Alignment and Nonsurgical Pain Relief Methods for Musicians: A Trumpet Player's Perspective

Jack Wengrosky, Jr.
University of Miami, jwjazz99@gmail.com

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UNIVERSITY OF MIAMI

ALIGNMENT AND NONSURGICAL PAIN RELIEF METHODS FOR MUSICIANS:
A TRUMPET PLAYER’S PERSPECTIVE

By
Jack Wengrosky, Jr.

A DOCTORAL ESSAY

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Musical Arts

Coral Gables, Florida
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UNIVERSITY OF MIAMI

A doctoral essay submitted in partial fulfillment of
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A TRUMPET PLAYER’S PERSPECTIVE

Jack Wengrosky, Jr.

Approved:

____________________________  ______________________________
Brian Lynch, M.M.                        Timothy Conner, B.M.
Professor of Studio Music and Jazz          Associate Professor of Practice
                                Instrumental Performance, Trombone

____________________________  ______________________________
John Daversa, D.M.A.                        Guillermo Prado, Ph.D.
Associate Professor, Chair of
Studio Music and Jazz                        Dean of the Graduate School

____________________________
Brian E. Russell, Ph.D.
Lecturer, Music Media and Industry
Alignment and Nonsurgical Pain Relief Methods for Musicians: A Trumpet Player’s Perspective (December 2017)

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Three out of four musicians may experience musculoskeletal pain that interferes with their ability to perform optimally. Within that group, the modern trumpet player must uniquely contend with high compressive forces on the muscles of the torso, which temporarily raise ocular and blood pressures. Also, the compressive forces temporarily affect heart function, and require the trumpet player to counteract negative external forces on the head and neck where the trumpet connects with the embouchure. When the rigors of performing music are combined with poor technique, poor posture, and general misuse of body mechanics, the chronic pain and injury to the body may be the result. Body misalignment can reduce the space that is needed for the joints to work smoothly, and may result in pain and inflammation in the body. When good posture is regained and postural behaviors are improved, the musculoskeletal system can operate freely, and pain may be reduced or eliminated. Somatic methods of alignment and movement behavior may provide a variety of nonsurgical solutions. This essay attempts to match documented complaints with sources that identify a set of postural corrective movements, which the author has personally applied, to address and correct pain and postural misuse. The twenty-one step alignment routine may benefit all musicians, and allow music educators to address performance efficiency problems not associated with improper technique.
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CHAPTER 1 INTRODUCTION

Approximately seventy-six percent of all musicians will report musculoskeletal pain from performing or teaching music on a regular basis.\(^1\) Additionally, trauma to the body by overuse or accident may cause body compensations that could result in poor alignment, bad technique, and long-term joint damage.\(^2\) Modern trumpet players are the soprano voice of the brass family, and have to contend with unique extremes in an effort to play the instrument that affect the body in many ways.

In 1996, Hunsaker and Ramsey conducted a study of the effects on how playing the trumpet affects the heart. They concluded that the act of playing trumpet appeared to temporarily raise heart rates higher than other members of the wind instrument group.\(^3\) Additionally, trumpet players experience momentary spikes in intraocular and blood pressures throughout the range of the instrument. Clarinet and oboe players experience the phenomenon only when playing in their upper registers.\(^4\) The physical demands while playing the trumpet can make maintaining good posture a challenge, but keeping the body in alignment may be the answer to minimizing the negative effects, and prevent the musician's workload from causing pain or damage.

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\(^2\) (Ibid.), 45.


\(^4\) Heinan, Michelle, “A Review of the Unique Injuries Sustained by Musicians,” 45.
When trumpet students first begin to play, they are likely to use excessive force, raise their shoulders, and strain from the weight of the instrument. The widely regarded model of early jazz trumpet players, Louis Armstrong began to increase his upper range to concert Eb6 around 1925. At a time when most cornetists and trumpeters rarely played above concert Bb6, Armstrong had set a new standard of the trumpet’s usable range that was copied by many who heard him. Unfortunately, due to the constant use of the upper range, and overuse injuries, Armstrong developed a rupture of the obicularis oris, named Satchmo Syndrome. Currently, the usable range of the trumpet has increased, and some players have regularly performed up to C7 or higher as demonstrated by Wayne Bergeron’s performance of “Oh Holy Night,” arranged by Tom Kubis, which can be viewed on YouTube. The increased demands on trumpet players, and documented complaints of musculoskeletal pain and injury reported among all types of musicians, raise a need to minimize pain and injury, and maximize efficiency. Keeping or returning the body to good alignment may be the answer to maintaining an environment of health and well-being for student, amateur, and professional musicians.

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Background and Environment

Achieving good alignment may benefit all musicians, but there is a need to design treatments for brass and specifically trumpeters as a separate category. For example, in a study by Bejjani, Kaye, and Benham, the musculoskeletal system of instrumentalists changes based on the instrument they play. The current pedagogical approach involves counseling students not to slouch in their chair and to stand up straight; however it may not address a forward head posture or rounded shoulders. Simply straightening the back may cause a student to straighten the lower back and create tension that may cause a sway or an arch that may create serious lower back problems. Musicians and educators need a whole-body model to keep the body in good alignment and pain-free.

