



REHABILITATION AND CORE STABILITY

# Pilates and the “powerhouse” — I

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## KEYWORDS

Pilates;  
Powerhouse;  
Core-stabilization;  
Contrology;  
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**Abstract** The Pilates method is a comprehensive body-conditioning method that is directed toward the development of both the body and the mind of the individual. Toward this end, the Pilates method incorporates six key principles: centering, concentration, control, precision, breath, and flow. The purpose of this paper is to investigate the underlying biomechanical foundation of the principle of “centering”. The principle of centering refers to the concept that all movements of the human body emanate from the center or core or what Joseph Pilates called the *powerhouse* of the body. The Pilates method endeavors to strengthen the powerhouse as one of its primary goals. In effect, strengthening the powerhouse is core-stabilization. Part one of this article investigates what the boundaries and components of the powerhouse are as well as the muscle groups that effect movements of the powerhouse. It then explores the three major effects that Pilates exercises have upon the health and integrity of the powerhouse: (1) its effect upon pelvic posture, (2) its effect of lengthening the spine, and (3) its effect upon the structural integrity or tone of the abdominopelvic cavity. The sum total of these effects is to create what may be termed the *Pilates Powerhouse Posture*. Part two will then illustrate various Pilates exercises and describe their effects upon the powerhouse.

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## Introduction

The Pilates Method of body conditioning was developed by Joseph H. Pilates. Joseph Pilates began to develop his system of body conditioning during the First World War (Siler, 2000) and continued to enhance and refine this system over the next 50 years until his death in 1967. All told, the Pilates system of body conditioning contains over 500 stretching and strengthening exercises. These exercises may be divided into two broad categories: mat and apparatus exercises. The first exercises developed by Joseph Pilates were mat

exercises, which as the name implies are done on a mat on the floor. Pilates next created a number of apparatuses that require one to exercise against resistance, the resistance being provided by the use of springs and pulleys.

Upon creation of his method of body conditioning, Pilates named it “The Art of Contrology”. Inherent in this name is Pilates’ belief that it should be the goal of a healthy person to attain a strong mind and use it to gain total mastery or control over his/her physical body. Therefore, the Pilates Method as advocated by Joseph Pilates is more than just a physical regimen for the body; it is also a balanced regimen for strengthening and conditioning the mind as well (Gallagher and Kryzanowska, 2000; Pilates, 1945).

Pilates felt that modern society had robbed us of our natural physical and mental vitality. He noted that with the advent of civilization and sedentary

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indoor living, our activities have failed to exercise the body in ways that are structured and balanced. Additionally he observed that our compensatory efforts via hobbies, activities and recreation, are all too often performed in ways that are unbalanced and ineffective at truly encouraging good control of the body (Gallagher and Kryzanowska, 2000; Pilates, 1945; Siler, 2000).

## Key principles of Pilates

For this reason, Pilates developed a comprehensive method of stretching and strengthening exercises that together aim to create a strong and limber body as well as a strong will of mind that can control the body. Certainly, any method as comprehensive and diverse as Pilates will have many core principles. This is true for the Pilates Method, which may be said to have six key principles (Liekens, 1997). They are: centering, concentration, control, precision, breath, and flow.

1. Centering is considered to be the main focus point of the Pilates Method. The “center” refers to the center or core of the body and is usually known as the “powerhouse”.
2. Concentration is important in that it is the mind that guides the body; hence focused concentration is necessary when carrying out Pilates exercises.
3. Control refers to the fact that when the work of an exercise is being done from the center with concentration, you will be in control of the movements performed.
4. Precision refers to the precision Joseph Pilates employed in developing each exercise and the precision with each exercise should be carried out. A common saying in the world of Pilates that illustrates this is: “It is not how many, but how”.
5. Breath is of utmost importance because all exercises should be done with a rhythm to the breathing for the purpose of obtaining optimal circulation of oxygenated blood to all tissues of the body.
6. And finally, flow refers to the graceful and flowing succession of one exercise to another during a Pilates session.

It is not within the scope of this article to try to exhaustively cover every one of these six key principles. Instead, this article narrows its focus in on the concept of Centering. More specifically, the relationship between the Pilates Method and the effect that it has upon strengthening what is called the *powerhouse* is investigated. Then

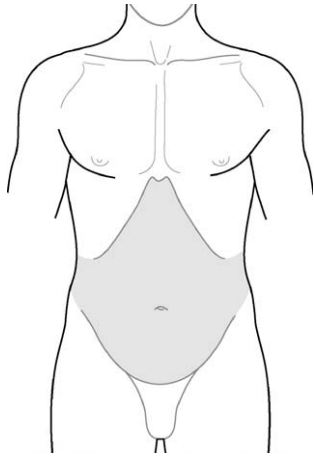
implications that a strong powerhouse has for the healthy structure and function of the human body are explored.

