



# Speed, Power and Agility: How it Helps in Youth Sports

## **Speed, Agility, Power: What's the Difference?**

Speed, power and agility are often used interchangeably. Often times this interchangeability happens because someone is describing an athlete who possesses all of these traits. This usually leads to describing one as the other or generalizing one as all three or all three as one. All of these traits are important for athletes of all ages and can help take sport-specific skills to the next level.

### **Speed Is:**

Speed is simply the ability to get from one place to another in a short amount of time. Tests of speed include the 40-yard and 100-meter dashes among others. The 40-yard dash is typically used in football, whereas the 100-meter dash is a track event. The 100-meter dash world or Olympic champion is usually called the fastest woman or man on the planet. This title does not mean they have the best agility or power. In fact, since track athletes are specialists, many times they aren't necessarily proficient in agility (although power can help them get a great start).

### **Agility Is:**

Agility, by definition, is the ability to move quickly and easily. Moving quickly can easily be confused with moving fast. This is why quick athletes who are not fast can be confusing to some. The average world class male sprinter takes 43 to 45 steps to complete the 100-meter dash. World-record holder Usain Bolt takes 41 steps. This means, while he is the fastest in history, his legs do not cycle as quickly as other sprinters.

Agility relies on quickness, which can help speed but does not determine speed. Speed is usually but not always linear, whereas agility exists through multiple planes of movement.

We can move laterally (side to side), vertically (up and down) and through the frontal plane (forward and backwards). Agility requires that we move through all of these planes with good speed (accelerating, top speed and decelerating) and ease. An example of agility is a [5-10-5](#) drill. This drill requires that you move laterally in both directions and forward with good speed. This also requires you accelerate and decelerate quickly, which is key for agility and changing directions quickly.

## Power Is:

Power is a force determined by weight moved, multiplied by a distance and divided by time. We have all heard of horse power, which is 550lbs times one foot, divided by one second- OR one-pound times 550 feet, divided by one second. This formula means that moving 550lbs one foot in one second is equivalent to one pound 550 feet in one second. The point in seeing this written two ways is that power is not solely based on [strength](#) or speed, it is based on both. Power measures how much strength you can develop in a short period of time. If two people squat 100lbs, you might say they are the same strength. However, if it takes one person two seconds to squat 100lbs and one person three seconds then the former is more powerful because they were able to develop the same amount of strength in a shorter amount of time. Power can be seen in all planes of motion. Higher vertical jumps require more power vertically. Faster starts require more power in the frontal plane and moving laterally from a dead stop (cutting in football or soccer) requires power laterally. Power in running motions is often referred to when talking about having a “good first step”.

## Applicability in Sport

For athletes, the gym should be a place to create compliments to or enhance your sport skills. The whole reason for athletes training is increased performance and injury prevention. So, if your gym numbers aren't translating to the playing field, you are not achieving your overall goal. It's great to increase leg strength but if you cannot translate that to speed, power or quickness (or another sport skill: kicking, holding in fighting sports etc....) then it is unlikely to help you in the field of play.

## Mechanics

Ideally, athletes should move properly before we add loads to their movements. This is traditionally thought of as, for example, making sure you have a great squat without weight before adding weight. For sports this can mean making sure an athlete decelerates (landing from a jump, slowing down when sprinting) before adding more complex jumping, running and cutting movements. A large portion of sports takes place on one leg so it is important to make sure athletes have the correct movement and strength patterns for these types of movements. Since we move with speed and the force of gravity is always pushing down on us, athletes are

constantly undergoing large amounts of force to make quick and powerful movements. The quicker the movement, the more force you have to overcome and the more important mechanics become. Thinking from a sports point of view, if you add more power to your soccer shot but the mechanics are off, you'll be shooting very hard and powerfully nowhere near the goal.

## **Speed**

“Sports is a game of inches” is a phrase often used to talk about sports and this is true. The difference between you making and missing a shot can be a matter of inches. This can be the difference between having a full second to set up your shot before the defender shows up versus half a second. This is a matter of both inches and milliseconds. A faster athlete can get to a spot faster, which allows them more time to set up and shoot. By the same token, a faster defender can get to the spot faster and make a difficult shot (for the offense) out of what would normally be an easy one. This is one large benefit to speed in an athlete, giving them more time to use their skill as they separate themselves from the defender and the opposite for defense. If you are on a fast break in basketball and you know the defender can jump higher to block your shot but you are fast enough to get to the hoop before they have a chance to jump, you don't have to worry about being blocked.

