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Strengthen Violinist's Artistry and Wellbeing through Body Mapping

The sounding part consists of the following recording:
Beethoven Kreutzer Sonata No.9
Shostakovich Piano Trio No. 2

Abstract

The master's thesis explores the importance of our bodies as musicians in establishing the positive impacts of mindfulness on performance, particularly in terms of improving body mapping. Musicians are aware that holding extreme tension in their bodies can affect the quality of the music. Therefore, understanding the complex workings of our bones, muscles, and connective tissues while performing can provide deep explanations on how to reduce pain and tension that can be caused by poor posture, a lack of balance, restricted movement, and other related factors. The approaches taken in this thesis involve developing an awareness of the important joints and bones for violinists and understanding their functions during performances, as well as whether they are well mapped or mis-mapped.

For the sounding part, my exam concert included Beethoven's "Kreutzer" violin sonata No. 9, Op. 47, in A minor, and Shostakovich's Piano Trio No. 2 in E minor. The reason for choosing these two pieces to be performed in one concert is because they demand a high level of stamina and muscle strength from the performers.

Keywords: body mapping, tension, mis-mapping, kinesthesia, breathing, joints, and bones.

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Introduction

William Conable was a cello professor at the Ohio State University School of Music who discovered Body Mapping. He discovered that his students' movements depend more on how they think they are structured than how they are actually structured. According to Conable, when the student understands the actual structure of their body, they become more expressive and efficient at making music (Conable, 2000, p. 5). Body Mapping teaches individuals how to use self-awareness to understand their own body map. By learning accurate information through kinesthetic experience, the use of a mirror, anatomical models, books, pictures, and guidance from teachers, students correct their own body map. It encourages individuals to replace their inaccurate body maps with anatomically correct ones, facilitating the release of tension and allowing for effortless and expressive movement (ABME, 2020). In contrast, the Alexander Technique (AT) primarily aims to improve overall well-being, focusing on tension release, posture improvement, and natural body balance, and practitioners of the Alexander Technique are required to obtain certification (STAT, 2019).

We all know we can always improve in our performances and practice. However, we often find ourselves unsure and confused about how to develop and address these areas, which results in falling into the trap of repeatedly following the same problem-solving routines that can lead to a loss of joy and excitement. Body mapping provides potential benefits to both types of violinists - those who have received strong foundational education and face fewer technical obstacles, as well as those who may encounter more challenges. It helps those who may face challenges by encouraging them to overcome their challenges. Additionally, it provides insights to assist all violinists understand and effectively solve the difficulties their students may encounter.

Aim

Jennifer Johnson is a violinist, teacher, author, and certified to teach musicians about efficient movement and body mapping. She specializes in using the body mapping technique to teach musicians healthy movement patterns. Jennifer's method focuses on the importance of musicians being aware of their bodies' natural movements. "Limitation, pain, and injury are the three best reasons for violinist to study how the body is designed to move. Understanding your structure and using it in accordance with its design will gradually melt away pain, injuries, and limitations"(Johnson, 2009,p.11). Many musicians, including myself, have not experienced any pain or injury but have experienced restrictions on their freedom while playing. Despite how hard we commit to our profession, there are moments when our movements seem limited, stopping us from fully expressing ourselves or reaching the level we desire.

The thesis aims to answer a key question: Does understanding the function of bodies through body mapping truly benefit violinists' artistry and well-being? I explore three core aspects. Firstly, the increased sense of kinesthesia. Secondly, the remapping of any mis-mapped neck muscles, particularly in relation to breathing. Lastly, the remapping of any mis-mapped joints and bones while playing and performing. By exploring these aspects, I aim to determine whether body mapping helps violinists overcome limitation, pain, and discomfort.

Sense of Kinesthesia

As part of developing our kinesthetic awareness and identifying tense muscles and bones while playing, it is important to obtain a good understanding of this sensory perception.

Kinesthesia, which means feeling of movement, is “the precise awareness of muscles and joint movement that allows us to coordinate our muscles when we walk, talk, and use our hands” (Quintero, 2015). “The kinesthetic sense tells you about your body: its position and its size and whether it is moving and, if so, where and how” (Conable, 1995, p.19). Kinesthetic cells are found in three places: cells in the muscles help us feel stretching motions, cells in the tendons help us notice when our muscles squeeze, and cells in the joint lining help us know how our limbs are moving (Sam M.S, 2018).

Important elements in performing music, especially live music, are space and time. When musicians play, they engage in intentional movements and gestures that correspond to the time. They attempt to do simple movements, but in fact, they are engaging multiple forms of kinesthetic awareness, sending multiple feedbacks to the brain (Husserl, 1989:152–154), such as the string players who need to know where to shift their left hand on the fingerboard and simultaneously move the bow in space. In order to experience the kinesthetic awareness, hold the hand in the air without looking at it, then wave the hand and fingers without making contact. Even without relying on the primary senses, noticing the hand movement through kinesthetic awareness can be possible. Musicians might play for long periods without being aware of the tension building up in their bodies, only noticing it when pain happens. “Any information we receive about ourselves kinesthetically is delivered to the brain by kinesthetic sense receptors found in the muscles and connective tissue.” (Johnson, 2009, p.24).

Remapping Mis-mapped Breathing

Free and proper breathing are fundamental needs for every musician. Playing an instrument demands a good supply of oxygen. When it comes to exploring mis-mapped bones and muscles that violinists may experience and how they can be re-mapped, mis-mapping of the breathing structures can limit freedom in the arms and torso when not breathing properly while playing. When we breathe, every cell gets oxygen, and our joints move, some slightly, some more. Our heads move as our spines stretch. The whole upper body engages in the breathing movement; each area-thoracic, abdominal, and pelvic-in a different approach (Conable, 2000, p.75).

The most important muscle group in the body in the matter of freedom and ease of movement are the muscles of the neck. Any tense neck muscles can lead to contractions or discomfort elsewhere in the body (Conable, 1995). Violinists rely on their chin and neck to hold the instrument, and this part of the body is the starting point of the breathing process. Maintaining a relaxed neck is important among violinists, as it gives them freedom while performing. A tense neck can affect other major joints in the surrounding areas, undoubtedly limiting freedom of movement. Being aware of the neck's condition helps relax muscles and joints, resulting in improved overall body balance. Therefore, the common mis-mapped neck muscles that are related to violinists breathing according to Jennifer Johnson are the Pharynx, tongue, hyoid bone, and Jaw.

