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The pelvis's role in supporting string playing is an under-researched topic in the professional upper string playing world. Violinists' and violists' injuries often present themselves in the neck, shoulders, arms, and fingers. However, based on what many medical and physical disciplines and studies know about the spine, singling out one area of the spine while ignoring another only treats the symptoms and often ignores the underlying problem. Professional upper string players, unlike other instrumental families, are unique for two reasons: they often start at a comparatively young age and play standing up. Only when upper string players enter the professional world, do they begin sitting for many hours of work during the day. Knowing how important the pelvis is to postural health in a seated position, I posit that many upper string players' injuries result from a lack of understanding of how to sit properly while playing and could originate in the pelvis. Using the elements of two well-known physical disciplines, the Alexander Technique and the Pilates Method, I believe the upper string player can develop the muscles and body awareness needed to sit with ease, in alignment, throughout their professional careers. By including the pelvis in the discussion of how players support themselves when sitting, I hope that upper string players' pain in all parts of the spine will be alleviated.

EXPLORING THE ROLE OF THE PELVIS IN THE SEATED
POSTURE OF UPPER STRING PLAYERS

by

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Approved by

Scott Rawls
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To Tony and Oliver, the dog
For giving me endless support, love, and snuggles

APPROVAL PAGE

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CHAPTER I

INTRODUCTION

While more and more music schools and conservatories are developing curriculum emphasizing self-care, upper string players are still entering their careers with a lack of understanding about the potential for injury in their field. Many work-related injuries do not present themselves until later in their career. By then, after years of playing, bad habits become harder and harder to correct. Self-care for upper string players should be taught alongside etudes and scale materials.

Due to the high physical demands of their work, upper string players have the potential to develop a multitude of injuries. Violinists and violists often suffer from conditions in the jaw, neck, shoulders, arms, elbow, wrists, and fingers.¹ Because upper string players often sit for long periods of time, their backs often become sore and fatigued. The *Medical Problems of Performing Artists* (MPPA) journal has many articles addressing the injuries and pain that befall upper string players.

Because of the profound difficulty of playing the violin and viola, professional upper string players frequently start learning their instruments at a very young age. Beginning lessons emphasize posture and technique, but they are often taught with games and metaphors, and the child absorbs the information slowly and instinctively over many years. By the time that the average professionally bound upper string player enters

¹ Moraes Souza, Geraldo Fabiano de, and Adriana Papini Antunes, "Musculoskeletal Disorders in Professional Violinists and Violists," *Acta Ortopédica Brasileira* 20 (2012): 43.

college, her technique is highly developed, and her postural habits ingrained in her body after years and years of playing.

Another unique feature of learning an upper stringed instrument is that the student learns standing up. Cellists and pianists, the two other instruments that are typically started at a younger age, learn while seated and continue into their careers in a seated position. However, young violinists and violists rarely sit to play. Many schools and cities do not offer youth orchestras until high school, and by the time an upper string player sits in any organized way to play, she has been playing with her own unique posture and technique in a standing position from anywhere between four and eight years, depending on when she started.

A typical professionally bound upper string player will continue private lessons, where she stands, through college and graduate degree programs. Lessons may or may not continue when a violinist or violist embarks on his or her professional career. Upper string players have many options for their performing careers: chamber music ensembles, professional orchestras, or a freelancing career, where they can do a number of different types of performing. What the majority of these career paths have in common is that they are all executed sitting down. While violinists and violists have spent each private lesson adjusting their technique and learning about posture in a standing position, when they start their careers they rarely stand up to play professionally again.

I believe this stark contrast in how upper string players learn to play (standing) and then spend their entire careers (sitting) is the major contributing factor to why upper string players have so many injuries. When upper string players stand, the pelvis can

more easily move and adjust. It is naturally incorporated into the upper string player's understanding of posture. As soon as she sits, however, the pelvis becomes "stuck." Freedom of movement is impaired, and injuries can result. Many other playing factors contribute to injuries. "The repetition, hours of exposure, and awkward postures associated with playing instruments often result in playing-related musculoskeletal disorders."² These injuries often occur in the upper body. Many studies show musculoskeletal problems occurring in the neck, shoulders, right elbow and hand, and in the left fingers.

The MPPA journal does an excellent job in presenting research that identifies these injuries and presents many studies whose research offer ways to alleviate the symptoms of these injuries. However, much is lacking in this research. One issue is the failure to understand the length and breadth of the pedagogical background of the upper string player. While a professional upper string player has essentially trained her whole life to reach a high level of playing, by sitting for the majority of her career, she is required to play a different game than the one she prepared for, and with a huge handicap. While it is unknown whether the rate of injury would stay the same if upper string players could perform their careers standing up versus sitting down, one must look at the unusual transition upper string players are forced to make from professional studies to professional careers and question whether or not the high rate of injury is related.

² Irina Foxman and Barbara J. Burgel, "Musician Health and Safety: Preventing Playing-related Musculoskeletal Disorders," *Workplace Health and Safety: Promoting Environments Conducive to Well-Being and Productivity* 54 (July 2006): 309.

Secondly, the research focuses on one area of the spine, the upper spine. From what many physical disciplines teach us about the spine, it is rare, if not impossible, to find issues in only one area. Joseph Pilates, founder of the Pilates Method, believed that if the pelvis was misaligned, it caused inefficient movement and muscular imbalances on the entire structure of the body.³ Frederick Mathias Alexander, developer of the Alexander Technique, noted regarding his own struggle with regaining his voice: “the misuse he had noticed was not just of specific parts but of his whole being.”⁴ Other research says the same. Moshe Feldenkrais of the Feldenkrais Method believed that pain was always a sign of some sort of disorganization in the body.⁵ Despite this knowledge and research that has been around for nearly one hundred years, the MPPA journal and other scientific and movement journals still restrict research imaging and treatment to the upper spine.

My research led me to focus on the pelvis because of the vital role it plays in seated posture. The pelvis steers the spinal orientation in our posture more when we sit, compared to when we stand.⁶ The Pilates Method, the Alexander Technique, Feldenkrais, and Yoga reference the pelvis in detail and also discuss its importance in postural health. All of these disciplines discuss the pelvis as a part of the spine. If a disorganization or misuse happens in the pelvis, the same disorganization and misuse happens in the whole

³ Rael Isacowitz, *Pilates* (Illinois: Human Kinetics, 2006), 17.