There are various ways to model and diagnose good posture through kinesiology, and somatic techniques like yoga, Alexander Technique, and the Egoscue Method. In order to assess shortcomings in posture, this study includes an illustration of good posture and an assessment method that a player or his or her teacher can easily ascertain. Researchers have identified many of the common injuries to brass players, and using a selected list of what pain and injuries trumpet players experience provides a framework for determining what postural alignment techniques or physical therapy exercises to deploy. Having established that framework, short postural routines that consciously maintain postural efficiency can provide a set of techniques to help musicians on a

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healthy path in music, and serves as a tool for wellness and to make performing as efficient as possible. In a personal journey to correct musculoskeletal pain after twenty-one years as a professional commercial trumpet player, I could find few scholarly resources that addressed my postural compensations specifically as a trumpet player that may have contributed to pain and three surgeries.

**Problem Statement**

Performance-related injuries often go undiagnosed and players often rely on teachers or anecdotal evidence regarding the injury and how to treat it. When a player does seek medical advice, he or she may be told to stop playing or to rest. During collegiate or professional endeavors, prolonged periods of rest may not be an option for musicians. After resting, a player may resume with the same dysfunctions in technique and posture, and musicians may be hesitant to seek or heed medical counsel. Pedagogical systems within the musical field may not address posture over technique for trumpet players, and the teacher and student may fail to improve an insufficiency that could possibly be fixed by better postural alignment and behaviors. Focusing on improving technique alone may fail to account for unconscious tension patterns that can manifest from the beginning level, and be difficult to change. The modern trumpet player, because of the increased risks and demands of endurance and range, must maintain the musculoskeletal system to maximize efficiency and minimize or avoid pain.

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13 Ibid, x.
Justification

Even though there is more awareness and information for performance-related injuries than in the past, the prevalence of those maladies continues. Researching for nonsurgical solutions can be time consuming for a musician to find the right answer. Health professionals surveyed in a study by Zaza, Charles, and Muszynski noted that many musicians who are in pain will try to make adjustments to their posture, modify their instruments, and participate in detrimental unguided strengthening.\textsuperscript{15} Medical professionals may assume that after the patient receives treatment, they will stop the activity that caused the pain. Ceasing to play is not an option for a professional musician; many will continue to play in pain and adopt negative strategies rather than stop playing.\textsuperscript{16} This study seeks to provide a daily, clear, and methodical approach to maintaining proper musculoskeletal mechanics; it takes into account the added and consistent stresses related to playing trumpet or other musical instruments.

Misalignment occurs from improper posture, and the result of taking the body out of a natural position is a reduction in spaces between the joints. Without the space for the joints to move properly, they may degrade over time resulting in soft tissue damage and arthritis. While supervised or directed exercise cannot heal a complete muscle tear, a study of shoulder injuries showed that the group that completed physical therapy had improved pain reduction and movement, and the control group that did nothing got


\textsuperscript{16} Heinan, Michelle, “A Review of the Unique Injuries Sustained by Musicians,” 46.
worse\textsuperscript{17} Proper alignment techniques with player-specific exercises may halt or greatly delay the damage.\textsuperscript{18} Trumpeters exacerbate poor body mechanics while holding up an instrument to the face by engaging in diaphragmatic compression and isometrics while sitting, standing, or marching.\textsuperscript{19} Because of the ongoing muscular stressors, standard somatic therapies may need supplemental or additional modalities like physical therapy exercises to keep or regain optimal alignment.

When a person regains and maintains proper alignment, the essential space in the joints lost from poor posture may be restored, and begins the first step in creating a healing environment.

**Purpose and Research Questions**

The purpose of this study is to establish a baseline for good posture; to catalog a selected list of performance-related injuries in trumpet players; and to match existing solutions through somatic and traditional physical therapies to reduce pain and possibly prevent future injuries. Because of the additional workload of high-brass players, this group represents the extremes of negative forces used for performance. This study will distill a daily routine in order to daily maintain musculoskeletal alignment and wellness. This study will answer the following questions:

1. What are the most common pain or injury complaints for trumpeters?
2. What is considered good musculoskeletal alignment and why is it important in maintaining wellness and good musicianship?

\textsuperscript{17} Johnson, Jim *Treat Your Own Rotator Cuff* (Indianapolis: Dog Ear Publishing, 2006), 33.
\textsuperscript{18} Ibid, 49.
3. What therapies are appropriate to treat common injuries, and what can a player do on a daily basis to prevent injury or relieve pain while enabling the body to produce the most efficient sound possible?

