both volume and intensity. It takes very little of either to stimulate the body to adapt and you can see results from just about anything. This is where training everything together can be effective. Over time however, as you become more experienced in your training this all changes. Through natural processes of adaptation, your thresholds begin to increase and it takes higher and higher intensities and greater volumes to continue to stimulate the body to adapt further. Always try to use the lowest intensity and the least amount of volume that will stimulate adaptation. This will always give you maximum results as you move up the food chain of fitness.

How Do You Move?

There is an inherent risk of injury in most active things we do in our lives. Even simple activities like walking up and downstairs, walking down the street, or carrying groceries can be made more dangerous by factors such as weather, speed, or if our body is not prepared. By increasing our physical fitness and in turn increasing our physical readiness, we can minimize potential hazards or risks.

Master The Movement

What we want to do in the Skill Transfer section is first look at the movements behind the tasks that you do in your daily life. Whether it be for work, for a hobby, for a sport, for your family, what movement patterns can you find throughout your day? In mastering the setup and movements behind these tasks we will help achieve better performance and safety. As we just looked at in the mobility section and energy systems section, having your postural mechanics correct will increase the efficiencies in your body's energy utilization, which again equals better performance.

Many movements throughout our day can be more complex. Awkward uneven loads, extra weight, reduced mobility from clothing or footwear, can all add extra bulk and instability to these movements. The speed at which you complete these movements also compounds any of these issues and increases your risk for injury,

By focusing on how we move, the foundation of our movement, our mobility, and our overall physical fitness, we can slow these movements down, mitigate risk, increase our energy, and improve our performance.

Principles of Safe Movement

As you shift from movement to movement in your daily life, you can look to establish a set of guiding principles that will help perform each movement efficiently and reduce your risk of injury. We have distilled the basic tenets down to just four foundational principles.

They are as follows:

Principle 1 - Bracing Sequence

All movements should initiate with the same core-to-extremity pattern, start with the bracing sequence. This sequence is used to stabilize the spine so that it can be used as a lever or column to translate power between the hips and shoulders.

Step 1: Squeeze your butt.

The first thing you need to do is set your pelvis in a neutral position. To accomplish this, position your feet directly under your hips—keeping your feet parallel to each other— plant your feet into the ground and squeeze your glutes (buttocks muscles).

Step 2: Pull your ribcage down.

Next, pull your lower ribs in, balancing your ribcage over your pelvis. The idea is to keep your pelvis and ribcage aligned. You can be in a braced neutral position and hinge at the hips forward or backward.

Step 3: Get your abdominal muscles (abs) tight.

The next step is to lock your pelvis and ribcage in place with your abdominals. Think about it like this: Glutes set position, abs brace position. To correctly execute this step, continue squeezing your glutes, take in a big breath of air, and then exhale. As you let the air out, engage your abs and get your belly tight. With your spine neutral, butt squeezed, and your belly tight (stiffening as you exhale). Now you can breathe into that tight space the key is to keep that firm tight space.

Step 4: Set your head in a neutral position and move your shoulders into a stable position.

Lastly, center your head over your shoulders, and gaze forward. Think about aligning your ears over your shoulders, hips, and ankles. As you do this, draw the heads of your arms back, spreading your collarbones wide, and release your shoulders down.

Principle 2 - Torque to stabilize shoulders and hips

Generating torque in the hip and shoulder takes slack out of the system to ensure the joint is stable and ready for loading. It also helps maintain the midline stability achieved during the bracing sequence.

Principle 3 - The muscle group that is loaded first will be the primary mover

The way a joint is moved to initiate a larger movement will dictate which muscle group is loaded first and by extension which muscles are recruited as the primary mover.

Principle 4 - Loads should be centered on the support base

Any load that is to be picked up and/or carried should be as close to the center as possible.

Move Safely. Move Efficiently

We will also look at common faults while performing common movement patterns. Knowing what not to do will greatly enhance your safety and improve your performance. In the following section, we will look at each task, the common faults with each movement.