⁴ Richard Brennan, *Alexander Technique: A Practical Introduction* (Boston: Element, 1998), 8.

⁵ Mary Spire, “Performer’s Perspective: The Feldenkrais Method: An Interview with Anat Baniel,” *Medical Problems of Performing Artists*, 4 no. 4 (December 1989): 161.

⁶ Kurt Claeys, Simon Brumagne and Jan Declerck, “Sagittal evaluation of usual standing and sitting spinal posture,” *Journal of Bodywork and Movement Therapies*, 20, no. 2 (April 2016): 332.

spine, including the neck. The opposite statement is true as well: what happens in the neck will have rippling effects throughout the whole spine and pelvis.

While the pelvis is included in the discussion of the function of the spine for healthy posture in these modalities, it has been neglected in more formal string research areas, with a segmented and individual focus on the back, neck and shoulders. Teachers and pedagogues continue to talk about posture in string journals and magazines, in particular the journal *Medical Problems of Performing Artists* (MPPA), and in presentations at string conferences like the American String Teacher's Association (ASTA). However, the pelvis is under-researched and under-represented in these mediums and is an integral part of the posture discussion.

My own experience in the fitness industry over my professional career as a violist reinforces what I know and have learned about the pelvis and spine. I attribute my injury-free career to my exposure to many of the disciplines listed above and to years of observing and exploring my own alignment. Throughout my formal music education, I have taken semester-long courses in The Alexander Technique, Feldenkrais, and Body Mapping. In my personal life, I have been a student of Yoga and Ortho-bionomy (a gentle, non-invasive, system of healing that allows the body to correct itself), and I have been a client of the classical Pilates method for sixteen years, becoming a certified Pilates Instructor after a vigorous 600-hour apprenticeship program completed in 2015. I have been teaching regularly since my certification as a Certified Pilates Instructor and have recently taken an eight-hour course on the pelvis and spine in Ortho-bionomy.

While there are many experts in these fields who have spent their careers researching and practicing these subjects, there are few if any professional, performing violists whose career has spanned the same experience and practice in many of these fields of body awareness. There is so much knowledge available to help upper string players, but I still see colleagues whose careers are interrupted or ended due to injury. I want to open up the discussion of posture to include the pelvis, whose potential role in solving these injuries is under-researched and unexplored.

In the following chapters, I will discuss the pelvis, the connection and role that the pelvis and spine play in a seated posture, and how the potential instabilities of the pelvis can be exaggerated by playing an upper stringed instrument. Because of my own experience in Pilates, I will also focus my research to elaborate more on how Joseph Pilates and the Pilates Method suggest strengthening and developing a healthier posture. Finally, I will also present exercises and research from Pilates to demonstrate one approach to caring for and preparing a healthy pelvis and spine.

While my experience is in the Pilates Method, many physical studies offer a different approach to gaining awareness of the pelvis and posture. Three of these modalities are prevalent in music conservatories and schools and have shown to be very effective in helping upper string players release tension and discover healthier ways of playing: Alexander Technique, Body Mapping, and Feldenkrais. While I feel an in-depth discussion of these methods is outside the scope of my expertise, I believe it is important to summarize what each mentions about the pelvis and posture. I encourage the reader to learn more about these very popular and effective teachings.

The Alexander Technique can be described as a method of releasing the physical and mental habits that we accumulate throughout our lives and helps us to regain poise and ease in movement.⁷ These unhealthy habits prevent our ability to move and function freely. Alexander Technique encourages a complete fusing of the mind and body in order to achieve a fluid awareness and practice of balance, posture, and coordination in our bodies.

The Alexander Technique teaches that the pelvis forms the foundation for the spine. Good use of the spine is dependent upon the balanced transmission of the weight from the spine through the pelvis onto the sit bones, bony protrusions that support our upper bodies when we sit. As soon as an upper string player puts her instrument onto her shoulder, anatomy tells us that the spine and pelvis must accommodate this shift in balance. Standing, the player can rock back and forth on her feet, making micro adjustments in her stance. Because she most likely has played standing for many years, she intrinsically includes the pelvis in her idea of posture. Her posture is a living and moving part of herself and of playing her instrument. However, when the player sits down, the same intrinsic knowledge of posture being a dynamic movement and one that can have the same freedom as standing is often lost. Without understanding that she has a freedom of movement in her spine and pelvis and can adjust and move on the chair, the weight of her instrument can easily pull her pelvis out of alignment. Doing this habitually over many years can erase any connection with the sit bones, and sitting in a dynamic manner with freedom of movement can be hard to recover.

⁷ Brennan, *Alexander Technique*, 1.

“In ideal coordination, the back and the pelvis are integrated into a single unit”⁸

Therefore, the back can connect to the shoulders, which connect to the arms, which connect to the fingers. As well, the back will connect to the neck and the head. With the pelvis forming the connection for which our spine relates to the chair, without a healthy pelvis and back connection, the upper string player will feel a cascading effect of poor pelvic alignment in her shoulders, arms, fingers, and neck.

In order to return to coordination, the upper string player can begin to observe the pelvis and back connection when she sits. Instead of telling her pelvis to do one thing or the other, she can observe what it is doing. No one position or posture is bad in the Alexander Technique, but if a posture is acquired through habit or through a misdirection, then the posture can cause pain and lead to injury.

Body Mapping was born out of the Alexander Technique and is the process of “constructively applying an understanding of anatomy to improving how we move.”⁹ Unlike Alexander Technique, which largely uses different terminology to describe actions, Body Mapping focuses on understanding how the bones of our bodies fit together in order to deepen our understanding of connection.

Identifying the sit bones is one way in which body mapping is helpful in understanding how the pelvis functions in the upper string player’s posture. The upper string player can sit on her hands on a chair, feel the bony structures of her sit bones, and notice how the upper body actually balances on the sit bones rather than the tailbone.

⁸ Pedro de Alcantara, *Indirect Procedures: A Musician’s Guide to the Alexander Technique* (New York: Oxford University Press, 2013), 24.

⁹ Stacy Gehman, “Body Mapping,” <https://www.alexandertechnique.com/articles/bodymap/>, accessed September 2, 2018.