**Delimitations**

This study is based on published materials that identify postural problems of trumpet players, and musculoskeletal problems that the author has determined may be attributable to performing as a professional trumpet player for over twenty years. The results and postural correction routines included in this study are based on published books that recommend the routines, and personal experiences of trial and error. The author has sought instruction by certified yoga, Egoscue Method, and Alexander Technique teachers, and determined that private instruction is preferable to text versions. The material provided in this study is intended to be informational, and is not intended to cure any condition or replace the advice and treatment of a medical professional. No individuals, other than the author, have been studied or surveyed about usage of the postural routines contained in this essay.
CHAPTER 2 LITERATURE REVIEW

This chapter reviews the literature used as sources in this study, and establishes the terms relevant to postural alignment methods; also included are tables, photographs, and references to postural methodologies. There are five categories as follows:

1. Common Injuries
2. Postural Models and Diagnosis
3. Somatic Methods of Musculoskeletal Alignment
4. Soft Tissue Manipulation and Physical Therapies
5. Trumpet Specific Breathing

Common Injuries in Trumpet Players

Most people experience pain during their lifetime; however, there is a difference between normal aches and pains and playing-related musculoskeletal disorders known as PRMDs. Zaza, et al., collected data to establish a theoretical difference between PRMDs and normal pain in “The Meaning of Playing-Related Musculoskeletal Disorders of Classical Musicians.” The results described a PMRD as having six main characteristics. First, pain must affect playing, at which point the musician may report the pain for the first time. Second, the pain must be chronic, which means the problem is consistent over a period of time, such as days, weeks, or months. Third, the pain is severe, and the musician may use descriptive terms for the pain, such as stabbing, or burning. Fourth, the pain may be described as unusual, felt for the first time, or during a specific activity such as holding the trumpet in playing position. Fifth, pain complaints are also subjective, as each person must judge if a problem has affected their playing, and each individual’s perception and tolerance for pain varies. Finally, PRMDs are beyond the player’s control.
Rest, ice, compression, and elevation are the universal home remedies to control pain, along with massage, NSAIDs, and stretches. PRMDs are often resistant to self-improvement methods.

A study that was based on a University of North Texas Musician Health Survey noted that 60 percent of brass players experienced one or more musculoskeletal problems. The force of pressure from the mouthpieces used by trumpet players exceeded 100 newtons. That is enough pressure to affect tooth alignment and injure the obicularis oris muscle. The internal air pressures are high enough to tear the anterior pharynx, to cause laryngoceles, and pharyngeal diverticula. The highest pain levels for trumpeters were reported in the fingers of the left hand, right elbow, left shoulder, and the lower back. Female respondents in the trumpet group reported higher injury rates in all categories. The trumpet players in this study registered higher pain severity levels in most categories compared to the total brass averages.

A 1996 survey of 2,122 symphony and opera musicians identified 76 percent of musicians reporting a medical problem that affected their performance. Overuse injuries affected more than 50 percent of the musicians surveyed. The authors surmised that overuse may lead to the development of reflex sympathetic dystrophy, followed by focal dystonia. Early treatment for overuse syndrome may prevent the progression of focal

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21 Ibid., 3.
dystonia. Temporomandibular Joint Disorder (TMD) was also prevalent among trumpet players in the survey.\(^\text{22}\)

Trumpet players, regardless of their style while sitting or standing, work with elevated shoulders for more than two hours per session. With the restricted motion, their muscles adopt a limited range of motion. The pain we feel when we suddenly increase the load on the shoulder joints is the body’s warning signal that the muscles are weak and not supple enough to support the increase in weight.\(^\text{23}\) The shoulders are supported by the spine, and if the spine is in constant flexion, the shoulders cannot stabilize and as a result they are pulled forward.\(^\text{24}\)

The contributing factor for shoulder pain is moderate arm elevation reduces blood flow to the supraspinatus muscle.\(^\text{25}\) Nearly 30 percent of the group with less than two hours of elevated arm position, including the trumpets, reported neck and shoulder pain. This study demonstrates the unavoidable positions that certain members of the symphony maintain to perform on their instrument, and highlights the need for a daily routine to counter the negative effects on the muscles and joints.

The body must operate as a unit and may operate differently under stress. Sixteen virtuosi trumpet players were studied while playing in the low register and the high register from low C to high F. Small changes were noted in the head, neck, torso, and sacrum. The knee joints showed the biggest movement. High pressures of exhalation are

\(^{22}\) Bejjani, Fadi Joseph, Glenn Kaye, and M. Benham, “Musculoskeletal and Neuromuscular Conditions of Instrumental Musicians,” 408.

\(^{23}\) Ibid., 141.


needed in the upper register. What this means for posture is that the obliques and abdomen are engaged, while reducing the lordosis (curve) of the lower back. The obliques also pull the pelvis to the posterior. The flexion of the pelvis is determined by the length of the hip flexors and ham strings. The bending at the knees releases the pelvis into a fuller posterior position. In order to maintain our posture, we may need to realign the hips, lengthen the hip flexors, and strengthen the hamstrings. Forward head posture, as described in Chapter 2 of *Forward Head Posture Fix*, may be exacerbated by the combination of forward and downward pressure as the trumpet player ascends from low C to high F above the staff.

The forces that trumpet players use on the head are cited previously as exceeding 100 newtons. In laymen's terms that is approximately 22.5 pounds of force. A professional trumpet player has been exercising the muscles to combat the inward pressure of the trumpet by pulling a virtual 22-pound dumbbell into his face during the length of his career. As the neck muscles that are called the longus colli, longus capitus, and the sternomastoideus, get stronger, the opposing muscles that are called the longissimus cervicus, longissimus capitus, splenius cervicis, semispinalis cervicis, semispinalus capitus, trapezius, interspinalus, and iliocostalis cervicis, get weaker. Figure 1 depicts a gym machine that approximates the forces to the neck and upper back.

