

## The greatest athletic capacity

Athletic performance depends on the foundation that posture provides. Posture is the shape and position provided to the three big sections of the body - the torso, pelvis/hips, and legs – primarily by the large joints in each section. The large joints are, in turn, affected by the smaller joints. Posture establishes the efficiency of the body: the degree of change needed in order to produce a specific movement or set of movements. The smaller the change needed, the more efficient the movement. An inefficient action also typically reduces power output so from the standpoint of athletic performance the most basic equation in sports conditioning is as follows:

IMPROVE THE MOVEMENT POSTURE PROFILE

→ ENHANCE THE EFFICIENCY OF THE BODY

→ RAISE POWER

## A silent thief

What's even more significant about posture is that it may be responsible for more injuries and poor physical condition than any other cause. Bad posture steals from you in such small amounts that you don't notice it until the moment after the last vital protection is gone. This is the moment the tissue fails and the pain begins.

Posture is like a wave against a break wall. Any single collision won't achieve much but the scouring of the stones is testament to the fact that many thousands of them will eventually cause the wall to crumble and collapse. There are 168 hours in a week and that provides bad posture with more than enough of an opportunity to break the human body. The first priority for any athlete should be injury-free and the first concern for injury-free is posture.

## The principles of posture

As stated, posture is the shape provided to the body by the joints. What is less obvious is how the body creates a foundation stable enough to stand up let alone move. The human body is not a rigid structure. It is in fact mostly water. The stiffness or rigidity necessary to stand and move is provided by muscles and supporting connective tissues. Muscles are the control unit of the postural system.

**Posture = Using muscles to set joint position**

A healthy joint is stable and balanced. Stability means it isn't going to be subjected to motion and forces it isn't designed to tolerate. A balanced joint is one in which the tensions provided by the opposing muscles and tissues equalise so that the head of the moving bone sits correctly in the joint socket. This is termed the joints neutral position. Poor posture places a joint away from its neutral position and if it is held like this for too long, surrounding muscles may lengthen and weaken which unbalances the joint. An unbalanced joint is very likely to become unstable and impaired joint motion may lead to degeneration or injury of the surrounding soft tissues and muscles.

### **Pelvic posture**

When sitting or standing still (with parallel feet) the pelvis can move by tilting forwards (anterior rotation) or backwards (posterior rotation). The pelvis needs to be set so that there is neither too much forward rotation as this leads to excessive arching of the lower back nor too much rearward rotation. Too much anterior or too much posterior pelvic rotation stresses the lumbar spine. Excessive anterior rotation compresses the necessary gaps between posterior bodies of the vertebrae while excessive posterior rotation of the pelvis increases the gaps and can lead to disc bulges and strains of the extensor muscles. To avoid excessive joint motion and injury the lumbar spine has to move with the pelvis and not separately from it.

Anterior pelvic collapse often happens during pregnancy due to the weight of the baby and fluids. It also occurs when we sit for long periods. The solution involves gaining control of the motion and position of the pelvis and by strengthening and stabilising the core.

During movement the situation is more complex. The pelvis may now rotate about two different axes: the left-right axis (anterior-posterior tilting described above), and about an axis in which a rod passes front to back through the body. The instant we take the load off one leg and begin walking, the weight of the entire torso bears down one side of the body through the hip joint. The unsupported leg and hip have to be 'held up' and the pelvis must remain level. The problem is solved by bracing the hip joint and pelvic-lumbar complex prior to foot strike. For this to be effective, the hip joint must be strong and balanced. Deficits, such as weak external hip rotators or tight internal hip rotators, impair the motion of the femur and create gait abnormalities (e.g. inwardly collapsed knees). A strong and functionally stable core is also essential during body movement in order to stiffen the entire pelvic-lumbar complex.