Body Mapping works in conjunction with the Alexander Technique and Pilates, two disciplines which largely ignore anatomical identifications in their practice, giving the player identifying words for and a deeper anatomical understanding of what they are learning. If one can understand that the spine is centrally located in the body and not mapped onto the back of the body, then sitting correctly balanced slightly forward over the sit bones will be easier to enact.

The Feldenkrais method helps people to better organize their movements and actions.¹⁰ Feldenkrais believed that learning movement wasn't linear, but rather a gathered collection of seemingly random movement experiments which all inform each other and, in the end, arrive at the desired goal. For instance, a young child doesn't know anything about the violin when she starts, but through sequential differentiations of movement, she learns how to play.¹¹ Each added skill informs the last and the next. The Feldenkrais method is not goal-oriented but exploratory. The movements and exercises are meant to increase the student's self-awareness of his or her movement.

When applied to musicians, the Feldenkrais method specifically addresses the movement aspect of music making.¹² Movement, according to Feldenkrais, is both neurodevelopmental (what is your brain telling you) and mechanical-structural (how can that body part move). As discussed, the injuries of upper string players often result from the repetitive habits of playing in a seated position. Feldenkrais practitioners look for

¹⁰ Spire, 1.

¹¹ Ibid.

¹² Ibid, 2.

patterns of movement in the player that could be directly or indirectly causing the problem.

Very often, the problem is not where the disorder is perceived. It is very common that the disorganization is more global than the local discomfort. If someone comes with pain in the wrist, one is very likely to find that there is significant disorganization in the way the shoulder, lower back, and pelvis are used.¹³

By gathering knowledge about the pelvis into one paper, I hope to aid professional violinists and violists as they develop their own healthy, seated, playing posture. Physical therapists, occupational therapists, and other medical practitioners can use this research as a launching pad for more discussion. More studies analyzing pelvic abnormalities in upper string players are needed to support a climate change in upper string pedagogy. This document can be a resource to upper string teachers and to students of any age who will see the need to introduce healthy sitting posture into private lessons from an earlier age.

¹³ Spire, 3.

CHAPTER II

THE ANATOMY AND FUNCTION OF THE PELVIS

The pelvis is a ring of bones that unites the upper and lower bodies.¹⁴ These bones are the sacrum (the lowest part of the spine), the coccyx (tail-bone), and the left and right hip bones (see Figure 1). The human pelvis has two main functions: to allow humans to walk upright by bearing and transferring the weight of the spine, and to enable human reproduction. Lastly, it supports our internal organs through muscles of the pelvic floor, and protects organs responsible for reproduction and eliminating waste.

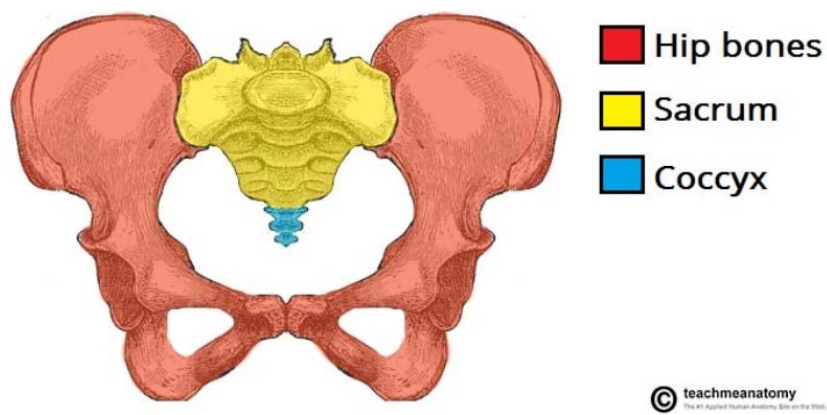


Figure 1. Bones of the Pelvis. Source: Fidoe, Sophie, “Parts of the pelvic girdle.” <http://teachmeanatomy.info/pelvis/bones/pelvic-girdle/>, accessed January 9, 2018.

The pelvis moves both as one solid unit and also subtly at the sacroiliac joint (where the hip bones attach to the sacrum at the back of the ring) and at the pubis (where

¹⁴ Isacowitz, 16.

the hip bones attach to each other at the front of the ring).¹⁵ The three major planes of movement of the pelvis that we will be exploring later are posterior and anterior pelvic tilt (tucking the pelvis under and rounding the low spine and sticking the bottom out and arching the low spine), right and left lateral tilt (moving the pelvis up and down in the vertical plane by lifting one hip bone up towards the ear), and right and left pelvic rotation (moving the pelvis in the horizontal plane by stepping one leg in front of the other).¹⁶ It is possible to combine degrees of movement along all three of these planes at the same time.¹⁷ It is important to see the pelvis as a strong structure that supports our spine and upper body, and also as a flexible structure that is constantly moving and adjusting.

What is also noteworthy about the anatomy of the pelvis for our purposes is that many of the muscles of the back connect at the pelvis. This fact is significant because it supports the theory that muscular tension felt in the head could be felt in the pelvis. Many upper body movements, especially those done by upper string players, originate in muscles that start in the pelvis or are supported by the muscular relationship of muscles that involve the pelvis. We will learn more about the specific muscles in Chapter III.

The angle of the pelvis changes when we stand and sit. In a standing position, the pelvis is angled more vertically (see the left image in Figure 2) with the weight of the spine transmitted through the legs and the feet into the ground. When a person sits, the pelvis tilts backwards slightly and the weight of the spine transmits through the sit bones

¹⁵ Barbara Conable and William Conable, *How to Learn the Alexander Technique: A Manual for Students* (Oregon: Andover Press, 1995), 89.

¹⁶ Rael Isacowitz and Karen Clippinger, *Pilates Anatomy* (Illinois: Human Kinetics, 2011), 19.

¹⁷ de Alcantara, 149.

(bony structures at the bottom of the pelvis) into the chairs (see the right image in Figure 2). Our sit bones are shaped like rockers and have a lot of potential for movement.