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Figure 1. Neck Flexion Machine

As the upper back becomes more rounded from improper sitting, hunching over to see a cell phone, or typing on the computer, the head must shift forward. This adds 10 pounds of pressure for each inch that the head lunges forward. As shown in Figure 2, at only two inches forward, the head now feels like it weighs 30 pounds. The pain that is felt as the neck gets stiff will probably be felt in the trapezius muscle. This can lead to chronic headaches as well.

Figure 2. Forward Head Weight

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29 Starrett, Kelly, Juliet Starrett, and Glen Cordoza, Deskbound: Standing Up in a Sitting World, 46.
30 Ibid., 46.
Rick Kaselj is a kinesiologist, injury specialist, and author, who self-published *Forward Head Posture Fix*. Starting as a personal trainer, he was dissatisfied with the lack of proper therapies for his clients. Kaselj utilized hundreds of medical research and physical therapies and has put together step by step routines that have been used in thousands of personal training sessions. The book includes how to assess posture, and its impact on the musculoskeletal and neural systems. Sitting an average of 13 hours per day, which includes 7.4 hours looking at screens, and 26 minutes a day texting, Americans are taxing posture more than ever before.³¹ The basis of the forward head routine is to “unravel” the neck muscles. The exercises are in a specific order and include: muscle reeducation drills, breathing exercises, mobility exercises, deep cervical flexor training, self-massage, static stretching, and postural stretching.

Identified as a more common disorder among trumpet, violin, trombone, and tuba players, Temporomandibular Joint Disorder can be an overuse injury from contact or overuse of pressure, or from improper alignment. TMD can cause pain, and in extreme cases, sufferers cannot open their jaw. It is usually caused by misuse of the jaw when forming an embouchure. In cases of overuse of the jaw, rest, occlusal splints, and physical therapy are recommended.³² Forward head postures use muscles that are normally used to operate the jaw. This puts the muscles in a constant state of flexion, and when those muscles have become overburdened, the jaw may cease to work.³³

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³² Beijani, Fadi Joseph, Glenn Kaye, and M. Benham, “Musculoskeletal and Neuromuscular Conditions of Instrumental Musicians”, 408.
The study by Parrup, et al., “Occurrence and Co-Existence of Localized Musculoskeletal Symptoms in Work-Attending Orchestra Musicians: An Exploratory Cross-Sectional Study,” reported that the majority of the orchestral brass sections surveyed experience pain mostly in the neck, shoulders and back. The majority of respondents perceived lower back pain, however, the clinical findings from medical examinations found that the majority actually suffered upper back pain. No reason was given for the contradiction between perceived and clinical pain.34

Postural Models and Diagnosis

The medical definition of posture in Merriam-Webster's Dictionary is (1) the position or bearing of the body whether characteristic or assumed for a special purpose i.e. erect posture, and (2) a conscious mental or outward behavior.35 Posture is how we carry our weight; however, over time, we assume the posture is the sum of all our life experiences. The second definition refers to psychological behaviors. Two modalities that specialize in the behaviors of posture are Body Mapping and the Alexander Technique.

Watch a child when he or she is walking. Notice how the child takes a full diaphragmatic breath. This is how the human body is meant to carry itself. The years of fighting gravity, the occasional accident, trauma, and reactions to anxiety, which draws the body close in, result in postural changes. Our bodies adapt to misalignment by

making compensations.\textsuperscript{36} Over time, the poor way we carry ourselves begins to feel normal; therefore, we need an objective way to diagnose our posture.

\textbf{Somatic Methods of Musculoskeletal Alignment}

Biotensegrity is a twenty-first century concept borrowed from tensegrity in architecture. Like a tensegrity bridge, the whole body relies on tension from all the systems to provide structural strength. The theory maintains that the contract, relax, push, and pull body system is a gross oversimplification, and that every muscle has tone even in a relaxed state.\textsuperscript{37} The Egoscue Method likens the body to a scaffold-like structure with interconnecting tensions, and address musculoskeletal pain through motion and alignment exercises.\textsuperscript{38} The biotensegrity concept of an interconnected whole also aligns with the views of the reviewed bodywork methods including yoga, Alexander Technique, Body Mapping, Essentrics, and Natural Posture. In \textit{Healthy Practice for Musicians}, it states that when we deal with the whole-body system, a host of muscles come into play. Not being aware of what the body does, may keep the tensed muscles in a permanently contracted state and a twisted ankle may manifest as tension in the neck.\textsuperscript{39} The author of this book also stresses the importance of maintaining good posture over a lifetime. Tension, habit, action, and disease constantly work against alignment, and the body will break down without regular postural maintenance.\textsuperscript{40}

\begin{itemize}
\item \textsuperscript{36} Porter, Kathleen. \textit{Natural Posture for Pain-Free Living: The Practice of Mindful Alignment}, (Rochester: Healing Arts Press, 2006), 32-33.
\item \textsuperscript{37} Jarmey, Chris and John Sharkey, \textit{Anatomy of Stretching}, 206.
\item \textsuperscript{40} Ibid., 45.
\end{itemize}
Natural Posture for Pain-Free Living: The Practice of Mindful Alignment written by Kathleen Porter, is based on Natural Alignment, which is a system born from the yoga studies of Noelle Perez in Paris, France. Perez studied Yoga in India, and was one of the first Westerners to study with BKS Iyengar. Porter’s book, Natural Posture, adopted Perez’s earlier theories by studying indigenous people who carry great loads on their heads with balance and without injury because their bodies are aligned. Porter believes that the pain people most complain about is from our disconnection from our bodies. The media and fashion have misshaped our perception of posture; and the hours we spend sitting and standing improperly places our bodies in positions that have a harmful effect. Not only does she outline ways to assess and correct posture, but she identifies postural over-correction, which can be just as damaging.  

