



## 17 Core Stability for Dancers

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### What is core stability?

Simply put, 'core stability' is the ability of an individual to maintain control of the centre of the body whilst moving. It requires a mix of co-ordination, control, body awareness and strength. It is the ability to hold the body steady and maintain balance whilst performing complex movements and results in an underlying smoothness and appearance of effortless. If a dancer's core stability is poor they may have difficulty in maintaining good posture or dynamic alignment during small or large movements. They may also develop excessive tension elsewhere – this is often in the hip flexors (front thigh muscles) or neck and shoulders. They might also hold their breath while dancing. Good core stability will enable a dancer to move smoothly and efficiently and will minimise the risk of injury throughout the body. It should be emphasised that improving core stability is all about improving control, which is not the same as improving strength.

Other disciplines such as Pilates or yoga can be used to improve body and spatial awareness, and thus improve core stability. Traditional Pilates teachers may talk about the 'powerhouse,' and dance teachers often instruct dancers to 'pull up,' or to 'work their abdominals', though actually this often encourages too much rigidity, and the focus should be less on the actual muscles working and more on how the movement feels – smooth movement and balance of the whole body is desired.

Core stability concepts came out of physiotherapy research on back pain in the 1990's. Our understanding of it has changed a lot since then and continues to evolve. In short, the core muscles tend to be the deeper, more invisible muscles of the torso. They are difficult to feel in isolation, as they are designed to function as a team, and the best measure of how well they are working is how smoothly a movement of any body part can be performed.

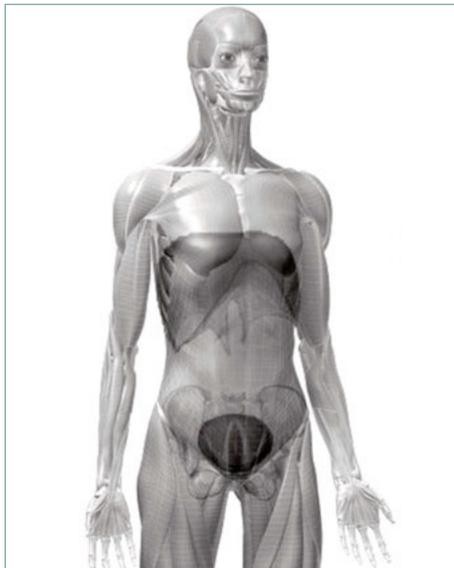
### About the core muscles

The core itself can be thought of as a cylinder (Figure 1); the wall of the cylinder comprises of a corset of abdominal muscles – the Rectus Abdominis (RA), the External and Internal Obliques (EO, IO) and the Transversus Abdominis (TA) – and the deep spinal muscles such as Multifidus (MF). The bottom of the cylinder is formed by the muscles of the pelvic floor and the top is formed by the diaphragm; the main muscle used when breathing. The core is the key link to the pelvic and shoulder girdle

and therefore bears influence on movements in both the upper and lower portions of the body.

Whilst it is theoretically possible to work the core muscles in isolation, the key function of these muscles is to work together. It is the balance of how much each muscle contributes to overall stability that can dictate the shape and 'look' of the abdominal area. A dancer who only concentrates exercises on a single part of the core can significantly reduce the core's efficiency of support. For example, a dancer that only uses abdominal curls (half sit ups) can narrow the area between the lower ribs, giving it a 'square' look, creating a horizontal line pulled in above the umbilicus (belly button) that leaves the lower abdominal area looking under toned and 'pouching' out.

It is important for dancers not to hold their breath during exercises that require secure and stable centres. Breath holding means that the diaphragm muscle has to do a disproportionate amount of the support work for the centre of the body, (this support is then immediately lost when breathing starts again). Also, during the breath hold, other muscles of the core all contract at once and do not get exercised as they should. Choosing a breath hold strategy is a common mistake, and can replace 'stability' with 'rigidity' – this can place a huge strain on the pelvic floor musculature, and also reduce the dancer's ability to perform flowing styles of movement, in addition to increasing the overall appearance of tension.