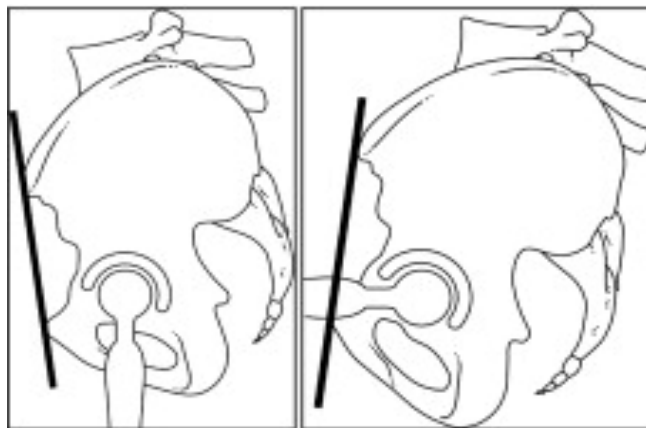


Figure 2. The Pelvis in Standing and Sitting. Source: Claeys, Kurt, Simon Brumagne and Jan Declerck. “Sagittal Evaluation of Usual Standing and Sitting Spinal Posture.” *Journal of Bodywork and Movement Therapies*, 20, no. 2 (April 2016): 326-333.

When performing complex fine motor actions while sitting (as in writing or playing an instrument), we normally focus on the use of the arm and hands and disregard the role of the back and legs. Although the use of the arm and hand is entirely dependent on the working of the total system, few people ever actually study sitting balance or consider it except in a cursory way.¹⁸

While it is possible to sit in a healthy way balanced on our sit bones, humans weren't designed to sit for as long as modern-day society encourages. Furthermore, it is easier for most people to discover how to walk and stand than it is to sit. Standing and walking are dynamic, while sitting is relatively static. “The average human being tends to wear the pelvis asymmetrically relative to the back, habitually swinging, tilting, or turning it in some off-center way, and habitually holding the pelvis in the off-center

¹⁸ Theodore Dimon, Jr., *Elements of Skill: A Conscious Approach to Learning* (Berkeley: North Atlantic Books, 2003), 159.

position.”¹⁹ The challenge in sitting is to find the same dynamic movement that the pelvis has while standing.²⁰ The asymmetry of playing an upper stringed instrument makes discovering this seated dynamic movement even more difficult.

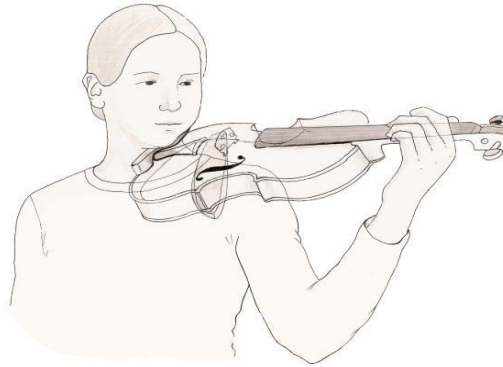


Figure 3. The Violinist in a Standing Position. Source: Jessica Shallock, “How to Hold a Violin,” <https://www.violinist.com/violin/how-to-hold-a-violin>, accessed September 1, 2018.

Playing the violin and viola puts the body in an asymmetrical position. The weight of the instrument is centered over the left side and slightly in front of the body and supported by the left arm, collarbone, and neck. The arms are elevated in front of the body. The neck rotates towards the left, or tilts down towards the instrument. Our right shoulders can overextend around our bodies to allow the bow to guide along the strings and our left shoulders often lift in order to support the weight of the instrument.

The demands on the body from playing the violin and viola are many. “Several studies have shown that playing-related musculoskeletal disorders present a significant

¹⁹ de Alcantara, 149.

²⁰ *Ibid.*, 118.

health problem for musicians.”²¹ These disorders include neck problems, shoulder problems, left hand tendonitis, right elbow tendonitis, and tightness in the low back. Long hours of playing, the repetitive nature of the playing and uncoordinated posture exacerbate all of these disorders.

As children, upper string players can coordinate very naturally to these demands of playing the violin and viola standing up by walking and moving freely on the feet. When upper string players sit, these asymmetries are more pronounced because movement feels limited. The challenge for the upper string player therefore is to find the possibility for dynamic movement in the pelvis while sitting. This is not easy.

Sitting down limits an upper string player’s ability to move. A number of reasons contribute to this lack of mobility. Many professional orchestras do not encourage movement, and over time, the pattern of not moving while seated causes the pelvis to become stuck. A wonderful way to release tension for a violinist and violist is simply to rock back and forth on her feet. The understanding of how to rotate the pelvis to find this release when seated and playing in a group needs to be taught. In a seated position, our sit bones function as our feet, and a combination of awareness and experimentation with rolling around on our sit bones will greatly help to relieve stress and tension.

The shoulders and neck are connected to the pelvis through the spinal column, and thus any tension or misalignment in the upper spine will be reflected and/or felt in the pelvis. If the pelvis is out of alignment, then body weight will not be distributed evenly through the sit bones, causing tension and instability like a wave throughout the spine.

²¹ C. Zaza and V. T. Farewell, “Musicians’ Playing-related Musculoskeletal Disorders: An Examination of Risk Factors,” *American Journal of Independent Medicine* 32 (September 1997): 292.

One cannot feel pain from misalignment in one area without having it reflected in another. Without feeling like the violin or viola is balanced, the pelvis will accommodate the weight distribution in a myriad of ways. The pelvis can develop a posterior or anterior tilt to compensate for the added weight of the instrument on the front side of the body. This tilt either accentuates the curve in the lower spine, pinching the vertebra of the low back, or reverses the curve, putting more pressure on the tailbone. A posterior or anterior tilt can travel up the spine causing the neck to protrude. A lateral pelvic tilt is common as well. Weight is moved to one sit bone or the other in order to support the weight of the instrument off of the left side. Finally, depending on how the upper string player positions her feet on the floor, and how she feels the connection with the feet, the pelvis can also rotate forward on one side, throwing off the alignment and balance on the sit bones as well.