The Pharynx

The pharynx is part of the throat behind the mouth and the nasal cavity, and it is shared by the digestive system and the respiratory system. The pharyngeal muscles are a group of muscles that work together in order to push food and liquid out from the throat to into the oesophagus, and not to swallow air (Pazhaniappan, 2023). When the neck muscles get tightened, the pharynx gets short, narrowed, and distorted as illustrated in figure 1 (Conable, 1994, p.70). In order to feel the pharynx muscles working, try to swallow and notice their condition when you finish swallowing. Do you let them be, or do you keep some sort of restraint on them? (Conable, 1994). Similar effects on the pharynx may be seen when holding the violin and tensing the neck; the pharynx shortens, narrows, and distorts, limiting the passage of air. Cueing fellow musicians audibly, as well , usually tend to unnecessarily tighten the muscles of the pharynx. While this is a common technique by musicians, a better pharyngeal muscles mapping involves simply using movements as cues rather than relying on constricted breathing (Johnson, 2009, p.146).

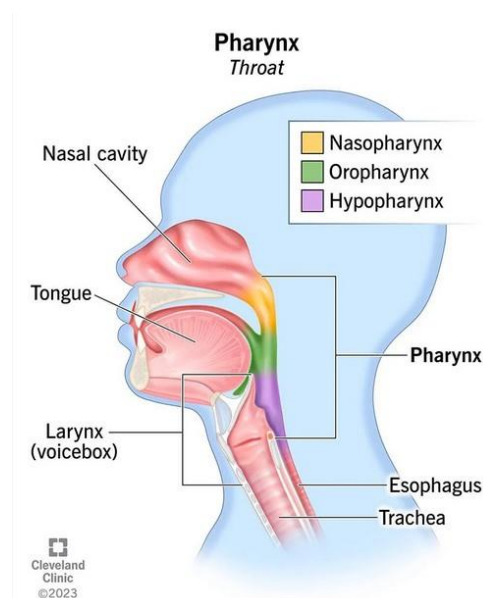


Figure 1: The pharynx muscles

Regarding tension in the pharynx, last year I decided to change my technique of cueing from using both audible cues and gestures to using only gestures. This change solved the issues I was experiencing and improved my confidence. I now understand from my research that my issue was probably related to unnecessarily tightening the muscles of the pharynx. However, some musicians can find a good balance between the two approaches, while others may not.

The Tongue

The tongue runs from the hyoid bone (located in the middle of the neck) to the floor of the mouth. It is a digestive organ that moves food around the mouth to help to chew and swallow. As well, it helps to keep the airway open to breathe properly (Kenning,2023). Although there might be no direct connection between the tongue and the violin playing, there are some reasons why violinists could have tongue tightness. First, as the tongue is connected to the shoulder, neck, and jaw, tensed body may unintentionally affect the tongue, especially with beginner musicians. Second, focusing and concentrating on a specific passage or technique under stress might lead to tongue tension. Third, incorrect breathing habits can unintentionally cause tongue tightness, leading to a struggle to control airflow during playing.

The Hyoid Bone

The hyoid bone is a small U-shaped bone, located in the midline of the neck. Understanding its location, as well as its involvement in the mechanical aspects of breathing due to its connections with the muscles of the pharynx, throat, and tongue, can prevent extreme neck tension while holding onto the violin (Jones, 2021). A main function for the hyoid bone is to provide support to the base of the tongue. “The neck muscles and the tongue will never be free if the hyoid bone is not included in the body map because these muscles will try to do all of the work that this

sturdy little bone is designed to do” (Johnson, 2009, p.194). While the hyoid bone's primary role is particularly significant for breath control, it plays a more essential role when playing wind instruments than in other. However, even though it may not be directly related to holding a violin, maintaining proper neck and throat alignment indirectly affects a musician's performance by allowing efficient breathing and sound production.

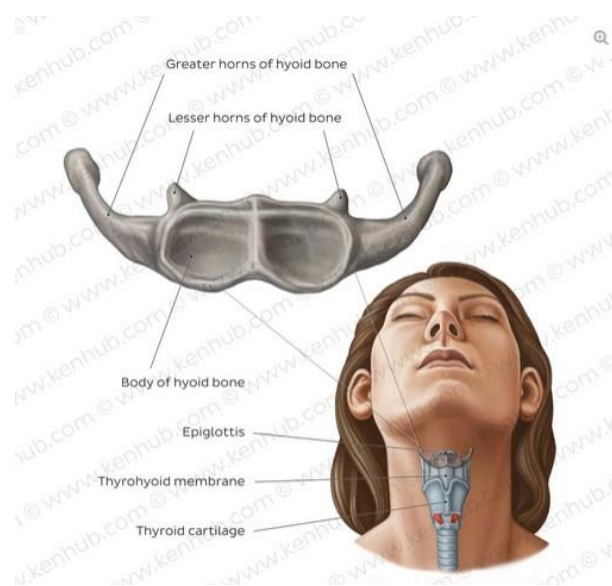


Figure 2: The hyoid bone

The Jaw

The jaw serves as an important point of contact between the violin and the player, providing stability and support during playing. Keeping a comfortable and balanced hold onto the violin is essential to produce resonant tones and fluid playing. However, miss-mapping the jaw by sustaining pressure and incorrect technique might result in temporomandibular joints (TMJs) syndrome. TMJ are located each side of the head. This condition appears when the cushiony cartilage that is meant to prevent friction between the two bones is either worn away or moves out of its place between the two jaw bones, causing the jaw to move from its center and one

bone to begin to make painful contact with the other (Johnson, 2009). Here are the conditions for a violinist's jaw while playing that may cause temporomandibular joint (TMJ) issues: teeth tightly clenched; teeth touching lightly; lips closed and teeth slightly apart; lips and teeth parted. According to Johnson, switching between the last three positions while playing is the best condition for a violinist's jaw. It allows a well-mapped jaw movement, and an even distribution of tension, providing a well-balanced feel. However, if a violinist often shown teeth tightly clench while playing, it will result TMJ problems and severe neck tension.

In conclusion, while musicians are not used to concentrating on these subjects since the demand of hours practicing and playing takes most of their time, exploring mis-mapped bones or muscles, such as the jaw, that violinists might encounter can be extremely important. Indeed, mis-mapping can significantly restrict the freedom of movement in the arms and torso, affecting their overall musical capabilities. Therefore, developing awareness of some of these aspects can lead to better performance and well-being for violinists.

Remapping Mis-mapped Balance: Joints and Bones

Violinists rely on the direct involvement of their head, neck, and shoulders to support the instrument. To achieve a sense of freedom through these points of contact, it is important to explore the mis-mapped areas that violinists may experience and how they can be re-mapped. The head, for example, can naturally and freely balance on the spine, considering its significant weight of approximately 7-8kg in adults (Conable, 2000, p. 5), however, one of the primary habits that violinists often develop while holding the violin is tension in the neck when placing their head on the instrument. This excessive weight and pressure can lead to movement restrictions, unwanted sound qualities, and tension in the left-hand fingers. Therefore, mapping a good balance point while holding the violin without unnecessary neck and spine discomfort will demand an essential understanding and awareness of three key elements; A.O joint, Lumbar Core, and Knee Joint.

The A.O joint

To begin with, the A.O joint is located between the atlas bone in the neck and the occiput in the bottom surface of the skull.