## Centering and the powerhouse

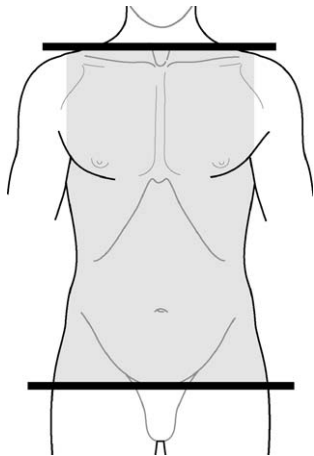
Perhaps the major tenet of the Pilates method is the concept of centering. While Joseph Pilates believed that all muscles of the body should be strengthened and stretched (Gallagher and Kryzanowska, 2000; Pilates, 1945), he felt that the major emphasis should be placed upon the muscles of the center, or core, of the body (Selby, 2002; Siler, 2000; Winsor, 1999). He referred to this region as the *powerhouse* of the body. Joseph Pilates himself never set down in writing what the exact parameters of the powerhouse were and there does not seem to be exact agreement amongst the master teachers of Pilates today.

It is worth mentioning that after the death of Joseph Pilates, his student and disciple, Romana Kryzanowska, was chosen by Clara Pilates to carry on the artistic interpretation and dissemination of the Pilates Method (Siler, 2000). Meanwhile, the archival material and trademark of the name Pilates became the property of Sean Gallagher, P.T. In a recent legal decision, the ability to trademark the name Pilates, and consequently the sole right of certification of Pilates instructors was lost. This means that there is no longer one certifying or governing body that determines exactly what the Pilates Method is or is not. As a result, the practice and method of Pilates, along with the underlying biomechanical basis, has been diverging greatly in recent years. There are now many techniques within the Pilates world, some adhering strictly to the system of exercises developed by Joseph Pilates, and others that are incorporating changes into this system. This article tries to address the biomechanical basis of the original Pilates method as far as is possible.

When most strictly defined, the powerhouse is said to be the “...center of the body. It is the exact point between the upper half of your body and the lower half of your body, between the right side and the left side” (Winsor, 1999, p. 30). Others have defined it as a 6-inch band that runs around the entire body and is located just inferior to the navel. However, many in the Pilates world view the powerhouse more broadly and define it as ranging from the pelvic floor inferiorly to the ribcage superiorly (Winsor, 1999) (see Fig. 1). Another term that is of importance to the subject of centering is the *box* (Liekens, 1997). The box is defined by two horizontal lines: one running from the top of one



**Figure 1** The powerhouse: The *powerhouse* in Pilates is usually defined as extending from the pelvic floor inferiorly to the ribcage superiorly. Effectively, the powerhouse is the center of the body.



**Figure 2** The box: The *box* is defined by two horizontal lines; one running from the top of one shoulder to the top of the other shoulder, and the second line running from one hip joint to the other hip joint, i.e., the box encompasses the entire pelvis and trunk. Just as the powerhouse is defined as being the center of the human body, the box is a more broadly defined center of the body.

shoulder to the top of the other shoulder, and the second line running from one hip joint to the other hip joint (Liekens, 1997) (see Fig. 2). In effect, the box incorporates the entire trunk and pelvis as a whole. The concept of centering may be broadened beyond the powerhouse to include the rest of the trunk and when this is done, the box becomes the center in that the box is a broader center of the human body. Thus the concept of centering refers to strengthening the center of the body. For the purpose of this article, the core powerhouse is defined as ranging from the pelvic floor to the

ribcage. However, this will have an effect upon, and will incorporate to some degree, the larger center known as the box. What is clear and universally accepted within the world of Pilates is that the powerhouse is thought of as the core of the body from which the power and strength of the body is derived (Winsor, 1999). In other words, the powerhouse is the core center of the body from which peripheral muscle actions are carried out.