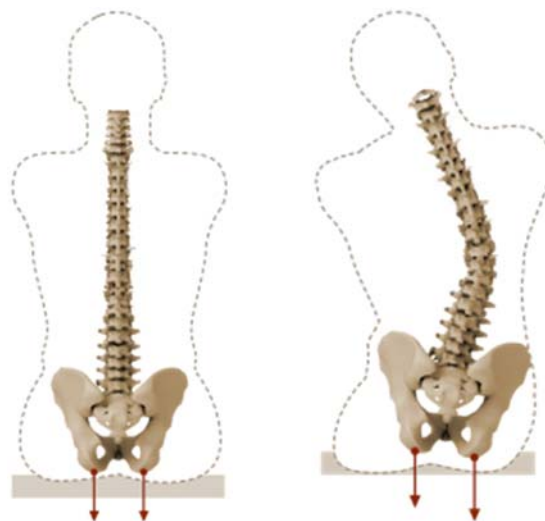


Figure 4. Angle of Even and Uneven Spine in a Seated Position. Source: Seating Matters, “The Pelvis, Posture, Spinal Presentations and Their Impact on Seating,” <https://seatingmatters.com/posture/>, accessed September 1, 2018.

While none of these habits of the upper string player are bad in and of themselves, when they are done haphazardly out of routine and then stuck in the one position throughout a rehearsal or a career, pain and injury can result. In the following chapter, we will begin to discuss how the Pilates Method approaches the pelvic/spine relationship and ways to find balance and harmony within the body in all positions.

CHAPTER III

LOOKING AT THE PILATES METHOD

Violinists and violists can use many holistic and physical disciplines to cope with the strain that playing their instrument puts on their bodies. As stated in Chapter I, many of these disciplines are even taught in music schools. They include Alexander Technique, Body Mapping, Pilates, Ortho-bionomy, and Feldenkrais. While each approach describes the functioning of the body differently, they all come to the same conclusion regarding spinal health: the pelvis is a part of the spine and paramount to achieving a healthy and balanced standing and seated posture. Joseph Pilates had a specific approach to developing a connection with the body.

Pilates Method

Joseph Hubertus Pilates was born in 1880 near Düsseldorf, Germany. Like Alexander, he had respiratory problems as a child and in order to build strength, he worked so hard at bodybuilding that he posed for anatomy charts by the age of fourteen.²² Fitness was a large part of Pilates' life as a young man. He trained in diving, skiing, gymnastics, self-defense, boxing and body building. Soon after moving to England in 1912, he was interned on the Isle of Man with other German nationals. At the internment camp, Pilates worked to refine his thoughts on body conditioning and health. Rumor has

²² Philip Friedman and Gail Eisen, *The Pilates Method of Physical and Mental Conditioning* (New York: Warner Books, 1980), 9.

it that not a single fellow internee got sick from the Influenza outbreak of 1918 because they followed his fitness regimen.²³

After returning to Germany and working as a trainer with the German National Army, Pilates decided to move to the United States. In 1926 he came to New York, and soon after opened his fitness studio and continued to fine tune his method. Originally calling it “Contrology,” Pilates developed a system of conditioning exercises based on the principle that the body must be actively trained and controlled through the discipline of the mind. “His aim was to make people more aware of themselves, more in touch with their whole, integrated being—to bring body and mind together into a single, dynamic, well-functioning entity.”²⁴

Pilates had a great interest in eastern philosophy and thought the mind controlled all actions of the body. Pilates believed in the perfect balance of mind, body, and spirit, and the method’s driving force was to integrate the mind, body, and spirit into every exercise.²⁵ Furthermore, through mastery of the exercises over time, the movement pattern became imprinted in the muscle memory and done almost subconsciously. Only then will these exercises “reflect grace and balance in your routine activities.”²⁶ Like Alexander, he believed that you were to live the principles all of the time. Unlike Alexander, Pilates believed consistent training with discipline and commitment on every level led to the path of health, happiness, and efficiency.²⁷ Pilates observed the “primary control” (the dynamic relationship between the head, neck, and back that acts as a

²³ Friedman and Eisen, 9.

²⁴ *Ibid.*, 7.

²⁵ Isacowitz, 5.

²⁶ Joseph Pilates, *Return to Life through Contrology* (New York: Presentation Dynamics, 1998), 23.

²⁷ Isacowicz, 5.

primary mechanism of coordination within the body) that Alexander saw in animals and felt that through consistent and conscious exercise, man would return to the “most marvelous of all Creations—Man himself.”²⁸

He emphasized six basic movement principles to be done during each exercise strengthening this connection of the mind, spirit and body: concentration, control, centering, flow, precision, and breathing. He believed that one must concentrate fully during an exercise, in order to not think about the body later on. To produce an effortless union of mind and body, the method requires that you constantly pay attention to your body while you are doing the movements.²⁹ One gains control of every aspect of every movement by concentrating fully. All physical motion must be done with complete control by the mind.³⁰ With control and concentration, a smooth and flowing movement will result. The principle of precision produces economy of movement helping to both get the maximum benefit of the exercise and to prevent injury. In support of doing the exercises well the very first time, no exercise is done more than three to five repetitions.

The principle of centering refers to the belief that the body has a physical center from which all motion originates. Strengthening this center, coined the “powerhouse” by Pilates, is paramount. These muscles include all of the abdominal muscles, and the muscles of the low back, hips and the bottom. The powerhouse forms the support structure for the spine and pelvis and is the lynchpin of good posture.³¹ Pilates believed that a strong powerhouse would result in less fatigue because the muscles around the

²⁸ Pilates, 16.

²⁹ Friedman and Eisen, 13.

³⁰ Sean P. Gallagher and Romana Kryzanowska, *Pilates Method of Body Conditioning* (Philadelphia: BainBridge Books, 1999), 12.

³¹ *Ibid.*, 20.

spine were working to enable effortless good posture. This strong core would also result in a lowered incidence of back pain and injury.³²

Lastly, the principle of breath marks the foundation of every movement. The breath provides energy to the cells and carries away the waste of inactivity. The core principles lead to the method's goal: creating a fusion of mind and body, so that without thinking you will move with economy, grace, and balance.³³

Pilates believed the pelvic bowl held the life force of our being and if the pelvis was misaligned, it adversely affected the function of body segments up and down the kinetic (energy) chain, resulting in inefficient movement, muscular imbalances, and stress on the structure of the body.³⁴

One way to view the pelvis is as a suspension bridge with cables (the muscles) holding it from above, below, the sides, and very importantly, from the inside. As long as all the cables are tensioned correctly and proportionally, little strain is placed on any one cable and the bridge will be stable and level. However, the moment the balance of tension on the cables changes or the bridge is not level, the other cables and the entire bridge will show strain. Although the pelvis will not typically collapse under stress, muscles that encounter excessive tension may become strained or even tear. Simply put, if the pelvis is out of alignment, the body is out of alignment.³⁵

Pilates plays a crucial role in keeping the pelvis healthy by strengthening the pelvic floor muscles, spinal muscles, hip muscles, and the core. A balanced strengthening of these muscles keeps the pelvis aligned and leads to ideal posture. Because the pelvis is considered the lowest part of the upper body, many of the muscles supporting posture and

³² Friedman, 15.