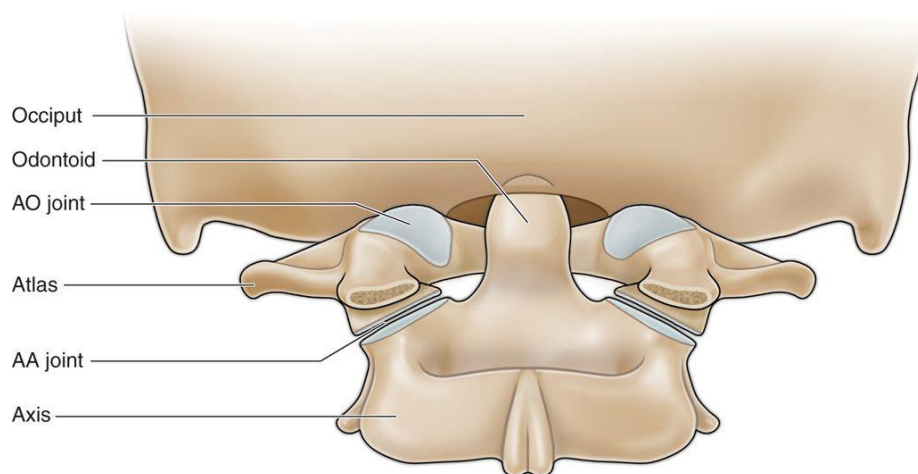


Figure3: The location of the A.O joint

Since the head is one of the five points of contact when holding the violin, having a well-balanced head on the top of the spine is necessary for experiencing a sense of security and freedom through the arms and neck. Difficulties in finding balance within the head may result in mis-mapping. Balancing the head on the spine should not be too far forward or backward and should not lean to one side over the other. It is exactly in the center, both front to back and side to side. Maintaining proper posture and avoiding unnecessary tension in the neck and spine is essential for balanced posture (Johnson, 2009, p.42).

According to Johnson, the two most common mis-mappings that lead the violinists into balance problems in this area are related to mapping the A.O joint too far back of the central core and mapping the A.O joint too low. When the A.O joint is mapped too far back of the central core, a rotated and downward position of the head causes the jaw to lift, stopping it from providing enough support directly above the chinrest. This can result in discomfort and insecurity for violinists, particularly those with longer necks. On the other hand, when the A.O joint is mapped too low, the top of the neck is positioned lower than the A.O joint, leading to unnecessary use of neck muscles to extend the head and neck to meet the violin. “When a violinist discovers the balance of her head at the A.O joint and imagines dropping the weight of the head onto the violin like onto a pillow, she brings the violin to her, where it nestles comfortably and securely” (Johnson, 2009, p.44).

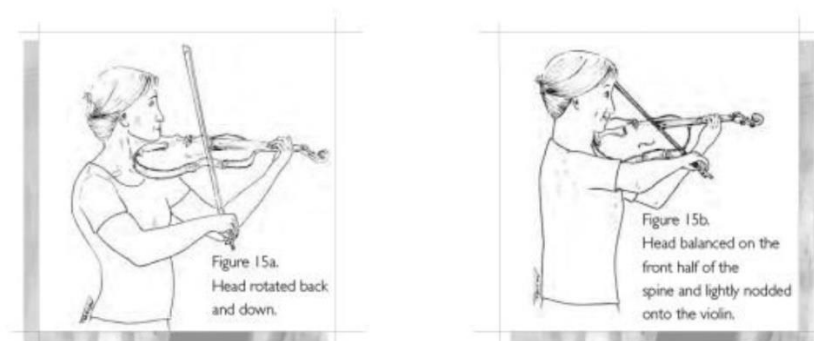


Figure 4: Head balanced with the spine (Johnson, 2009,p.43)

Maintaining a balanced head and spine involves gently nodding the head onto the chinrest while allowing it to move freely. The last century's classical violinists showed this freedom by allowing their heads to move freely rather than remaining in one spot on the chinrest. To achieve this balance, pay attention to the five points of contact with the violin: the jaw, collarbone, neck side, left hand, and the friction of the bow hair on the string. These points contribute to ensuring that the head remains in balance with the spine. Thus, my issue was indeed due to mapping the A.O. joint too low as well as not letting my head gently nod onto the chinrest. Unneeded neck muscles were being engaged. Although acknowledging that my chinrest and shoulder rest might not be an ideal fit, I achieved a clear improvement in relaxing neck muscles. This adjustment has left a positive result, including a better sense of the violin's vibrations, resulting in improved sound resonance and a significant reduction of the brown mark and neck irritation.

The Lumbar Core

The lumbar region consists of the five lumbar vertebrae, these vertebrae are the biggest bones in the spinal column. The thickest part of the lumbar is located behind the belly portion of the lumbar region, and it extends approximately halfway across the torso from front to back (Waxenbawn, 2022).

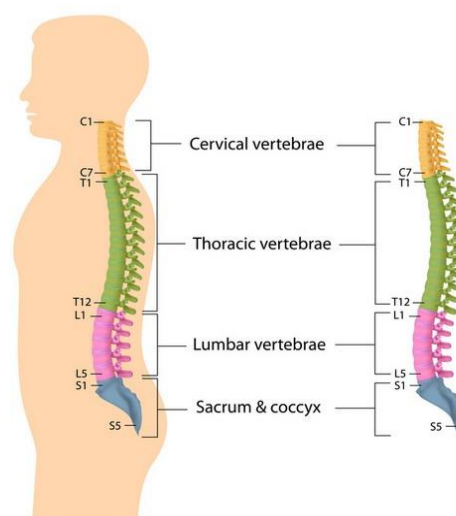


Figure 5: The lumbar core (pink colour)

The relationship between the lumbar core and holding the violin is connected to maintaining a good, balanced posture and stability, both while standing and sitting. The lumbar core, including lower back and abdomen muscles, supports spine curvature, ensuring proper posture and avoiding excessive leaning or slouching. A typical posture of violin players illustrates the rotation of the head, neck tilt, and raised left shoulder, leading to a lateral deflection of the lumbar and thoracic spine, which result in pain and unbalanced load (Watson,2009,p.33). Therefore, engaging the lumbar core effectively can help distribute the weight evenly.

To develop a sense of the lumbar core's location, walk a few steps forward and then backward while being attentive to the lumbar area until you start to identify what is different in the torso balance when changing directions (Johnson, 2009). This often leads to a natural awareness of the lumbar core, likely because we naturally avoid leaning the upper torso backward when moving in reverse. Additionally, Conable's exercise on *rediscovering balance around the lumbar core* (Johnson, 2009, p.64) reveals a previously overlooked posture and sensation during practice. A backward tilt in the back was noticed during playing, and increased comfort was found by adjusting a slightly forward position, especially while sitting. During extended orchestra rehearsals, be conscious of keeping proper balance and reducing tension in the lower back. These re-mapping can relax not only the lumbar core but also the shoulders, leading to a more relaxed feeling in the neck muscles.