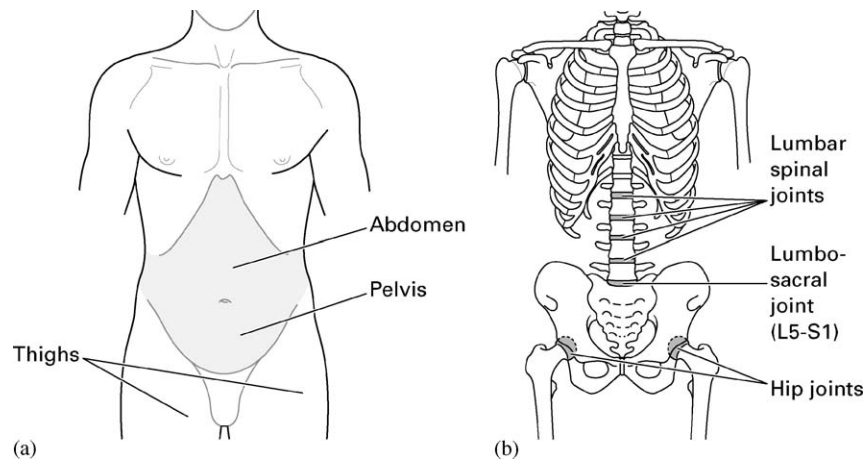
The concept of centering is to create not only a strong structural powerhouse, but also a flexible one. Indeed, Joseph Pilates used to have the following maxim on his business card: “A man is only as old as his spine is inflexible”. With a core center to the body that is strong and flexible, Pilates asserted that the integrity of functioning would be improved. That is, the ability to move and function throughout the activities of daily life would be optimized (Pilates, 1945; Siler, 2000). The Pilates method of body conditioning does not aim to bulk a person’s musculature; it aims to strengthen and lengthen a person’s posture and musculature (Gallagher and Kryzanowska, 2000; Pilates, 1945; Selby, 2002; Siler, 2000).

## Components of the powerhouse

Using this expanded concept of the powerhouse that reaches from the pelvic floor to the ribcage, it can be seen that the body parts that are contained within the powerhouse are the pelvis and the abdomen; the abdomen being defined as the anterior abdomen as well as the posterior abdomen, i.e., the lower back. The joints that are involved with the powerhouse are the lumbar spinal joints, including the lumbosacral joint between the lumbar spine and the pelvis, and the hip joints (femoroacetabular joints) between the pelvis and the thighs (see Fig. 3). The muscles of the powerhouse are the major muscles and muscle groups that are located within this region; of particular importance to the purpose of this article will be the muscles and muscle groups that move the body within the sagittal plane.

Taking a closer look at the muscles of the powerhouse, they may be divided into the following five major groups (see Fig. 4):

- Anterior abdominals (also known as spinal flexors). These muscles include the rectus abdominis, external abdominal oblique, internal abdominal oblique and the transversus abdominis.
- Posterior abdominals (also known as spinal extensors or low back muscles). These muscles



**Figure 3** (a) Components of the *powerhouse*: The *powerhouse* contains the pelvis and the abdomen. (b) The joints within the abdomen are the lumbar spinal joints. The pelvis is a body part that is bounded by the lumbosacral joint superiorly and the hip joints inferiorly.

include the erector spinae group and the transversospinalis group, as well as the quadratus lumborum.

- Hip extensors. These muscles include the gluteus maximus and may also include the hamstrings and the posterior head of the adductor magnus.
- Hip flexors. These muscles include the iliopsoas, rectus femoris, sartorius, tensor fasciae latae and the more anterior adductors of the thigh at the hip joint.
- Pelvic floor musculature (also known as perineal muscles). These muscles include the levator ani, coccygeus, superficial and deep transverse perineals and others.

Given the structural components of the powerhouse, it can be stated that the principal tenet of working the powerhouse will be to affect the muscles and joints of the pelvis and lumbar spine; the thrust being to not only affect the static posture of this region, but also to affect the dynamic strength and flexibility of this region as well.

### Effects of working the powerhouse

The Pilates method of body conditioning may be generalized to have three major effects upon the powerhouse. First, Pilates affects the posture of the pelvis, which results in postural changes to the lumbar spine. Second, it works directly upon the musculoskeletal structure of the spine (the lumbar spine in particular) by strengthening, stretching, and lengthening the spine. Third, Pilates affects the structural integrity or tone of the abdomino-pelvic cavity as a whole.

### The neutral pelvis and its effect upon the spine

It is often said that the pelvis is the keystone of the skeletal structure of our body. Examining the structural and functional considerations of the pelvis, it is seen that the pelvis is a body part that is located between the trunk and the thighs. When the pelvis moves, it may move relative to the trunk at the lumbosacral joint and/or it may move relative to the thigh(s) at the hip joint(s) (see Fig. 5). Muscles that attach from the trunk to the pelvis move the pelvis at the lumbosacral joint; muscles that attach from the lower extremity to the pelvis move the pelvis at the hip joint(s). A primary concern involves pelvic sagittal plane movements and the resultant sagittal plane effects on the spine. Unfortunately, there are a plethora of terms used to describe the movements of the pelvis. Probably the most common terminology for sagittal plane pelvic movements and the one that will be used in the article is posterior tilt and anterior tilt of the pelvis (see Fig. 6).