³³ Ibid., 13.

³⁴ Isacowitz, 16.

³⁵ Ibid., 17.

movement in the upper body actually originate in the pelvis. We can divide these muscles into the abdominal muscles and the spinal muscles.

The abdominal muscles that are more responsible for the movement of the spine are the “rectus abdominis” that run up and down the middle of our abdomen. These muscles are primarily responsible for spinal flexion, or curling the spine forward. The “rectus abdominis” attaches at the rib cage and runs all the way down the front of the body to the top of the hip bone, or the ilium (refer back to Figure 1 on page 11). The external and internal obliques control twisting spinal movements and side-to-side spinal movements. Again, these muscles also attach at the rib cage and the ilium. The deepest abdominal muscle is the “transversus abdominis.” This muscle surrounds the spine and is responsible for pulling the abdominal muscles inward towards the spine and stabilizing the spine and pelvis.

Joseph Pilates studied anatomy and taught that by pulling our stomach muscles inwards we engaged all of the abdominal muscles, the superficial ones and the deep “transversus abdominis” that surround the spine and connect to the pelvis. It is possible to engage our abdominals by pushing our stomachs outwards. However, when we pull them in, we engage the entire powerhouse. One image Pilates taught was bringing the navel to the spine. Another way to envision this engagement is to try to scoop your stomach inwards. Pretend you are wearing a corset that is pulling your stomach together and making you smaller. This is the correct way to engage your powerhouse in the exercises in the next chapter.

CHAPTER IV

THE PRACTICE

Drawing from all of the disciplines described in the earlier chapters, I have come up with a series of stretches, exercises, and practices to help the upper string player develop a deeper awareness of the pelvis's connection to the spine, strengthen the muscles surrounding the spine and pelvis, and to prepare the pelvis and spine for a long rehearsal or performance. I will provide three combinations of exercises: ones that can be done in the chair for the three to five minutes before downbeat (and during the rehearsal), ones that can be done standing and sitting for the ten to fifteen minutes backstage, and ones that can be performed lying down, sitting, and standing twenty to thirty minutes at the upper string player's home. These exercises will be done lying down, seated, and standing. The principles of the pelvis's relationship to the spine and abdominal engagement are the same throughout. If you cannot find a space to lie down, try doing just the seated and standing exercises. The principles stay the same. By finding this relationship in many positions, we are reinforcing the hallmarks of healthy posture throughout our day. With repetition and continued observation of our behaviors, we can begin to change our awareness and playing habits.

Before we do any exercise in any position, we will explore the movement of the pelvis. As we discussed before, the pelvis can move in all directions, front and back, side to side, and up and down. Because of the flexibility at the pubis and sacroiliac joints,

even more movement is available in the pelvis. The purpose of continually exploring these movements in each position is to reinforce movement in the pelvis. A stuck pelvis leads to an unhappy spine and poor posture. Perhaps lying down, sitting down, or standing will most easily enable us to feel a fluidly moving pelvis.

Let's begin by lying down on a flat surface. Bend your knees and bring your feet close to your bottom, flat on the floor. Arms can rest gently at the sides or on your stomach. Rotate your pelvis front and back, up and down, and side-to-side, and make small circles in one direction and then the other, and observe changes in other parts of your body, if any. There is no wrong or right way to do this. Just observe.

One of the best ways to release our spines and pelvis from the grip of gravity and the potential problems resulting from playing the violin and viola is to lie down. Both Pilates and Alexander advocated for rest in their methods. The semi-supine position, often called "constructive rest" in Alexander Technique, can be done anywhere there is a firm surface. This exercise, often considered the hallmark of the Alexander Technique, involves lying down on your back with knees bent, feet flat on the floor, your hands gently resting on the floor or on your stomach, and a book or two under the head to support it.³⁶

Here are some thoughts to consider as you practice constructive rest. The number of books underneath the head should give the neck support and prevent the head from falling back. The soles of the feet should be as close to the seat as comfortably possible. If the legs want to fall in, then move the feet closer together, if the legs want to fall out,

³⁶ Brennan, 114.

move the feet further apart. The goal of constructive rest is to be able to fully relax the spine, neck, and pelvis. In keeping with Alexander tradition, try not to “do” anything in the pose. Breathe and just let gravity restore your spine to where it wants to go. Because the recommended amount of time for constructive rest is at least twenty minutes, this is an exercise I suggest doing at home. However, because even a little bit helps, feel free to find a quiet corner backstage and lay down before or during a break in rehearsal or practice.



Figure 5. Constructive Rest.

I recommend doing some strengthening exercises after constructive rest as the spine and pelvis are in a more relaxed and aligned position. Drawing from the Pilates Method, some Pre-Pilates exercises can help teach us to engage our abdominal muscles in

a safe and healthy way. Make sure to remove the book(s) from under the head to continue.

Leg Lift Supine: Lay your arms next to your side and position your feet hip width apart, and move them away from you until they form approximately 90-degree angles relative to the thighs. Gently pull your belly button to your spine. Keeping the navel to your spine, slowly lift one knee and guide it until the knee is just above the hip joint. Keeping the stomach scooped, lower the knee putting the foot back on the floor. Try to focus on keeping the pelvis stationary with the weight evenly distributed on both sides of the pelvis. Repeat three to five times on both sides.

The abdominal muscles worked in this exercise are the transversus abdominis, the deepest abdominal muscles next to the spine, which attaches the pelvis to the rib cage. In this exercise, these deep muscles are mainly working as stabilizers and work to keep the pelvis neutral while we move the legs. These muscles are what keep us upright when we sit.



