

# THE ROLE OF PILATES IN LUMBAR SPINE INSTABILITY TRAINING

Glenn Withers, founder of the Australian Physiotherapy and Pilates Institute (APPI), explains how his methods can help populations with lower back pain

Over 65% of the clients that present to my practices are reporting low back pain (LBP) and one of the reasons Pilates has become so popular is its perceived ability to help.

The recurrence of LBP is most widely attributed to the nature of "instability", which is often debated as a cause due to its challenges in diagnosis.

In the instance of clinical instability, the treatment of choice is specific rehabilitation of the segmental spinal muscles that attach directly to the spinal segment/s that are moving too much. Hides<sup>1</sup> showed that by activating the local multifidus muscle of the lumbar spine, in co-activation with the transverses abdominus muscle, the recurrence rate of acute back pain 12-month post specific rehabilitation was reduced by as much as 50%.

However, more recent studies have suggested that this static stabilisation approach is not as effective as once thought.<sup>2</sup> Indeed, these recent reviews are advocating a more well-rounded rehabilitation programme that takes into account the many aspects of LBP that affect individuals. It is now widely accepted that rehabilitation programmes for LBP should also encompass the emotional and functional effects of pain in addition to the mechanical pain.<sup>3</sup>

The conclusions of studies into LBP rehabilitation conducted over the past ten years are advocating a rehabilitation approach that restores normal movement as well as emotional and functional well being. This approach leads us back to the popularity of the Pilates method.

Joseph Pilates developed his own set of exercises designed to improve strength and posture. His exercises focused on the development of a strong "central core" of abdominal muscles to enable more efficient movement.<sup>4</sup> Pilates believed that injuries were caused by imbalances in the body and habitual patterns of movement. He observed that when a person had a weak or malaligned area, they overcompensated, or overdeveloped another area to achieve a certain functional movement. He developed three primary objectives for his exercises:

1. The correction of malaligned movement
2. Movement re-education
3. The prevention of injury recurrence<sup>5</sup>

However, despite common objectives, there are limitations

to the application of traditional Pilates in the management of LBP. For example, several traditional Pilates exercises involve long lever movements with the spine in high degrees of lumbar and cervical flexion.

At a scientific level, increased lever length is known to place increased pressure on the spine.<sup>6</sup> Therefore, the founders of the APPI Method have deemed these selective traditional movements too stressful on the spine when being used in the clinical management of LBP.

The above example highlights the limitations of applying traditional Pilates to the LBP population. However, there are many Pilates objectives and movements that are ideal for managing LBP once modified according to known scientific and research principles.

## THE APPI METHOD

A widely-used modified Pilates approach comes from the Australian Physiotherapy and Pilates Institute (APPI). The APPI Pilates Method was developed by analysing each of the 34 traditional movements and breaking each one down into four or six levels suitable for the LBP clinical population. Analysis was based on spinal stabilisation, biomechanical and anatomical research. Through this analysis, the APPI also felt that several of the traditional movements were inappropriate for the LBP population (see right).

In these pictures you can see that the spine is placed in an extreme degree of flexion,

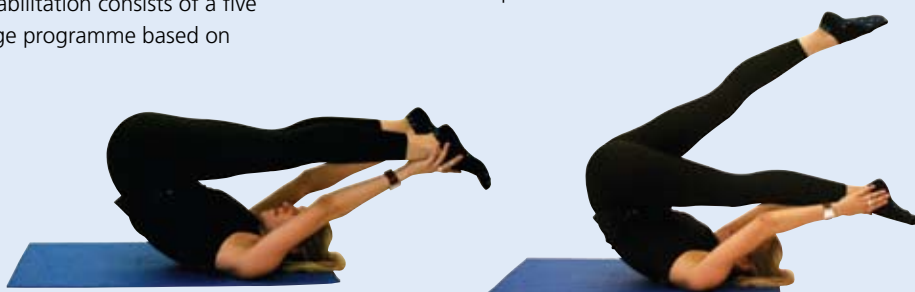
with full bodyweight and gravity being loaded through the cervical spine with the lumbar spine in full loaded flexion. These end-range positions and extreme loads to the spinal discs are some of the most common precursors to a spinal disc injury.