Figure 6: Balance around the Lumbar Core (Conable,2000)

The Knee Joint

The final element in exploring any mis-mapped areas for achieving a good balance point while playing the violin is Knee Joint. This joint evenly distributes weight to maintain stability and support while playing the violin. It is essential for maintaining the correct posture as it helps hold the instrument between the chin and collarbone, helping the musician's ability to maintain the appropriate angle and height. A common mis-mapping that many people tend to do is confuse the knee joint with the kneecap. An example is that when someone mentions knee pain, they often point to the front bump on their leg, which is the kneecap. Where in fact, the knee joint is located below the kneecap (Conable, 1995, p.50).



Figure 7: The kneecap and knee joint (Conable, 1995)

There are three basic conditions of the knee: locked, balanced, and bent. When the body loses balance in the lower area, locking the knee helps to preserve the spine and hips. If it's a quick imbalance, the knee locking is temporary, and the knees restore balance with the body. However, if imbalance keeps going, the knee locking becomes chronic, restricting flexible movement in the legs and torso (Conable, 2000, p.31). The femur, tibia (lower leg), and patella (kneecap) are the three bones that together create the knee.

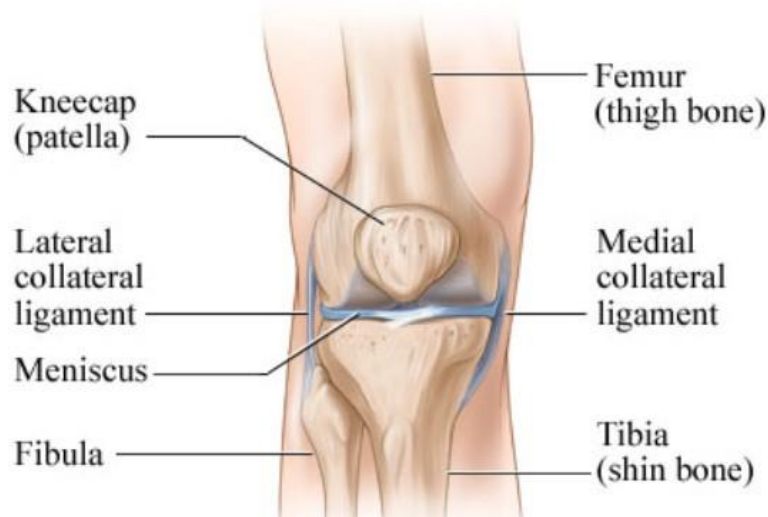


Figure 8: The Knee Joints

To order to find balance at the knee joints, explore Johnson's exercise (Johnson, 2009,p.79-80) on Finding balance at the Knee joints while standing. To perform this exercise effectively, closely examine the picture in figure 8, and understand the different parts of the knee. This visual understanding is key to imitation. First, start by making sure the head is well balanced on the spine and that the neck muscles are not stiff. Try walking backward to help ease the upper torso onto the lumbar core and search for a neutral position at the hip joints. When you are prepared, focus your attention on the knee joints that are located beneath the kneecap. Start

by unlocking the knees while allowing the kneecap and all the surrounding muscles to let go. This action lets the thigh bone gently move forward across the top surface of the tibia to the center, creating a head-on meeting of the two bones. As the tension reduces, the muscles surrounding the kneecap will relax. With this adjustment, the weight is efficiently distributed through the lower leg bones and feet. As you free your neck, you may notice that the spine is growing taller, giving you the impression of growing taller. Explore this process further until the thigh bone finds a balanced, centered position directly over the lower leg bone. Be patient; having had chronic knee pain for years, it may take weeks or months to find the balance point. Consequently, encountering difficulties in relaxing the surrounding muscles of the kneecap is common. These muscles are constantly working to support and stabilize the body during play, which makes relaxation challenging. Additionally, doubts in violin position and posture could contribute to this difficulty. However, a gradual learning process is necessary to experience an improved sense of balance within the knee joints.

Remapping Mis-mapped Arm: Joints and Bones

When it comes to violin playing, understanding the anatomy of the upper limb and its function is important, as are their limitations. It helps musicians acknowledge their function without pushing their bodies too hard. As playing the violin involves repetitive arm movements, these parts are at risk of pain and discomfort, limiting performance. A healthy musical career depends on understanding what might go wrong and how to prevent any mis-mapping (Watson, 2009).

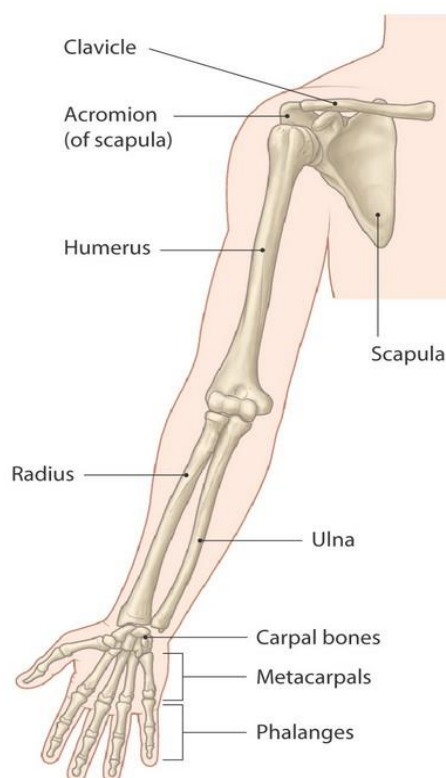


Figure 9: The upper limb

As figure 9 shows, an arm consists of several parts, including a collarbone, shoulder blade, upper arm bone, two lower arm bones, a wrist, and a hand (Conable, 1995). The joints that connect the different parts of the arm are the upper and lower arm joints. The upper arm joints connect the upper arm bone (humerus) with the shoulder blade (scapula), while the lower arm joints involve connecting the lower arm bones (radius and ulna) and the wrist (ASSH, 2023).

The sternoclavicular joint (SC joint), humeroscapular joint, radius and ulna, and wrist are the four main arm joints that are essential for playing the violin. Each joint has a specific function that allows the smooth, precise motions that violinists need to produce good music and comfort.

Arm Joint 1: The sternoclavicular joint (SC joint)

SC joint is the joint that connects collarbone and sternum, enabling shoulder arm movements, including shoulder elevation, depression, protraction, retraction, and rotation movements. Therefore, the sternoclavicular joint is required to be flexible to accommodate a better arm movement and strong to form a stable connection between the arm and the body (Sangal, 2023).