In part two of this book, the author outlines functional movements such as how to sit, stand and walk with balance. For example, in the past toddlers instinctively knew how to sit with the support of the pelvis. The increasing amount of time toddlers spend sitting in car seats and strollers results in a shortening of the rectus abdominus, psoas, and loss of elasticity in the transversus abdominus. As a result, many toddlers are showing signs of dysfunctional seating habits. In a similar fashion, performers and music teachers can be in a seated position for hours which weakens the leg musculature. Intervention by exercise and periodic breaks to stretch and strengthen the musculature may be essential to avoid a lifetime of misalignment and pain.


41 Porter, Kathleen. Natural Posture for Pain-Free Living, 3-4.
42 Ibid.,140.
The key to correctly diagnosing posture is having a clear and measurable standard for “good” posture. Peter Egoscue developed a postural method after leaving the Marine Corps where he sustained painful injuries during combat in the Vietnam War. He regularly treats professional athletes and clients who have had orthopedic surgeries or who are seeking non-surgical options and has pain clinics across the United States. In *Pain Free: A Revolutionary Method for Stopping Chronic Pain*, he details a portion of his book to self-assessment getting the reader to get in front of a mirror and categorizing their posture into four categories. He also details in his book that all of the body’s systems work in tandem. Therefore, a misalignment in one area can cause pain in another. This study will use the Egoscue ratings for posture and alignment using his scaffold-like body alignment theory. The S-curve of the spine is the defining point of our movement. The curve enables humans to bend, rotate, and twist. The spine, combined with the ankles, knees, pelvis, and shoulder joints that complete the scaffolding, is what keeps humans erect and moveable. Each of these joints should be at parallel or vertical axis. Dysfunction is defined by a lack of motion in the musculoskeletal system. Pain is the body’s warning that a dysfunction is present. Other signs of dysfunction can be present without pain. Stiffness, discomfort, hands that turn in, and feet that turn out are all signs that the system is out of balance. The system is bilateral, which makes self-diagnosis as easy as taking a digital picture and comparing a picture to the scaffolding that Egoscue details in his book.

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44 Ibid, 5-6.
The latest book by Pete Egoscue, *Pain Free Living*, makes the connection between emotion, posture, and good health. One of Egoscue’s mantras is that each person is the best judge of how their body feels. Therapists have experience diagnosing problems, however each person is most aware of what helps relieve the pain, and healing begins when once that person learns to listen to his or her body. The problem that Egoscue discovered that many of his clients were not finishing the full exercise protocol for their musculoskeletal pain because the pain was gone and there was no motivation to keep up the exercises. Common themes in the sources of this essay stress that the body is an integrated system, and postural maintenance should be a continuous or daily activity. The Egoscue Method addresses how and why a person’s pain started; and encouraging them to become aware of their health. Stress, physical or emotional, can start the symptoms of pain that may not be felt until many years later. The loss of positive energy can be viewed as a cause of bad posture, and depression and anxiety can manifest in the tell-tale signs of how the body is held. Therefore, poor posture can be a symptom, not just a cause. The author suggests the reader try each of the three emotionally-based menus from the book, to see which one garners a result. Each of these groups has forgotten how to feel within mind and body by searching for information, negative feelings, and doubt. When the client regains awareness of how the body moves, healing can continue.

*What Every Trombonist Needs to Know about the Body* is a book based upon the principles of body mapping, which is a hands-off form of the Alexander Technique.

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46 Ibid., page 7.
47 Ibid., 2.
48 Ibid., 15.
Kinesthesia as it relates to a musician is the awareness of how movement feels while playing or singing music, however, many are not aware of how the joints work and where they are located. The perception, and actual location of the joints may differ greatly, and may contribute to musculoskeletal pain. The body map can tell us how to use the arms to bring the trumpet up to the lips, instead of moving the head forward. If musicians know how the shoulders move, they may be able to better hold up the horn with elevated shoulders.\textsuperscript{49} One of the common elements of body mapping and the Alexander Technique is the \textit{semi-supine position}. Lying on the floor with the knees bent, the upper torso is aligned. If done quietly and with awareness, one should be able to feel any tension in the body, thoughts and emotions, and how the body makes contact with the floor. Assisting in visualizing the breath, a book can be placed on the abdomen to visualize the breathing motion. Rather than utilizing the scaffold theory of alignment, Body Mapping diagnoses posture assessment at the joints in motion, and is called “the places of balance where all motion takes place.” The term \textit{balance}, rather than \textit{posture}, is adopted as a more accurate description of how we sit, stand and move.\textsuperscript{50} Creating accurate body map can enable a musician to move properly. Without body mapping, problems may start when a person is not aware of where a particular joint actually moves, and can cause a misbalance. Awareness of where the musculoskeletal joints intersect, and how the musical instrument interacts with the joints as we play, the better we can express ourselves while working more efficiently.\textsuperscript{51}