## **More on Agility**

Speed is great, it will get you to a spot faster than someone else, but what if they are just as fast? This is where quickness and agility come into play. If a defender is just as fast, you will need to change directions to force them to react. Defenders already have a disadvantage since the offense is acting and they are reacting so how can an offensive athlete increase this gap? Using deceleration and acceleration. Deceleration and acceleration will make a change of direction a time that two athletes of the same speed become separated. If one athlete can slow down from 10mph and change direction and accelerate back to 10mph half a second faster than the other athlete then they will have a half second lead on the defender after their change of direction move. This is where athletes with better agility, deceleration and acceleration can beat out bigger, stronger and faster athletes. This is also where bigger, stronger and faster athletes can separate themselves. If you are running for a touchdown in football and a defender is running to get to the goal line at the same time as you, deceleration will allow you to stop and move around the defender faster than the defender can react and stop to catch you.

## **More on Power**

Power is force multiplied by distance divided by time or how far can you move something in a certain amount of time. While strength is important in sports and for developing power (you can't move 300lbs fast if you can't move 300lbs at all), power might be more applicable to sports. As I mentioned earlier, if one athlete can move 600lbs but it takes them two seconds to

move 300lbs and another athlete can only move 500lbs but can move 300lbs in one- and one-half seconds, the second athlete is weaker but more powerful. Strength can happen slowly but power cannot and in sports it is uncommon to benefit from moving slowly. Two-footed power is beneficial in many sports. Getting a rebound in basketball, starting in track, getting a header in soccer or tackling in football are all based on lower body power off of two feet. Power in sports can also occur off one foot and often. Most movements at the end of a run will happen off of one foot if the athlete doesn't break stride. Running into a one-footed jump (header off one foot, fast break layup, jumping to make a catch in football or baseball while running) or sprinting to throw without stopping to plant (baseball, softball, football) or shoot/kick (football, soccer) are all situations where you must recruit power off of one foot. These are all situations where balance, deceleration, strength and power must be done on one foot at a time. While you may not get as much power off of one foot, compared to two feet, you will save time by not having to set up. Since time is a key component in power, saving time is important. When you recruit power off of one foot, you can complete an athletic movement in stride rather than having to set up.

## **Injury Prevention**

We don't often think of the load of gravity as weight because it's a weight we have to endure every day. Since gravity is a force, speed and time can increase the load of gravity on your body. Ground contact time is the time your body (generally through your feet or one foot) is in contact with the ground. In many sports you want your ground contact time to be short. When running, short ground contact time helps you run faster. When jumping, short ground contact time will help you jump quicker. Short ground contact time is also a way to increase quickness, the less time you spend on the ground, the faster you can make your next move. If you're running to your right and want to cut left, you don't want to spend a lot of time slowing down and then moving left, you want to do whatever it takes to stop moving right and start moving left as quickly as possible. Shorter ground contact time allows this movement to happen faster. When going up for a header in soccer or a rebound in basketball, the less time you spend on the ground preparing to jump, the more time you can spend actually jumping. While taking less time to prep to jump may result in a sub maximal jump, if you get to the ball faster than your defender, that's all that matters, right? These are all benefits of short ground contact time. Something that can come with short ground contact time is more force absorption.

## **Force**

3 phases of a depth jump.

The higher we jump and the faster we move; the more force we are applying to our lower limbs to leave the ground and the more force we are landing back on the ground with. While Olympic sprinters are generally 150-200lbs with no weight on their back, the force applied to the ground when they run can be up to 500lbs.

A depth jump (stepping off of a 6-24" box, landing on both feet and immediately jumping) can apply forces of three to four times the bodyweight of the jumper to the lower extremities. When landing with straight legs (not allowing your muscles to absorb some of the force), it can apply six to seven times the force.

For a 150lb athlete, this is 450-1050lbs of force. The goal of training for sports is to prepare your body for undergoing these forces unexpectedly. Strength training so that the body can absorb force safely is large benefit of power and agility training. Safely absorbing force can be the difference between landing with bent legs versus straight legs, which can add an additional two times an athlete's bodyweight worth of force.

## Training

The goal of training is for an athlete to get better at their sport. Ideally the work you are putting in in the gym is translating to improving an ability. Abilities range from sport skills, speed, power, quickness or availability. You can't be a better athlete if you can't play because of injury. The methods to develop these skills differs depending on the age and ability of the athlete but the skills are required at all levels of sports. As the level of play becomes higher, the little things become more important. Speed, power and agility are skills that translate between sports and can help take your game to the next level.