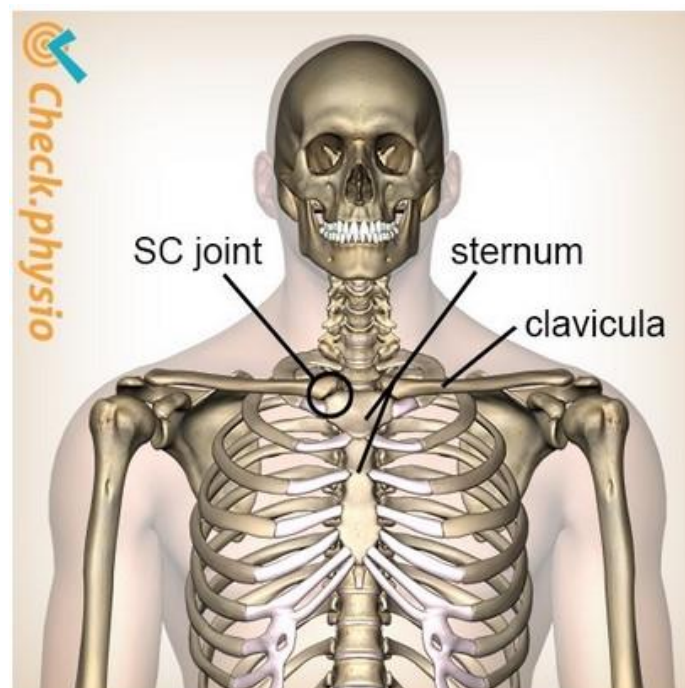


Figure 10: SC joint location

Common mis-mapping violinists often attempt is miss-mapping the collarbone during playing. Violinists frequently tend to lift their collarbone/shoulder when holding the violin with their shoulder rest or chinrest, resulting in tension and pain in the shoulder and neck areas. In addition, lifting the collarbone with an unbalanced amount can also cause excessive pressure

on muscles, limiting the collarbone's normal motion and causing stiffness and harder flexibility in adjusting various playing positions.

When Johnson questioned some violinists about the function of the collarbone in relation to the SC joint, the answers were mostly related to its role as a shelf for the instrument. However, as previously mentioned, the collarbone should move freely and healthily to avoid any discomfort or restricted movement. Allowing movement at Arm Joint 1 while playing is important, and therefore, Johnson's exercise can be a helpful tool to experience SC joint mobility (Johnson, 2009, p. 89–90). Begin by playing open strings, ensuring that as you travel to the lowest strings, you pay attention to the relationship between the shoulder blade, humerus, and collarbone. The shoulder blade should follow closely behind the humerus. The collarbone starts rising as it pivots on its joint with the sternum. Be careful that it is not just the bow-arm collarbone that moves while playing; the shoulder blade should also move along with the humerus (feel free to explore the other movements from arm joint 1 in both arms). Then, allow the left collarbone to move forward so that the violin moves into the bow on every up bow. When you start rediscovering, try improvising a passage above seventh position, and as you prepare to move the hand back down to first position, allow the collarbone to move up to temporarily aid in the security of the violin during the downshift. Briefly, the sternoclavicular joint plays a crucial role in positioning the violin, moving the instrument up and down, and shifting to higher positions. Additionally, it helps get the tip of the bow into good contact with the strings (Conable, 2000).

Arm Joint 2: Humeroscapular joint

The humeroscapular or “glenohumeral joint” is the main shoulder joint connecting the upper arm bone (humerus) with the shoulder blade (scapula). “If SC joint is mis-mapped and the collarbone/shoulder unit is held back or down, either because of the good posture disease or “get your shoulders down” advice, arm joint 2 will undoubtedly be mis-mapped” (Johnson, 2009, p.90). Violinists often mis-map the humeroscapular joint in several ways. First, when they pull their scapular too close to the spine, it prevents an easy movement forward and up when raising the violin to play. This results in muscles working in direct opposition to one another, creating huge tension. Second, violinists can be unaware of the importance of the scapula to the humeroscapular joint. They might mistakenly think that the shoulder joint is only a connection between the humerus and the torso (Johnson, 2009, p.91).

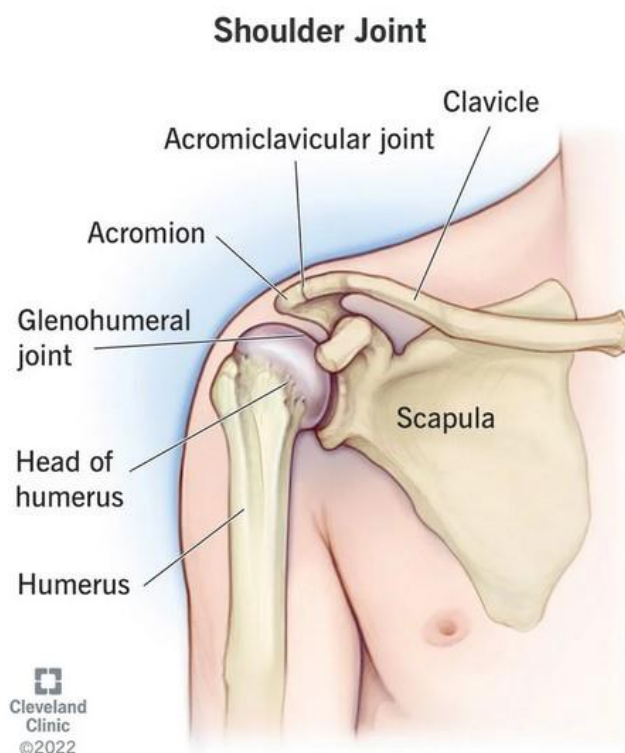


Figure 11: Humeroscapular Joint or “glenohumeral joint”

With the aim of understanding the function of the joints and muscles, the shoulder blade can move in four directions: it can be lifted (elevation) and lowered (depression); glide outwards (abduction) and inwards (adduction). Additionally, it can be rotated to help lifting the arm (Franklin, 2002,p.30).