\textsuperscript{49} Vining, David, \textit{What Every Trombonist Needs to Know About the Human Body}, (Flagstaff, Arizona, 2010), 4.
\textsuperscript{50} Ibid., 4.
\textsuperscript{51} Ibid., 4.
Somatic Behavior

The book, Indirect Procedures: A Musician's Guide to the Alexander Technique, written by Pedro de Alcantara, is not an instructional method book, nor a replacement for a teacher of the Alexander Technique who has spent hundreds of hours to be certified to teach the lessons with guiding hands. The material is presented in a way to educate those who are interested in taking lessons, or people who want to learn the theory behind the method. Also, the Alexander Technique is not body-work or an alignment system, although it often achieves those in the process. Although Pedro de Alcantara, cautions that the Alexander Technique cannot be taught by a book, the method is included in this essay because there are numerous studies that confirm its benefit to musicians, and the concepts of awareness must be applied to the twenty-one-step postural alignment routine included in the results chapter of this essay.

F. Mathias Alexander was a stage performer, who lost his voice while performing. After losing his voice a second time after resting it, he surmised that the reason for his dysfunction was not in his throat but in the misuse in his body. Alexander studied and refined the behavior of movement, and developed the method called The Alexander Technique. Tension has a negative effect on the body; however, it can be positive as well. Bad tension refers to a state of improper amount, and location of tension in the body. For example, bad tension in the shoulders may be an indirect result of lack of proper tension in the back, hips, and legs. Creating support in the supporting structures of the shoulders to release pain and tension is the very definition of indirect procedure. Parallel this concept to a trumpet player who does not provide the correct tension in the abdominal

muscles of exhalation, or the proper tension around the embouchure. The player must in turn provide that tension in the lower parts of the torso, the neck, or excess pressure from the mouthpiece on the lips. Music pedagogy has substituted focusing on function or output, instead of good use to achieve good output. The trumpet player who has misuse and cannot play properly is instructed to go home and practice more.⁵³

The following is an example of another Alexander Technique term called “end-gaining.” The term end-gaining reflects the action of treating symptoms, rather than causes. For example, a musician complains of a weak back, and is prescribed exercises specifically designed to strengthen the back. If the misuse lies in the misalignment of the hips and legs, then the back will get stronger without the support of the lower extremities. The back is stronger while the patient is still in pain, and the imbalance widens setting the musician up for an increased chance of injury.⁵⁴ Trying to learn how to play double C is an end-gain strategy. Striving to slowly build upon the range of the instrument using the tongue to control the air and Bobby Shew’s depiction of the Complete Yoga Breath, while controlling tension in the right places, avoids end-gaining.

Means-whereby, is the opposite of end-gaining, and refers to the preferred method to achieve a goal. The intermediate steps of any goal are the most important, as well as the awareness of use to the Alexander Technique practitioner. Awareness is the main focus of the Alexander Technique, and each step along the path of good use is the most important one. Habits are the regular reactions to movement, either good or bad. Bad movements are automatic; they cause pain, and are beyond our conscious control.⁵⁵

⁵³ Ibid., 17.
⁵⁴ Ibid., 18-19.
⁵⁵ Ibid., 21.
Primary Control is Alexander’s term for the relationship between the head, neck, and back, and the head leads the body and where it leads, the body must follow. The energies of Primary Control flow outward; the back lengthens and widens while the head and spine move up. Moving or feeling these directions is the hands-on part of Alexander Technique. The teacher is trained to help the student by not trying to maintain primary control, but keeps the student from making motions contrary to it, such as halting a habitual over-extension just before the student moves.56

The Alexander Technique includes Zen-like concepts, such as non-doing and inhibition. Non-doing forces the student to not move in bad ways. This means, one must inhibit any poor habitual movement until he or she can move correctly when a better habit becomes established. New Alexander Technique students move very awkwardly until not-moving badly becomes a habit. The movements that are left after eliminating bad movements must be good ones.57 The reason that lessons are recommended in somatics, is the concept of faulty awareness. Any person moves in the sum of their experiences, whether it is trauma, emotions, or lifestyle. When we are born, barring congenital defect, babies move with the greatest efficiency, and that is normal for them. As we get older, our experiences mold and adapt to movement that becomes the new normal.58 I have corrected students with forward posture, and noted the improvement in their playing only to return to the strained neck position by the end of the lesson. Instead of directly correcting a poor posture, an educator could inhibit the forward head posture, and might achieve more enduring results. That is why the Alexander Technique student

56 Ibid., 31.
57 Ibid., 49-51.
58 Ibid., 77.
must not judge during poor movement, simply hesitate to move poorly and complete the proper movement.