The posture of the pelvis largely determines the posture of the spine. The spine sits upon the base of the sacrum; therefore, any change in the sagittal posture of the pelvis will change the level of the base of the sacrum. The level of the base of the sacrum will then affect the curve of the lumbar spine. For example, if the base of the sacrum were level, the spine would be totally straight. However, once the base of the sacrum is unlevel to any degree, the spine must have a curve in it to compensate. This curve is necessary to eventually create a level base for the head to sit upon. This righting mechanism to create a level base for the head is necessary to place the eyes and the

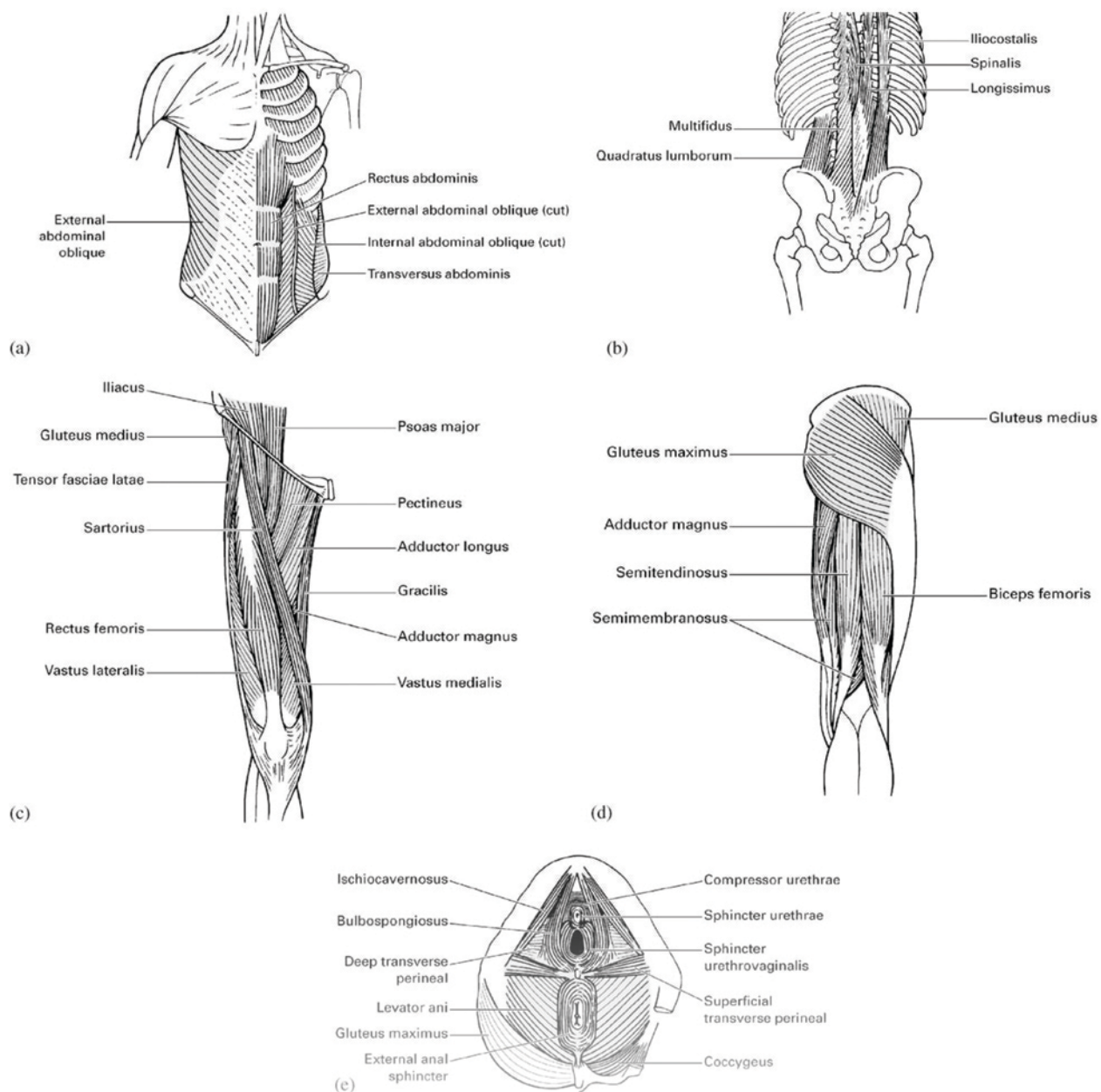


Figure 4 The major muscle groups of the *powerhouse*: The five major muscle groups of the *powerhouse* are the anterior abdominals (a), posterior abdominals, i.e., low back muscles (see b), hip flexors (c), hip extensors (d), and the pelvic floor muscles (e).

labyrinthine receptors of the inner ear on a level plane, this being necessary for proper static and dynamic proprioception of our body.

two lines: a horizontal level line and a line along the top of the base of the sacrum; and then measuring the angle that is formed by the inter-

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