### **Shoulder posture**

Poor shoulder posture involves changes to the position and motion of the shoulder blades. In the most common case, the shoulder blades are drawn outwards and slightly upwards lengthening and weakening the muscles (mid-lower traps) that stabilise against outward and upwards motion (of the shoulder blades). Chronically rounding the shoulders or preferentially strengthening anterior shoulder muscles (e.g. bench pressing) further worsens things due to the shortening of these muscles. The chronic effect on the shoulders of this imbalance can be profound: impingement of rotator cuff tendons, pain at the front of the shoulder, and irritation and pain in the thoracic spine and neck.

The most common cause of this problem is sitting for long periods at a desk. Sitting, of itself tends to collapse the shoulders because our chairs are not ergonomically designed to promote neutral setting of the thoracic spine and shoulders. Chairs tend to collapse our upper backs forwards and the shoulders follow, in turn. Added to this we reach to access devices and objects on our desks such as computers and reading and writing materials. It is highly advisable to take a break every few minutes to 'reset' the shape of the back and shoulders.

Overtime, the mid-lower traps become weak and the loss of strength and muscle memory for correctly setting the shoulder blades intensifies the downward postural spiral. To prevent or overcome the problem, the mid-lower traps need to be strengthened and tasks that employ the

shoulder blades in their in-and-down position need to be used regularly. Rowing is an excellent activity for restoring muscle memory in the mid-lower traps. Tight anterior shoulder muscles – pec major and minor – must be stretched daily.

### **Athletic posture – linking the shoulders, back, and hips/pelvis**

There are fundamental postural shapes and angles inherent in any sport but one characteristic is fundamental to them all: the relationship between the hips/pelvis and the shoulders. Protract the shoulders and your back will likely flex. Flex your back and the pelvis will very likely rotate posteriorly. The torso is a chain of structures, and a change in the position of one segment will affect the position of the next and so on. This is the most basic rule for athletic and mechanical efficiency.






In mover sports, such as football and rugby, the hips have to be loaded without becoming unstable while maintaining a neutral spine & shoulders. During running, the load experienced at the hip joints (typically several times body weight) is transmitted up the entire chain from the feet to the head. Each segment braces to support itself and in this way transmit the load efficiently. If a joint is not strong enough to maintain stability the segment instantly loses shape and places the next segment in an inefficient position. Inefficiency reduces the power output of the entire chain, and if the motion is repeated often enough tissue failure (injury) is a likely outcome.

The most common muscle deficits affecting athletic posture are weak hip stabilisers and poor pelvic motion control, and a weak and unstable core. These deficits severely restrict the power that can be safely developed, below, in the legs and, above, in the shoulders.




In swimming sports the critical posture is the streamline or aquatic line. This is the line from the hips through the lumbar spine to the thoracic spine (the spinal segment into which ribs attach). Ideally, the line is straight so that the hips and shoulder joints, in a neutral position, both sit parallel to the surface of the water. Weak positioning of the hips and pelvis, typically the result of a weak or unstable core, results in the legs falling. The inability to set the thoracic spine effects the entry position and line of pull of the hands and arms.

For swimmers, strength conditioning should be primarily focused on improving the capacity of the body to extend the shoulders (thoracic extension) without a compensatory change in the position of the pelvis and hips (from neutral). This requires considerable core strength and the coordination of a lot of muscle. The benefit of a great streamline is high mechanical efficiency in training, which drives the development of work capacity, and a reduced injury-risk profile. The biggest threat to swimmers is long periods of sitting and poor thoracic posture generally.

### **Summary**

-  Great posture improves power output and reduces the risk of an injury
-  Avoid sitting for too long in chairs - understand what this does to your shoulders and spine
-  A muscle balance and posture assessment is needed to identify weak postural muscles
-  Develop very strong hip stabilisers, a strong and stable core, and strong mid-lower traps
-  Stretch fatigued muscles after exercise

*RELATED ROUTINES/READING:*

-  Long-term athlete development
-  Core strengthening
-  Static stretches