“Applied Anatomy in Music: Body Mapping for Trumpeters” is a DMA essay by Micah Holt and published by UNLV Thesis, Dissertations, Professional Papers, and Capstones, and is one of the few studies completed for trumpet players interested in good body alignment. Body Mapping is a hands-off version of the Alexander Technique pioneered by Barbara and William Conable, where the teacher redirects misconceptions of where the joints are and how they move. Holt identifies the lack of somatic resources for trumpet players as a result of a culture of improving technique, breathing, and equipment rather than examining how the body’s engine produces the sound out of the instrument and the detrimental effects of bad posture, restricted airflow, and restricted movements that affect our artistry. Holt’s method was to study Body Mapping, and focus on the areas that are relevant to trumpet playing. Awareness that the spine ends at atlas and the skull begins at the occipital bone, referred to as the atlanto-occipital joint, allows for better movement of the head without engaging the neck. He addresses misconceptions on how to sit and stand and provides detailed functions of each of the elements of the musculoskeletal system. The author reaffirms Vining’s preference of the use of the term balance over posture in What Every Trombonist Needs to Know About Posture, and body mapping aims to improve balance, which is described as the feelings associated with posture. This essay utilizes his conclusions related to gripping the

60 Ibid., 6
61 Vining, David, What Every Trombonist Needs to Know About the Human Body, 1-2.
trumpet, along with sitting and standing with the trumpet, as no other source addresses these elements.

*Working Without Pain: Eliminate Repetitive Strain Injuries with Alexander Technique: Eliminate Repetitive Strain Injuries with Alexander Technique*, written by Sherry Bergeron-Oliver and Bruce Oliver, strives to ease the risk of every day misuse problems that often progress into repetitive stress injuries. She explains the Alexander Technique term, “advantage” as the discovery of the Primary Control. When a person balances the relationship to the head, neck, and spine, movement becomes pain-free and fluid. Many factors that can interfere with the Primary Control are not always alignment based, such as anxiety at work, pressure to perform, indecision, and changes in workloads or practice duration. Alexander recognized the relationship of the psyche to tension, so Bergeron recommends that people should be aware of the stress-tension relationship, and then strive to change their reaction to it. Repetitive strain injuries can be avoided by early detection, releasing stress, and changing bad habits into good ones.

**Soft Tissue Manipulation and Physical Therapies**

The shoulder is a complex set of bones and connective tissue. Unfortunately, the socket where the upper arm meets the torso is relatively shallow. This makes the area vulnerable to misalignment or injury, and statistically 54 percent of adults will develop a rotator cuff tear after the age of sixty. Jim Johnson’s *Treat Your Own Rotator Cuff*,

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63 Ibid., 30-37.
explains in the inner workings of the shoulder joint and clears up many misconceptions about the rotator cuff. The rotator cuff is actually four flat tendons that surround the humerus, and not to be confused with the four rotator cuff muscles that connect to the rotator cuff. 64 He goes further to explain that there is enough room for the joint to move, but because of the small space allowed in the subacromial joint, very small misalignments can cause impingements which consist of soft tissues being damaged between two adjacent bones. 65 The book identifies multiple studies that came to the conclusion that therapy exercises improve rotator cuff pain and tears, while the condition of the shoulders of the control groups waiting for treatment became worse. 66 The author points out that controlled studies show that stretching once per day for thirty seconds for five days per week produced the best results. 67 This book also supports the claim that properly stretching and strengthening the shoulder muscles to regain alignment, can relieve pain and joint damage. In light of the research, stretches in this essay’s alignment routine are to be held for thirty seconds.

_Treat Your Own Spinal Stenosis_, also by Jim Johnson, defines spinal stenosis by a reduction of space in the spine. Once the discs between the vertebrae become compressed or damaged, the spinal column may become pinched and the facets may respond to irritation by getting larger, thereby compounding the problem. 68 This book includes stretching and strengthening exercises. Improving proprioception, which defined by _movement outside of what can be seen_ in this book, is very important to musicians as

65 Ibid., 5.  
66 Ibid., 19.  
67 Ibid., 36.  
68 Johnson, Jim, _Treat Your Own Spinal Stenosis_, 12-15.
many of the tasks for a trumpet player involve proprioception, for example fingering the valves, compressing the diaphragm, engaging the upper back and chest, tapping the foot, and even moving around stage. This book, and others cited in this essay, support the premise that proper alignment can restore the condition of the spine without surgery.

Starrett is a physiotherapist who specializes in mobility and body maintenance, and trains the armed services, elite military units, Olympians and athletes. His book, *Becoming a Supple Leopard: The Ultimate Guide to Resolving Pain, Preventing Injury, and Optimizing Athletic Performance*, contains exercises and a philosophy of movement based on the animal’s explosive speed and ability to accomplish that power from a rest position without ever pulling a muscle. Included, are hundreds of exercises and self-massage techniques with detailed pictures showing correct and incorrect techniques and stances. There is also a fourteen-day mobility tune up for those with range-of-motion dysfunction.