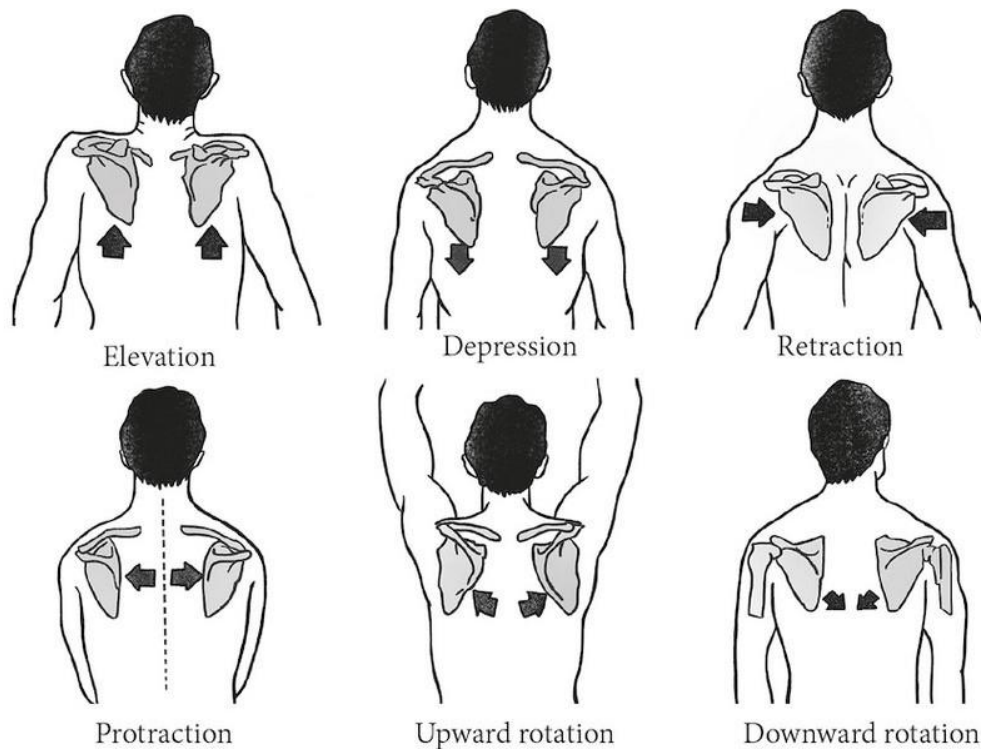


Figure 12: Scapular (shoulder blades) movements

While most violinists can easily control the back-and-forth and up-and-down movements of the upper arm bone, they often ignore the importance of the arm joint's rotation (arm joint 2) and ignoring the humeroscapular joint's rotation can reduce tone quality and comfort. Therefore, a mis-mapped humeral rotation at arm joint 2 would explain for example why a bow has a satisfying sound in the lower half but cannot sustain in the upper half (Johnson, 2009,p.92 -93).

Over-rotation refers to extreme shoulder joint bending or rotating. Violinists can get into issues in two ways:

- 1. Disconnection in Arm Movement:** When the arm is over-rotated, it means that the coordination between the parts of the arm is disrupted, resulting in mis-mapping and a less efficient and controlled movement of the arm. Such as getting asked to locate the elbow under the violin to set up the left arm so the pinkie finger can reach the strings. The issue with this is focusing on wrong joint (elbow joint only), rather than combining humeral rotation, a forward movement of the collarbone, supination at the elbow joint, and forward movement of the pinkie hand bone (Ulna) (Johnson, 2009, p.93).
- 2. Incorrect Bowing Technique:** violinists who over-rotate their arm downward (see figure 12) while bowing to produce a louder tone may unintentionally misapply arm weight to the bow. When this happens, the collarbone and shoulder blade may be pulled out of their balanced positions. As a result, vibration and sound quality are lost when the arm's weight is not efficiently transferred through the bow into the violin string.

"The humeroscapular rhythm is a description of what happens when lifting an arm. It is a subtle combination of upper arm movement in the shoulder joint and rotation of the shoulder blade on the thorax" (Franklin, 2002, p. 33). The focus of humeroscapular rhythm is to ensure a smooth and even motion of the arm and shoulder. This rhythm is mostly important for violinists while playing various bowing techniques, such as spiccato, sautille, and string crossing. The humerus and the shoulder blade work together to enable the bow to move fluidly.

Arm Joint 3: Elbow

The elbow joint is situated between the upper arm bone (humerus) and the two bones of the forearm (ulna and radius). The ulna bone controls the movement of bending and unbending, while the radius bone controls the movement of rotation. Few people experience bending and unbending pain . However, many people have problems with incorrect rotation at the elbow, resulting in tennis-elbow (Conable, 2000).

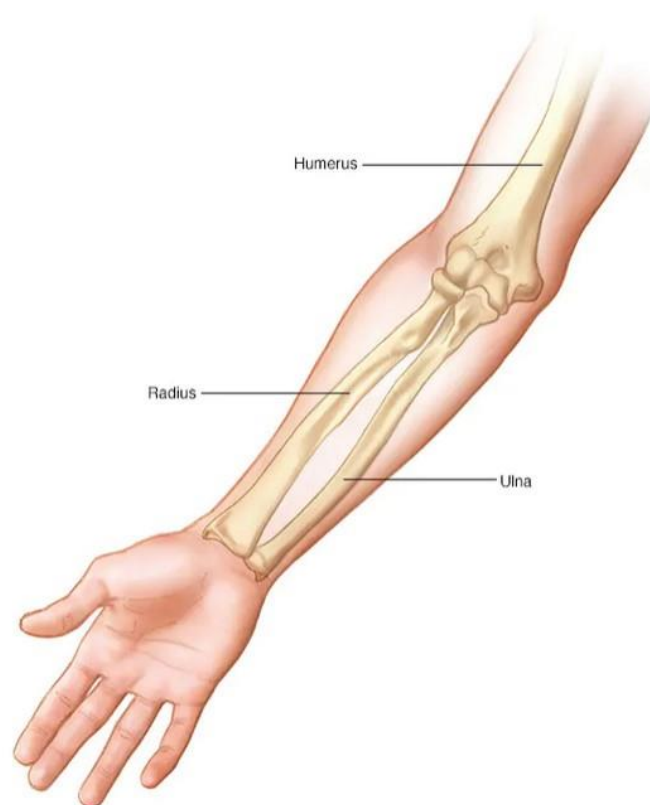


Figure 13: The Ulna and Radius Bones

1. The bending and unbending movements:

Some violinists are aware of this information, while others are not. However, it is important to note that the upper arm muscles (humerus) play a main role in the left arm movements such as shifting up and down and producing elbow vibrato. When we raise the violin, our elbow bends, and the ulna's main job is keeping a good balance on the humerus as we begin playing.

Weakness to achieve this balance can result in unnecessary muscle tension in the upper arm.

As well, mis-mapping the elbow joint in the right arm might cause stiffness in movements. This stiffness limits the violinist's ability to move the bow freely and produce resonating sounds. For example, difficulties in achieving bow strokes like spiccato can often be related to the mis-mapping of the elbow joint, as well as the mistaken belief that fingers and wrist movements are the parts that will help. It is essential to understand that every bow stroke and pizzicato requires free bending movement from the bow elbow joint.