Figure 6. Leg Lift Supine.

Arm Lift Supine: We will now engage our arms in a stretching and strengthening movement. Keeping your legs in the same position, slowly raise the arms parallel towards the ceiling and back until they are reaching or resting next to your ears. Feel the stretch of the spine from the pelvis all the way to your fingertips. Return the arms with control to the start position. Do two more times enjoying the stretch.

On the third time, pull your navel to your spine, and keeping the gentle scoop in your stomach, lift the arms overhead and stretch them behind you. Try to keep the stomach in and the back connected to the floor underneath. Do you feel the stretch in a different area when you engage the abdominal muscles? Are you able to bring your arms as far back? Notice the change when the abdominals play a part in the movement of your arms.



Figure 7. Arm Lift Supine.



Figure 8. Arm Lift Supine, Arms Back.

The Hundred: The Hundred is one of Joseph Pilates' iconic exercises. Done at the beginning of every Pilates mat workout, the hundred warms up the entire body and circulates blood throughout. Every body part is engaged, and the forceful inhaling and exhaling up to one hundred awakens and prepares the muscles for the workout. For our purposes, we will do a modified hundred to gently engage our abdominal muscles.

Start with the same knees bent, legs parallel position and bring your knees and feet together. Gently squeeze your legs. Pull your stomach towards your spine. Keeping the stomach scooped and the legs squeezing, pull your knees towards your chest and hold them at a 90-degree angle. Keeping the arms straight, lift them four to six inches off of the ground. Inhale and pump the arms for five counts, exhale and pump the arms for five counts. Continue for up to one hundred counts.

The goals of this exercise are to keep the legs and body still as you pump your arms and breathe. The stomach should stay scooped. This takes extraordinary abdominal

control and strength. If you feel the back arching, lower the arms, and lower the feet back to the floor. Pilates recommended starting at twenty and adding more every time you exercised.



Figure 9. The Hundred.

Corkscrew: The last exercise that we will do laying down will involve the oblique abdominal muscles. According to the Pilates Method, after having completed corkscrew, you will have engaged every muscle in our bodies that contribute to healthy posture. Zip your legs together and again, with a scooped stomach, bring your legs to the same position you had them in the hundred. Keeping the navel to the spine and the legs gently squeezing together, make small circles with the knees in the air.



Figure 10. Corkscrew.

Seated Exercises: Find a comfortable chair to sit in. The chair should have a straight back, and ideally when you sit in it, your hips should be at a higher angle than your knees. At this point, you have relaxed your spine and pelvis in constructive rest and already actively engaged all of your abdominal muscles in leg lift supine, arm lift supine, the hundred, and corkscrew. When you come to the chair, you are already sitting with a deeper sense of connection in your body. Let us take the principles of the workout on the floor to the chair.

Before we begin the exercises, let's observe the movement in our pelvis again. Move it front to back, up and down, side-to-side, in circles. What do you observe? What is happening in our pelvis and spine while we sit? When we lay down, gravity distributes weight equally throughout our spine, making it the ideal position to take stress off of our spine and pelvis. When we stand, gravity transmits the weight through our spines and pelvis to our feet. Our pelvis's design enables this weight to be distributed evenly. If we

stand with coordinated posture, then the pelvis and spine does what it was designed to do and the skeleton stacks effortlessly. When we sit, our sit bones become our feet. Gravity travels down our spines and ends with those bony protrusions at the bottom of our pelvis.

Finding the Sit Bones: Take a moment and slide your hands under your bottom and locate your sit bones. Do you notice anything about their location? Are they closer together or further apart than you thought? Are they further forward or further back? Remove your hands and feel the sit bones connect to the chair. Explore the roundness of the sit bones by rolling around on them a bit. Tilt the pelvis forward, then back, tilt side to side, balance the weight more heavily to one sit bone and then the next. What do you observe? Come center and try to balance the weight evenly on both sit bones.



Figure 11. Finding the Sit Bones.

TV exercises: TV exercises were exercises designed to be done in front of the television in a seated position. Developed by Joseph Pilates' protégé, Romana Kryzonawska, they challenge our abdominal muscles to keep our spine aligned in a seated position. Sit in a chair with both feet placed evenly on the floor. The knees can be at a 90-degree angle or lower. The spine should be evenly balanced over the sit bones and neither pitched forward or pitched back. Try this exercise in front of a mirror to check for your straight spine. Place your arms by your side with your hands pressing into the sides of the chair and use your arms to stretch your upper body to the sky while keeping your bottom on the chair. Squeeze your bottom gently, pull your belly into your spine and feel it pulling up under your rib cage, and release your arms trying to keep the height that you had while supporting yourself with your arms. Don't sink. Hold for 5 to 10 seconds and repeat.



Figure 12. TV Exercises.

Round, Straight, Side-to-Side, Twist: Staying seated, we are going to practice pelvic stability while we stretch and move the spine. In all of these movements, try to move your spine while staying balanced on the sit bones.

Round: Cross your arms against your chest and, and lengthen your spine. Draw your tummy inwards and imagine that you are making a large letter “C” with your spine by starting to round at the mid back. Pull your tummy in deeper and stretch your middle back towards to the wall behind you while keeping your shoulders stacked over your hips.



Figure 13. Round.

Straight: Cross your arms against your chest and lengthen your spine again. Pull your stomach in and up under your ribcage. This time, keep lengthening your spine and

imagine that the top of your head is attached to a puppet string and someone is gently pulling you upwards. Stay balanced on your sit bones and try not to over arch your back.



Figure 14. Straight.

Side-to-side: Cross your arms against your chest and lengthen your spine. Find two corners of the room. Pulling your tummy in, imagine that you are trying to lengthen both sides of your spine and stretch the top of the head to the top of the right corner of the room. Resist the urge to take your left sit bone with you as you stretch to the right. Where do you feel this stretch? Repeat on the left side, again keeping that right sit bone glued to the chair. Is one side easier than the other?



Figure 15. Side-to-side.

Twist: Lastly, we are going to rotate the spine. Congratulations! At the end of this exercise, we will have stretched and moved the spine in every possible direction. Cross your arms against your chest, and lengthen your spine to the ceiling. Keeping the spine long, the sit bones glued to the chair, and your navel pulling inwards, gently twist to the right. Imagine the entire spine twisting, from the low back all the way up to the top of the head. Repeat on the left. What did you notice about each side? Was one side harder to feel the connection to the sit bones? Did you feel more flexible on one side or the other?