The APPI method to LBP rehabilitation consists of a five stage programme based on

pain, pathology and function. Importantly, the end goal is functional restoration. Along each of the five stages, a client is given an exercise that replicates their functional goal. This exercise is initially performed in non-weight bearing positions and gradually progressed to weight bearing and more functional positions

based on the client's ability to maintain their "neutral spinal position". In addition, the core of the APPI method is a focus on clinical reasoning of each and every exercise.

To illustrate the role of APPI Pilates in rehabilitation amongst the LBP population, consider the common



presentation of a middle-aged client reporting low grade backache that is exacerbated by running on a treadmill. On examination, this presentation will lack the required hip extension needed to “push off” effectively and then compensate by hyperextending or “hinging” in the lumbar spine.

This “hinging” movement is seen as a form of “instability” whereby the motion of this

“hinge” or “shear” can gradually wear away at the discs in the lower back. If the client can learn to stabilise the lumbar spine by correctly activating the muscles that directly attach to the motion segment in question, then they will be more likely to regain the independent hip extension needed to run pain free.

In applying this common complaint to the APPI five-

stage programme (below) we can start to ensure a full functional recovery.

**Step 1:** Activation of the centre: Here the client is unloaded so gravity is not affecting the load on the spine. The client is taught to activate the lower abdominals, in association with the multifidus, pelvic floor and diaphragm<sup>7</sup>. It is important to note here that in the APPI

Method the client is asked to think of activating only one of these muscles, not to activate one and then the other as is common in Pilates teaching. This is based on the findings of Sapsford et al. 2001<sup>8</sup> who showed that activation of the pubococcygeus and TrA occurs in co-activation at the required sub-maximal level for tonic retraining of the postural fibres required for stability.

**ONE-LEG STRETCH, LEVEL ONE**

**Step 2:** Closed-chain progression: The client is challenged by controlling the centre as a closed-chain lever is added. The exercise one leg stretch is chosen here as it specifically replicates the muscle memory required for the walking and running motion.



**SCISSORS, LEVEL ONE**

**Step 3:** Open chain progression: The client is now progressed to an open chain movement, whereby the weight of the leg is added to the challenge of stabilising the lumbar spine. Here the scissors level one movement is chosen as it replicates the challenges of the walking or running motion.



**SHOULDER BRIDGE, LEVEL ONE**

**Step 4:** Spinal Articulation: In this stage the spine is moved to ensure that synergy between the local muscles (those that attach to and stabilise the spine) and the global muscles (those that move the spine and extremities) is retrained. This synergy is vital as this is how the body functions normally in everyday activities. Shoulder bridge level one is selected as this movement requires the gluteal muscle activation to generate a relative hip extension moment (therefore, helping to retrain the primary problem that was initially at fault) as well as control segmental spinal movement. It is important to note that the APPI adaptation of the shoulder bridge movement is different from traditional Pilates. The APPI adaption of this exercise focuses on the initial gluteal activation to commence the hip extension movement rather than a pure

focus on the hamstring muscles. This is to avoid the client incorrectly either over-recruiting the hamstring muscles or reinforcing poor timing of activation between the gluteals and hamstring muscle groups, which can cause a major imbalance that is commonly seen in LBP.

**Step 5:** Function: In this stage, the principles of the previous four stages are applied to any functional movement that the therapist sees fit. This final stage is not Pilates-specific, but sport, or function-specific. In the example of running, a lunge squat may be used to teach the lower limb biomechanics of loading from one limb to the other, while encouraging the hip extension required to run pain free. Importantly, in this stage the client is weight bearing, as this is required for the functional task.



Pilates enjoys worldwide popularity and is an achievable exercise method for a variety of populations. In using Pilates in the treatment of lumbar instability, it is important to ensure that the relevant research is applied to the movements and the effects of pain acknowledged in the rehabilitation phase. The application of Pilates in the low back pain population requires ongoing assessment, monitoring and adaption of the

movements and their responses to ensure that the best outcomes are achieved.<sup>fn</sup>  
www.fitpro.com/references

**GLENN WITHERS**

Glenn Withers is the founder of the Australian Physiotherapy & Pilates Institute, director of Pilates Art Physiotherapy and London Sports Medicine Centres.  
www.ausphysio.com