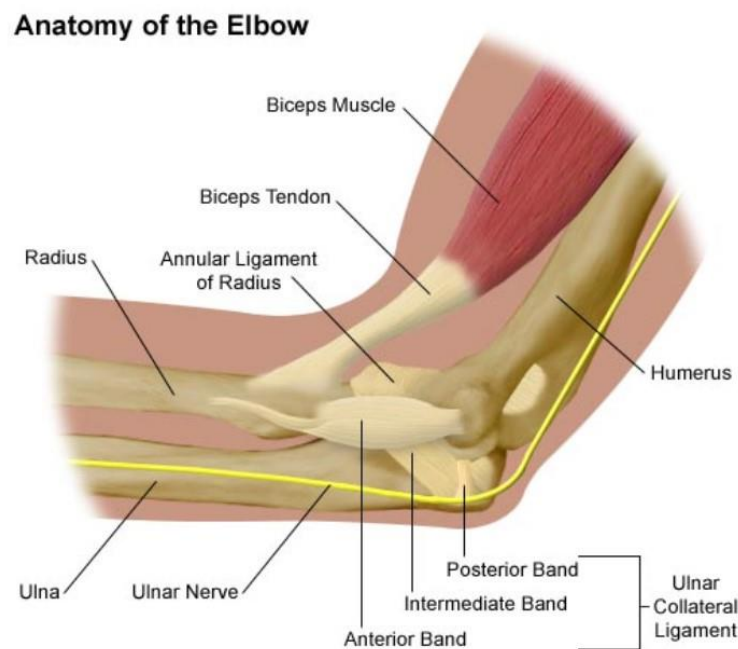


Figure 14: The perch of the Ulna on the Humerus

2. The rotation movements:

When violinists bring the violin into playing position, they are bending and rotating at once. Misunderstanding the rotation is what causes most problems. Violinists tend to reduce the length of their lower arm rotation, assuming that the rotation centers around an axis located on the thumb side of the lower arm. For example, this can happen when we don't rotate our hand sufficiently to comfortably use the fourth finger for playing on the G string (Conable, 1995, p. 56). Some violinists might develop soreness and carpal tunnel syndrome because of misunderstanding the ulna's function. "Tendonitis is the diagnosis given when a violinist injures

the tendons at the elbow by chronically attempting to rotate the ulna in the pronating and supinating movements from the elbow” (Johnson, 2009,p.101).



Figure 15: The Ulna and Radius rotation movements

Therefore, to get a sense of the radius of your right arm, use your left hand's fingers to feel along it. You will discover that feeling the radius at the wrist is easier due to less muscle tissue. Make three marks along the bone: one at the wrist end, one halfway up, and one below the elbow side. Notice how the mark moves when you turn your palm-down. Notice how the mark nearest the elbow does not move while the radius bone rotates around. Johnson has categorised the rotation movements into two types:

1. Unhealthy rotation

With your hand and forearm placed palm up in a sheet of paper, draw lines on each side of the arm, one across the ulna and the other across the radius. Unhealthy rotation is moving your hand palm-down to switch the positions of the two bones, putting tension on the ulna where it connects to the humerus. Since the ulna is not intended to rotate, this move will create tensions

on the tendons, muscles, and the elbow joint. In addition to the twisting the back of the hand, this unhealthy rotation crocks the wrist that the thumb lines up with the radius instead of the neutral, healthy position where the pinkie lines up with the ulna (Johnson, 2009,p.102-103).

2. Healthy rotation

With your hand and forearm placed palm up in a sheet of paper, draw lines on each side of the arm, one across the ulna and the other across the radius. Healthy rotation involves moving your hand palm-down while keeping the ulna in its original place. You will see that the radius line has a new location, far from the first radius line. Draw a third line at this new place. Notice how the thumb, pinkie, and the wrist feel freer and more relaxed without tensions (Johnson, 2009,p.103).

Arm Joint 4: Wrist

The wrist joint is a complex joint formed by multiple small bones in the hand. It allows a variety of motions, including a flexion, extension, and rotation (Jones, 2023). In violin playing, the wrist joint plays a main role in allowing precise bow control and producing a rich sound. As well as achieving various bow strokes with comfort. Many violinists suffer from severe wrist problems from poor rotational movement at the elbow. “These mis-mappings can originate from different joints, but the result is the same: the eight little wrist bones are jammed together or moved out of right relationship to each other, restricting movement at the wrist. A player experiencing wrist problems needs to check how he/she has mapped the structure and function of both the elbow and wrist joints to discover the source of poor movement at the wrist” (Johnson, 2009,p.106).

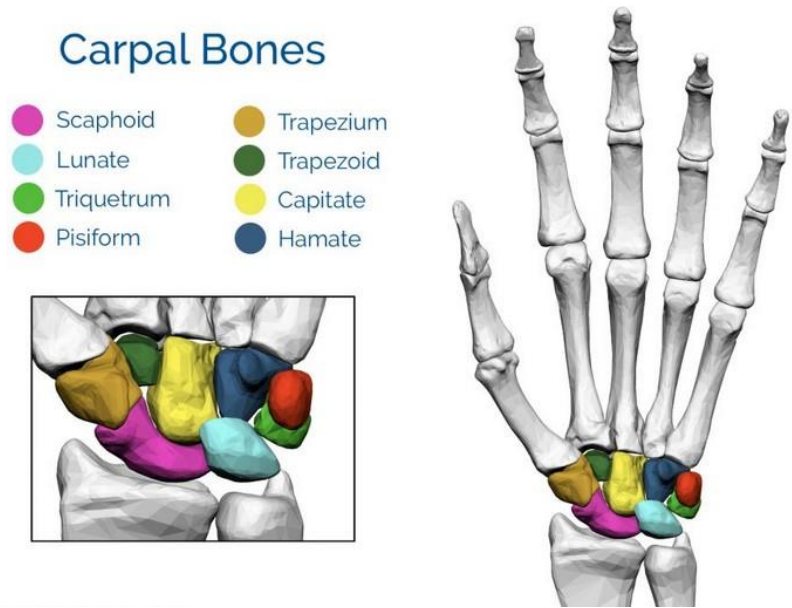


Figure 16: Carpal Bones

In Figure 16 , you can notice the wrist, which includes eight carpal bones placed in two rows. This facilitates smooth passage of nerves, tendons, and blood vessels. The wrist is defined by three joints connecting the carpal bones rows together. This multi-joint structure significantly enhances the wrist's flexibility, in contrast to a single hinge joint that permits movement in only one direction (Jones, 2020). There is a YouTube video (Kuo, 2020) I came across from Jennifer Johnson where she demonstrates the violinist's wrist's range of motion to two aspects:

1. **Extreme Supination :** This results from mis-mapping the thumb, causing tension and restrictions in the wrist movement to side-to-side motion.
2. **Increasing pronation:** This improves wrist mobility, enabling fluid and controlled bowing, as well as keeping the natural level of the pinkie with the radius bone.

Johnson (2009) provided a list of common mis-mappings in violin playing that are helpful to keep in mind both when practicing and performing:

- **Back Muscles Engagement:** As the back muscles support us, avoid overarching the lumbar spine, pushing hips forward, and locking knees, ensuring that the lower back and hip joints align with the knees and ankles while standing or seated.
- **Kneecap Miss-Mapping:** The kneecap is just a part of the knee. Over locking the knees can give the sensation that the kneecap is the entire knee, limiting flexibility.
- **The A.O Joint Awareness:** Mis-mapping the A.O. joint could result in problems, like squeezing the violin and making the head, chin, or jaw work hard to hold onto the chinrest. Make sure to balance between the five points of supporting the violin (the head, left hand, collarbone, side of the neck, and bow-string contact).
- **The Collarbone Flexibility:** The collarbone should move freely and be balanced over the torso rather than pressed on top of the ribs while holding the violin.
- **The rotation movement:** it happens when the radius bone rotates its joint with the humerus rather than the wrist joint. Therefore, when curving the pinkie over the strings, for example, focus more on the thumb side of the arm than the wrist joint.
- **Shifting Movement:** Smooth shifting up and down demands movements mainly from arm joint 2 and a bit from arm joint 1, as the elbow cannot provide the side-to-side direction.