Figure 16. Twist.

Standing postures: Before we go to the final exercise, let's once again feel the whole movement of the pelvis in a standing position. Stand evenly on both feet and with knees slightly bent, tilt the pelvis forward, tilt it back, move it side-to-side, rotate one side forward and then the other, make circles. What do you notice? Is one position more comfortable than the other? Now that you have moved your pelvis lying down, sitting down, and standing up, have you observed any commonalities between the positions? And dissimilarities?

The Wall: The final standing posture exists in different forms in both the Pilates Method and the Alexander Technique. Find a wall and stand with your back against it.

Bring your feet about hip distance apart and with your back pressing against the wall, walk your feet out until your entire lower and mid spine can connect to the wall. Press your feet into the floor to feel the back connect with the wall more. Engage your abdominals by pulling your belly button to your spine and gently drawing your abdominals under your rib cage. Try to keep your pelvis in a neutral position while you engage your abdominals. Walk your feet towards the wall, keeping your abdominals engaged, feel the natural curves of your spine and how different parts of your back make connections with the wall. Breathe.

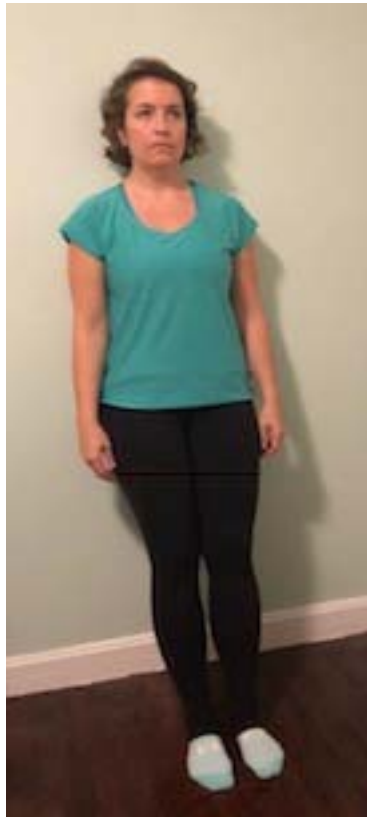


Figure 17. The Wall.

CHAPTER V

CONCLUSION

The upper string player is unique in two ways: she often starts at a young age and spends her childhood and pre-professional years standing for much of her time playing. Only when she enters a professional career, either in a symphony orchestra, chamber ensemble, as a freelancer, or as a teacher, is she faced with sitting for long periods of time. While she has most likely spent most of her education understanding and working on technique and posture standing up, those skills often fail to translate to a seated posture. Many professional players develop pain and injuries in their necks, shoulders, arms, and fingers. Music journals are full of excellent articles discussing different shoulder and chin rests that can help with neck and shoulder pain. Famous pedagogues have discussed proper placement and action of the right and left hands and fingers. Medical journals have been studying this problem in upper string players for years and have imaging and exercises and treatments for the upper spine, neck, shoulders, and fingers. There are countless studies contributing to the discussion of these areas on the upper string player. However, upper string players are still experiencing pain and ending their careers early due to injury.

My experience as an instructor in the Pilates Method combined with the disparity in the training (standing) versus the career (sitting) of upper string players leads me to believe that upper string players are ill prepared for professional careers where they sit

because they do not have a basic understanding of the role of the pelvis in a seated posture. The Pilates Method, Alexander Technique, Feldenkrais, and Body Mapping all teach that the neck, spine, and pelvis is one unit and that pelvic stability is the cornerstone for healthy posture, and yet this part of the body is rarely discussed in music journals and has yet to be researched in medical and movement journals.

In this document, I offered one possible solution to this problem in the Pilates Method, and showed one way of developing pelvic stability by strengthening and training the muscles surrounding the pelvis and spine to improve seated posture. However, there are many physical disciplines available to musicians that address and treat this problem. Alexander Technique, its offshoot Body Mapping, and Feldenkrais all use the bony structures as guides to finding alignment and coming into a healthy coordination in the body. These modalities are already taught in many music schools, and I encourage the reader to look into them as a balanced approach to improving and understanding their connection to their instrument.

Strengthening and learning about our bodies is one way to alleviate pain and injury for the upper string player. Much research has been done showing the effectiveness of proper equipment as well. The playing environment, including the type of chair, the lighting, the positioning of the stands, the amount of space, and the noise can all have an effect on the comfort level of the upper string player. Some of these environmental factors, like the chair, can be adjusted.

Research supports that the ideal height of a chair is one where the hips are positioned at or above the knees, and the feet are firmly touching the floor. Depending on

the person and the chair, this might be impossible. Some upper string players use seat cushions that effectively raise the height of the seat of the chair and lift the hips so that the hips are at a higher angle than the knees. Other cushions, called stability discs, both lift the hips and are also full of air so that the player is sitting on a slightly unstable platform. This cushion, often used by physical therapists to strengthen the muscles of the spine, not only raises the hips but also reinforces the idea of a dynamically moving pelvis with the player constantly working to find balance.

Many upper string players prefer to bring blocks or lifts to use on the back legs of the chair in order to change the angle of the chair. Again, this benefits the player by placing the hips at the proper higher-than-knees position. Many professional orchestras often use specialized chairs that can adjust the height of each individual leg in order to find a seated angle that suits each person.

Leon Fleisher, the famous pianist, said, “Musicians are the athletes of the small muscles.” While musicians do not burn as many calories as professional athletes, the small muscles that any professional instrumentalist uses to play are trained to the same level of expertise as any sports professional. Upper string players, who often start at a younger age, can potentially master their small muscle “sport” while still very young. And yet, while professional athletes can and often do regularly seek treatment for injuries and even have a field of study dedicated to them, sports medicine, professional upper string players struggle with an unusually high rate of injury and often neglect self-care until it’s too late. With so many physical modalities and string accessories available to help the upper string player move and play with ease, I hope upper string players will

continue to seek out the knowledge of how their bodies move and function so that future generations can benefit and live injury-free.

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