

Sprint Technique, Maturation and Strength

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In this article I wanted to discuss the issue of performance technique (in particular sprinting technique) and make some general comments on the development of good technique and the challenges we face in particular with younger athletes.

As someone who has been very interested in speed every since I was a Little Athlete myself, it has been a real passion of mine to try to best understand what makes someone fast, what is the most efficient technique to achieve this goal and how do we ensure that our athletes minimise injury during the process of pushing their bodies at 100% speed intensity on a weekly basis.

I work not only with track and field athletes, but athletes in many sports that have the need for their players to run fast (be it acceleration speed or a combination of acceleration and top speed). What is absolutely consistent across the board with all the programs I work with, is that non of these athletes develop the right running mechanics naturally, they all have to be “taught” to run with the correct leg, arm and torso mechanics in the quest to improve their technique.

This had me thinking why is that the case because for some time now I have been quite interested in the running technique of young children and noticed that they often have great running mechanics typically running with high knees, swinging their arms, etc.



But as the young child starts to grow up and particularly if they get involved in competitive sport, there is often quite a dramatic change in their running technique, this is highlighted by a more forward lean, less leg lift at the front and much greater rear-sided leg mechanics.

This “modified” technique is then often taken into their teenage and even adult sporting lives leading to a very inefficient sprinting technique with a high incidence of injury due to the poor leg mechanics during this rear sided sprinting movement.



WHY DO SPRINT TECHNIQUE CHANGES HAPPEN IN THE YOUNG ATHLETE?

If you are a student of sprinting biomechanics, you will have some understanding of the role ground force production plays in sprinting performance. If you are not strong in the right way, then you will want/need to spend time on the ground generating the force you feel you need to propel

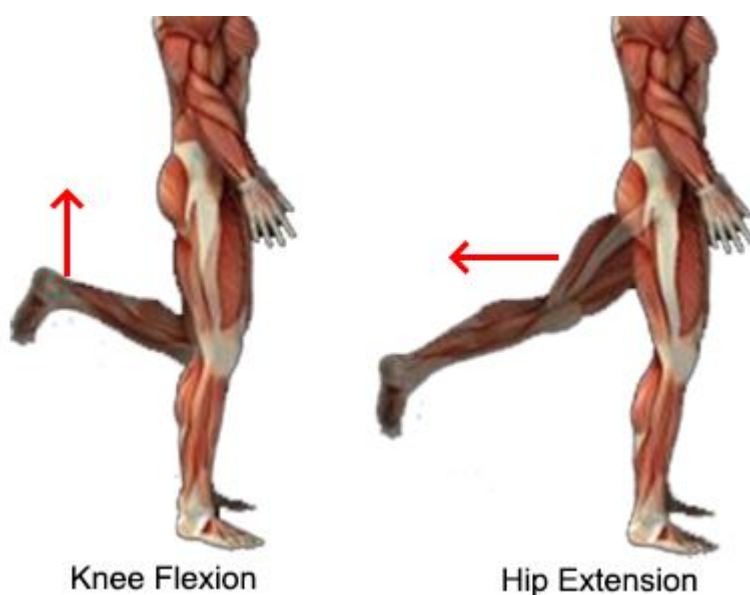
your body forward.

This manifests itself in young children (and adults who are not plyometrically strong) by them having to spend more time on the ground per stride to allow them to generate the force required to propel themselves along the ground. Without good coaching instruction, all young athletes in time will modify their running/sprinting technique to allow for this increased ground contact time with the result being the development of very poor running mechanics (rear side mechanics).

These poor mechanics are bad for the aspiring athlete in several ways:

1. Increased rear sided running mechanics increases the chance of injury at high velocity.

The reason for this is that in the thigh there are several "2-joint muscles", the hamstring muscle group and the Rectus Femoris in particular. These muscles are elastic in nature and assist in the swing phase of the sprinting stride. If the athlete places their leg in a hip extension, knee flexion position they do two things:



a. They over stretch their Rectus Femoris (which is now stretched at the hip & knee) and this can easily lead to a muscle strain, and

b. By placing the hamstring in a overly contracted state (the hamstring muscles extend the hip and flex the knee), if you then try to rapidly flex the hip and extend the knee (as that which takes place in a sprint stride), the muscle often cannot rapidly relax out of this highly contracted state resulting in the muscle cramping and then being strained in the subsequent stride.

A good practical example of just how hard on your hamstring this position is, try this position whilst stationary:

- 1. Stand up right.
- 2. Fully extend one leg at the hip.
- 3. Now try to fully flex your knee at the same time.

You will likely feel the hamstring muscle wanting to cramp, imagine this taking place at 4.5 strides per second!!!



2. Spending excessive time on the ground per stride results in a slower velocity.

There has been some great research in recent years looking at ground contact times and ground reaction forces and sprint performance. My next article will look into detail at this aspect of sprinting and how we can ensure we maximise this aspect of sprinting biomechanics.

THE DILEMMA:

The challenge with teaching your young athletes the correct running technique early on is that they will likely not have the strength to apply this technique and run as fast as they could if you let them run with a more rear sided approach.

You are then faced with the unenviable decision to have athletes who look great when they run but don't run super fast versus having an athlete with less than ideal mechanics but they run fast (and potentially stay in the sport – which otherwise they might not if they don't see early on success).

I remember many years ago when I was running a Level 2 T&F sprint workshop – I had an attendee say that he had applied my view on sprinting technique to all his young athletes and they looked great but non of them ran very fast!!!

I personally think it is a mistake to allow the athlete to ingrain poor technique purely for results – because this will come back and bite both you and the athlete in the butt with an increased incidence of injury over time.

Over the years there has been many sprint athletes who have had to move up to the 200m-400m because they kept getting injured when trying to run the 100m – not always but in many of these cases it was because their running mechanics placed them at risk of injury when performing 100% speed as required in the 100m event.

A key goal to success in this case is to ensure you develop the appropriate strength with your athletes as soon as they are capable of handling the training loads. The application of appropriate plyometric routines will go a long way in teaching them to apply force at speed which is a key requirement to good sprint performance.

An example in another sport of how the technique/physical conditioning equation is often out of balance is that of junior tennis. I was the S&C coach for ACT junior tennis a couple of decades ago and in the squad was the best 13 year old boy in Australia. The main reason for him being the best in the country was that he was at that age spending 30-hours per week on court (but doing no physical conditioning at all)!!!

As part of my role, physical testing was conducted on all the players and this particular player had results typical of a 10-year old (he was 13) – but he could hit a tennis ball more smoothly and accurately than any player his age in the country and at this age that is the key to success.

By the time he had turned 15, many of the younger more physically conditioned players around the country now had developed their hitting technique and within another 18-months this player wasn't ranked in the top 10 and ultimately dropped out of the sport.

THE MORAL OF THE STORY:

As coaches, it should be our moral obligation to ensure that our athletes are the best they can be (both technically and physically) which hopefully leads to maximum performance (too often technique is sacrificed for a whole host of reasons). we need to balance up the physical requirements of our event with the technical demands and then factor in the age/training history of the athlete.

I will continue to ensure my athletes have the best technique that they possibly can at their current stage of physical development and hope to educate them on the training journey they need to travel to develop the appropriate strengths to be able to reach high level performance with high level technical proficiency.

IF you would like to read more on the specifics of the kinematics of sprinting at different ages - check out my review of the literature post ([Speed & Power review of the literature](#)). In particular, this is a great paper looking at key kinematics with junior athletes ([Kinematics of sprinting in children and youth](#)).

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