One Arm Object Carry

Common Faults

1. Leaning to one side to pick up object losing midline stability and rotationally loading the spinal erectors.
2. Bending at the lumbar spine instead of the hip loading the spinal erectors.
3. Allowing the shoulder of the carrying arm to rotate forward creating an unstable shoulder position.

Lifting Object From Ground

Common Faults

1. Bending at the lumbar spine instead of the hip loading the spinal erectors.
2. Allowing the shoulders of the reaching arm to rotate forward, elbow pit in, creating instability in the shoulder and thoracic spine.
3. Overextension of the lumbar spine and flexion of the thoracic spine.

WELLNESS

Weight Loss

Weight loss is always a challenge and traditional wisdom says you just need to eat less and move more to lose weight. Unfortunately, just doing those two things doesn't always solve the problem.

A few things to remember if you are trying to lose weight:

- All calories are not created equal. The types of foods you eat are even more important than the number of calories you consume. A cup of cubed chicken breast and a king size bag of Peanut M&Ms have about the same number of calories – but if you want to lose weight, a king size bag of Peanut M&Ms is not a good choice for dinner. Different foods are processed in different ways and have varying metabolic effects on your body. What foods you eat influence fat burning, the parts of the brain that control appetite, and hormones. Macronutrients are not all created equal either. For instance, a banana and a Hershey's chocolate bar have approximately the same carbohydrate content – but bananas also come with the benefit of being high in Vitamins B6, C, Potassium, and Magnesium
- You cannot outrun your ice cream. While physical activity is important, just moving more while eating a poor diet is not going to get you to your weight loss goals. If you were to eat a pint of Ben & Jerry's Chubby Hubby ice cream (1,360 calories), it would take an average man running at a 5 mph pace more than 2 hours just to burn the calories from the ice cream. Proper nutrition plays even more of a role in weight loss than physical activity.

So, if you want to lose weight, how should you go about it? There are no exact guidelines that are right for every individual because what you need for your own weight loss is specific to you, your activity level, and what works for one person does not always work for another. The best way to manage weight loss is to follow the general guidelines but experiment with what works best for your own nutrition and fitness. Pay attention to what works and what does not work. Weight loss tips that seem to be helpful:

Refined Sugar. The world of nutrition science is in a debate about the benefits and relative effectiveness of low-fat and low-carbohydrate diets – but most all groups agree that excessive refined sugar intake leads to weight gain. To lose weight, limit excess sugar including sugar-sweetened beverages (e.g. sodas, sugared sports drinks, juices with added sugar), desserts (e.g. cookies, cakes, pastries), and candies.

Know Your Food. Be aware of what is in the foods you are consuming. Learn to read labels so you can tell what additives are in the foods you are consuming. Several foods have added sugars. It is important to know where extra sugar is sneaking into the diet. The less processed your food is the better. Shop the outside of the grocery store (e.g. vegetables, meats, fruits). If

the label of your food has ingredients you do not know or cannot pronounce, think twice before you eat it.

Tracking. Many people find tracking their food useful to make them aware of what is going into their bodies every day. While specific guidelines and calorie counting are not always beneficial, it is important to know what you are putting in your body – even too many healthy foods can cause weight gain. Online/app programs allow you to enter daily intake and monitor your intake of micro and macronutrients.

Sleep. The importance of good sleep in helping with weight loss cannot be overestimated. Too little sleep or interrupted sleep can result in interrupted circadian rhythms which in turn cause metabolic disruptions. Being tired can also lead to poor food choices and less likelihood of being physically active. Losing weight requires adequate sleep which can be a challenge for many adults.

Move. While exercise and fitness cannot overcome a poor diet, being physically active is important for overall wellness and weight loss. Our bodies were designed to move and metabolism is positively affected by being active. While the metabolic changes are not enough to overcome a high-sugar diet, they are useful in maintaining weight loss. Try to move every day and tax your system regularly using functional movements.

Do Not Do it Alone. Making an effort to lose weight requires a commitment to changes in diet and exercise. Significant changes are most easily made when the people around you are on board and can help you move toward success. Talk to your friends, family, and co-workers – anyone you typically eat and live with about your decisions – before you start making changes. Having their social support can make the difference between a successful and unsuccessful weight loss attempt. Engaging others and working together toward common goals can be helpful. Engage family, friends, and colleagues in your fitness regimen so you have someone to be accountable to who can encourage you to keep moving.