Discussion

The aim of this thesis was to answer the question: does understanding the function of bodies through body mapping truly benefit violinists' artistry and well-being? In order to answer this, three core aspects were explored: increasing the sense of kinesthesia; remapping mis-mapped neck muscles and bones related to breathing; and remapping mis-mapped joints and bones while playing the violin.

Within the thesis, understanding the concept of kinesthesia has significantly improved my awareness of my body's movements and joint sensations. It has made me more conscious and mindful of the stress within my body, especially since I frequently use a mirror for adjusting my left- and right-hand techniques. I found that increasing my kinesthetic awareness was extremely important for addressing the parts of my body that I do not feel are truly tensed. During the process, I addressed several issues, including neck tightness, improper relaxation of the shoulder blades, and, for a short period of time, wrist pain caused by playing a long, repetitive theme written for the second violin in an orchestra project. Consequently, exploring solutions to these problems through body mapping was quite helpful. Yet, going through this brought about a sense of impatience in terms of releasing tense muscles. This approach is a multi-step process. It begins with first noticing tension, followed by locating the exact tensioned area within the mind. Then concentrate on relaxation by adjusting other bones and muscles surrounding the area and keep watching and relaxing until the tension automatically releases without conscious effort and becomes a habit.

In my personal experience, I have frequently felt limitations in my breathing, whether while playing or not. The chin and the neck are the main parts that support the violin, as well as the starting point of the breathing process. Thus, exploring my mis-mapped areas was also

important for achieving more unrestricted and natural breathing. Experiencing Conable's suggestion on feeling the pharynx muscles working while swallowing and feeling the condition of the pharynx, whether it is restrained or not made me start thinking about the placement of my violin. Indeed, I felt that my violin's position is causing some tension, and I started looking for a more relaxed position while focusing on relaxing the five violin hold contacts and feeling the vibrations of my violin.

Moreover, I have gained an understanding of the importance of balancing my head's weight and neck when holding the violin without using unnecessary tension. I discovered that I was mis-mapping my A.O. joint too low, which restricted my head from gently nodding onto the chinrest. As a result, I experienced improved relaxation in my neck, better balance, and a significant reduction in the brown mark on my neck. In addition, violin players often hold their bodies in a rotational, neck-titling, and raised left shoulder position, causing pain and an imbalanced load on the lumbar core. As previously stated, ensuring a healthy lumbar core and proper violin holding, whether standing or sitting, is essential for maintaining a balanced and stable posture, especially during long orchestra rehearsals. Performing Conable's exercise on rediscovering balance around the lumbar core helped me indeed sense my lumbar core. For example, I have experienced a sense of tension while sitting and practicing with the music stand in front of me. To find a good balance point, I moved forward slightly while aiming as well to maintain balance in my A.O. joint and shoulder blades. I realized that these aspects are connected, and I must be cautious not to mis-map other parts during the process of discovering and mapping. Therefore, maintaining continuous kinesthetic awareness is essential.

The process of remapping and exploring my mis-mapped joints, including the sternoclavicular (SC) joint, the humeroscapular joint, the elbow joint, and the wrist, has given me a deeper

understanding of the functionality of the upper limb and its limitations. I obtained a clearer understanding of the collarbone's role in relation to the SC joint, as well as its anatomy and length, a part where many of us often mis-map the joint where the collarbone meets the shoulder blade (see figure 11). As mentioned, like many violinists, I have seen the collarbone as a shelf for the violin. However, as Johnson points out, the collarbone should move freely and healthily to avoid any discomfort or restricted movement. These days, I am frequently thinking of the relaxation of my collarbone and how it connects with my shoulder blades and humerus while practicing. Nevertheless, I have faced some challenges, especially with my left-hand collarbone when playing in higher positions and holding onto the violin. As a result, I have made progress in finding a better balance among these areas, but it still needs time to become natural.

Furthermore, I found the mapping of the elbow and understanding how the ulna and radius contribute to its function and to the pinkie and thumb to be essential for avoiding limitations, pain, or injury. Now, I understand that the ulna bone and the humerus are connected and that these hand parts are the ones responsible for the bending and unbending during shifting and elbow vibrato (hand vibrato) techniques. Thus, when I feel tension in the humerus, elbow (ulna bone), or thumb, I now realize the connection among these three parts. This awareness helps me release tension, especially when vibrating with the pinkie finger, whether on the G string or in higher positions. On the other hand, as Conable pointed out, many people struggle with incorrect rotation at the elbow, and this is where the role of radius takes place. We often mis-map the function of the ulna with the function of the radius. Violinists always need rotational movement in their left hand, and this action begins by positioning the thumb without stiffness rather than mis-mapping it with the wrist role. Now, I understand that if I feel pain in the wrist area, it means that I am not rotating properly and balancing the parts of the hand well. When violinists bring the violin into playing position, they are both bending and rotating at once, so

it is important to understand the function of these movements and the potential reasons behind any limitations, pain, or injury. Overall, playing with the upper body bent backward and the head pulled forward prevents taking a full breath, affecting the ability to breathe easily while playing (Kelly, 1998). A relaxed neck supports smooth movements and improves sound quality. A stable lumbar core supports posture and reduces the risk of strain. Well-balanced knee joints ensure stability and improved blood flow. Ignoring these balance points may lead to limitations that affect sound projection and injuries.

In conclusion, musicians cannot perform music without taking care of their bodies. Selecting Beethoven's Kreutzer Sonata and Shostakovich's Piano Trio No. 2 to be performed in a single concert was one of the reasons that led me to explore body mapping. These two pieces demanded a high level of stamina and muscular strength, which made me uncomfortable and anxious. Therefore, I wanted to ensure that I could maintain my strength throughout the performance with feelings of enjoyment. This thesis aimed to explore the concept of body mapping and its benefits for violinists' artistry and well-being. My findings support that understanding body mapping improves musician's performance and overall well-being. I hope this thesis will encourage other violinists to explore body mapping and its importance within the musician's career, because body mapping is all about self-exploring and remapping the joints and bones that you feel may be limiting your performance. Taking into consideration the results of this research, it would be advantageous to provide body mapping classes, especially in the early years of a bachelor's degree. This is particularly important since musicians practice for long hours and might lead to the development of harmful habits resulting in pain, injury, and limitations. Given more time, I would have further explored body mapping's influence on the arm joints and bones. I recommend Jennifer Johnson's detailed insights into the functionality of finger joints and their importance in violin playing to every violinist.

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