**Figure 1:** The central cylinder consisting of the diaphragm, corset of abdominal wall, pelvic floor

### Concepts about the core

Our understanding of the concept of core stability, both as medical professionals and as dancers is still growing. The more we understand the core, the more apparent the amazing and intricate interplay of these muscles becomes. Distinctions between different actions of the individual muscles are becoming less and less relevant as it becomes clearer that none of the muscles work in isolation. For example, all of the core muscles mentioned above play a role in the simple movement of breathing in and out, in addition to the roles they collectively play in balancing and helping control flexion, extension and rotation of the body. The core muscles also have a more subtle postural function – they send information about the position of the body not only to the spinal cord, which triggers balance reflexes but also to the brain; and the brain reacts by sending even more precise instructions back down to the muscles.

It is crucial to understand that the core muscles do not just have one task. The TA alone, for example, is now understood to have at least six distinct functional segments, each doing different things at different times. On either side of the body, the upper fibres of TA assist with rotation of the torso in one direction, whilst the lower fibres assist with rotation in the opposite direction; the middle fibres are involved in controlling tension in the thoraco-lumbar fascia, whilst the lower fibres play an important role in compressing the sacro-iliac joints in the pelvis, all this without even touching on the upper and lower fibres interplay in assisting breathing control.

Core stability is a skill based concept, it has very little to do with strength. The most common misconception in core stability is that the stronger the abdominal muscles become the better the core stability will be. This is simply not true. Strength and control are completely different things. It doesn't take strength to walk a tightrope or perform a good pirouette, but it does take exceptional stability, control and coordination. The control and interplay of all the muscles in this area happens at a subconscious and reflexive level, so, the best way to train better control is simply by moving; picking out individual muscles to strengthen won't help nearly as much.

## How much effort is required to stabilise the core?

The best answer is 'just enough,' usually this is effort up to about 25% of maximum voluntary contraction (MVC) for postural loads (moving your own limbs, or trunk). Engage your abdominals as hard as you can (100% effort), halve it (50% effort) and halve it again (25% effort) – quite gentle, isn't it! Faster movements or higher loads will need greater than 25% MVC to stabilise the load.

A body with good core stability will be ready to respond automatically to movement and will be less prone to potentially injurious loads or movements. With poor core stability a body will be less likely to respond appropriately with a correct supportive strategy and so will be more susceptible to injury.

It is worth bearing in mind that it is not normal to be able to 'feel' the core muscles working when they are doing their job properly, they are wired up to the brain in a different way from the movement producing muscles such as the quadriceps and hamstrings found in the thigh. It is better to focus simply on the quality of your movement as a measure of the core function, as if you try to feel them working, you're probably overdoing it and tending towards rigidity.

## The Pelvic Floor

The pelvic floor can be useful to carefully engage, as gently pulling up the pelvic floor assists with stabilising the pelvis and lower abdomen and spine. The pelvic floor is at the bottom of the core group of muscles and can allow a dancer to remain relaxed in the diaphragm area so breathing can continue. Though less common, having a tight pelvic floor can be as much of a problem for athletic women as having a pelvic floor that is not engaged enough. The best way to deal with this is to remember that the pelvic floor is an equal partner in core stability. If you are a breath holder you can seriously overload the pelvic floor, resulting in serious problems with bladder control (and erectile dysfunction for males). If you feel a weakness in this area think of gently engaging the pelvic floor (remember the 25% rule) but don't overdo it.

## Core stability exercises

For dancers in particular, Pilates remains one of the best methods of improving core stability.

Exercising the core muscles as an integrated group of muscles should be divided into exercises that are done at or below 25% MVC. This is aimed mainly at improving the brain's efficiency of turning the core muscles on. Exercises above 25% MVC are aimed at increasing strength, however this is not necessarily part of improving core stability.

Initially exercises should be very simple, and focus simply on trying to keep one area of the body relatively still, whilst moving another, ideally whilst in a supported position such as lying down. As exercises progress the focus should be on increasing the challenge in terms of coordination and balance, and coming up into less supported positions, kneeling, standing at the barre, and onto free standing, then more dynamic sequences.

Exercises should address movement and forces in all directions; flexion, extension and rotation type movements. It is recommended that you obtain advice and supervision from a chartered physiotherapist.

### FURTHER READING:

#### **Pilates for Life**

by Darcey Bussell

Publisher: Michael Joseph, 2005

#### **The Pilates Body**

By Brook Siler

Publisher: Braodway Books, 2000

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