Plan for Success. Know what your biggest challenges are and make contingency plans. Clean out your pantry and refrigerator ahead of time and have plenty of good food choices available. Know when you tend to have difficulty and what foods tend to trip you up and make a plan to avoid them. Be prepared to engage in physical fitness and have a plan.

Don't Let Perfect be the Enemy of the Good. There are times when you will fail – you will eat foods you probably should avoid and you will have days you just do not feel like working out. When you stumble, take it in stride and plan to do better the next day. Not being perfect in your weight loss plan is expected – but it does not mean you have failed the plan. Make the next day a better one.

Tobacco

Tobacco is the only substance that, when used as directed, will kill you. Tobacco damages nearly every organ in the body and causes approximately one in five deaths each year. According to a report by the Surgeon General, smoking increases the risk of coronary heart disease risk by 2 to 4 times, the risk of stroke by 2 to 4 times, and the risk of lung cancer by 25 times. Even light smokers who use fewer than 5 cigarettes a day show early signs of cardiovascular disease as smoking damages blood vessels by making them more narrow and thick, increasing blood pressure and causing clots. Smoking also increases several types of cancer including:

- Bladder
- Blood (acute myeloid leukemia)
- Cervix
- Colon and rectum (colorectal)
- Esophagus
- Kidney and ureter
- Larynx
- Liver
- Oropharynx (includes parts of the throat, tongue, soft palate, and tonsils)
- Pancreas
- Stomach
- Trachea, bronchus, and lung

According to the CDC, cigarette smoking among U.S. adults has reached an all-time low of 13.7% in 2018. These drops are likely due to the focus paid by national organizations to decreasing smoking, increasing regulations around smoke-free workplaces, presumption laws, and shifting social norms. However, rates of smokeless tobacco use have not seen quite a dramatic decrease. While smokeless tobacco is perceived to be less harmful than smoking, there also are increased risks of several cancers and lesions as smokeless tobacco is full of known carcinogens. Quitting smoking significantly improves health risk:

- One year after quitting, cardiovascular risk begins to drop.
- Two to five years after quitting, the risk of a stroke becomes the same as non-smokers
- Five years after quitting, risk of cancers (e.g. esophagus, bladder, mouth, throat) are cut in half.
- Ten years after quitting, the risk of lung cancer is cut in half.

There are a number of options for those looking to quit tobacco. Most smokers quit without any specific intervention but resources are available. For instance, the national quit line 1-800-QUIT-NOW is a free cessation quitline that provides support, advice, and counseling including a quit plan, tips, coping strategies, access to discounted medications, and resources. Medications also exist both over the counter (e.g. nicotine patch, gum, lozenges) and through prescription (e.g. nicotine patch, inhaler, nasal spray, Zyban, and Chantix). While tobacco cessation is a challenge, the benefits to health and readiness make it worth the effort. Quitting tobacco is the single best thing you can do for your health.

Alcohol

Alcohol is the third leading cause of lifestyle-related deaths in the United States and leads to more than a million emergency room trips each year. Binge drinking and excessive alcohol consumption are related to increased risk of injury, pregnancy complications, behavioral problems, increased risk of cardiovascular disease, liver disease, neurological impairment, and cancer. A drink is considered to be a 12-ounce beer, 5 ounces of wine, or 1.5 ounces of distilled spirits. According to the National Institutes of Health, a binge drinking episode is when a man drinks more than 5 drinks in a two hour period or more than 4 drinks for women. In the general population, about a quarter (25.6%) of adults report a binge drinking episode in the past month.

It is important to understand both the risks associated with heavy and binge drinking as well as what their consumption is relative to what is considered healthy or moderate drinking. Potential resources exist online and have been recognized as effective by the National Institute of Alcohol Abuse (NIAA) such as www.drinkerscheckup.com which provides the opportunity to examine your drinking patterns and identify if they are problematic or detrimental to health. Another program NIAA recognizes is the www.moderatedrinking.com which can help individuals moderate their drinking if it is identified as problematic.