Also by Starrett, *Deskbound: Standing up to a Sitting World*, is a compendium of the consequences and remedies of poor posture while sitting, and standing. Starrett quotes the World Health Organization’s assessment that sitting, along with inactivity, is the fourth highest preventable cause of death on the planet. The human body was designed for constant motion. The modern human starts to show musculoskeletal disorder as early as when children start school because they are seated at desks for hours for the first time in their short lives. Children currently spend up to 85 percent of their day in a car, desk,

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70 Ibid., 13.
or on the floor, with a video game. Many schools have reduced or eliminated fitness or
sports programs, and the number of obese students has tripled, while active children are
shown to have more grey matter in the areas that control cognitive thinking and
memory. Adults who work seated in an office report more injuries than construction and
metal industry workers. Our bodies conform to hours of the inactivity of sitting, and
going to the gym for an even an hour per day may not compensate for a day spent being
inactive. Musicians and educators are expected to be seated for hours at a time in the
practice rooms, orchestras, lesson studios, and recording sessions. We can reduce time
that is being spent sitting, by:

1. Sitting only when necessary

2. Moving for two minutes after 30 minutes of inactivity

3. Utilizing posture techniques and good mechanics throughout the day

4. Exercise and stretch 10-15 minutes per day.

The exercises in the book outline proper movement techniques for sitting,
standing, and carrying heavy objects. Also, there are detailed pictures of standing work
stations, and instructions for short mobility routines that can be done at any time of the
day. The final chapters contain menus for pain relief in each area of the body, and range
of motion exercises. Starrett warns the reader to be aware of the difference between
soreness, from tight or neglected tissue, and pain from injury. Ignoring pain when we are
doing any type of exercise or body-work, can be damaging to the joints and tissues.

71 Ibid., 15.
72 Ibid., 7.
73 Ibid., 12-13.
74 Ibid., 25-29.
75 Ibid., 25-29.
Postural Retraining for Pain-Free Living by Craig Williamson strives to eliminate tendonitis, back pain, including neck and shoulder tension. The first half of the book consists of changing our concept that the brain is separate from the body, and stresses that kinesthetic awareness is being aware of our sense of movement. According to the book, that is the key to unraveling pain problems, and if we can feel the movements, we can control the muscles properly and give a sense of bio-feedback to the brain in order to move efficiently.76 The young musicians who Williamson has worked with had pain because they restricted their muscular movements. As the demands of more difficult passages increased, so did the tension in their bodies. In order to eliminate their pain, he had to teach them that kinesthetic awareness and relaxation is the preferred way to solve the problems. Human movement may be a collection of our past experiences, but it is restraining movement that maximizes pain.77. Muscles react to pain, pleasure and stress, and over a lifetime affect how we move and react to stimuli that run contrary to good functional movement. If we regain our pain-free movement, then we can retrain our posture which can enable better musical performance.

Forever Painless: End Chronic Pain and Reclaim Your Life in 30 Minutes a Day rests the blame for chronic pain on the average American’s sedentary lifestyle. Nociceptors are at the end of our nerve fibers and send immediate signals to alert the brain tissue to real or potential damage. When we touch something very hot, signals are sent to the thalamus in the brain. The thalamus sends those pain signals to the somatosensory cortex to determine intensity of the feeling, then to the limbic system

77 Ibid., 6-7.
which tells us how to process it emotionally, and the frontal cortex which tells us how to process it intellectually. This protocol happens in a fraction of an instant, but the neural paths created can last a lifetime when, occasionally, this process becomes a recurring pain loop, an echo of past pain. A good way to break this cycle is gentle exercise. Exercise can change the connective fascia, the bands of tissue that connect muscle to bone, and allows the tissue to glide as we move through tight, lubricated sleeves that encase the entire body. We begin to feel stiff when the fascia loses its lubrication, mainly from lack of movement. Extended sitting during a long rehearsal can restrict movement, causing pain and stiffness. Poor posture, in a similar way, can shrink the muscles, since some muscles are overworked, while others shorten from lack of use. Also, scar tissue from trauma or surgery can become tight and inflexible without proper therapy. The pain is not from the scar, but from the immobility of the tissue, and muscular imbalance.

Obesity can set off a chain reaction of the previous scenarios. Joints designed to last 125 years, now are overburdened, movement increases pain and slows the body, and lack of movement stiffens and atrophies the musculoskeletal system causing more pain. Losing weight with regaining motion can reverse the process. The basis of the author's book is *Essentrics*, gentle movements that breaks the pain cycle, and the author, Esmonde-White, teaches her techniques to Olympic athletes, and clinics worldwide. Try standing comfortably and swing side to side, but stop when any pain is felt. Now, repeat the

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79 Ibid., 18-21.
80 Ibid., 42-43.
81 Ibid., 46.
motion and stop before any pain is felt. Any pain echoes that have been caught in that loop can be interrupted this way. Unfortunately, this does not work with real pain, just the stored pain loop. The “essentric” exercises and stretches address all the joints, connective tissue, immune system, arthritis, and accumulated emotional stress. By stopping movement before feeling the pain, we can retrain the body, while gently expanding our movements.

**Trumpet Specific Breathing Methods**

There is an abundance of breathing methods, and I have adopted two methods published by respected trumpet players for trumpet players. Don Jacoby had a noted career as a trumpet soloist, studio musician, and educator whose love for teaching opened the door to the modern clinician. After moving to Denton, Texas, Jacoby taught private lessons to students from all over the country, including many who went on to professional careers in trumpet performance and pedagogy. He wrote *Jake’s Method* after years of observing students and helping them with the increasing demands of modern music. His method centered on breathing in a natural way. He noticed that we all breathed naturally as babies, however when many first get a trumpet, they begin to make adjustments in breathing. The trumpet is a wind instrument, and takes air to make it work. The quality of the air taken in determines the quality of the sound coming out, and the artistry of the professional resides in air control. Jacoby compares the diaphragm to an upside-down salad bowl. During inhalation, the salad bowl flattens out, and we should be able to feel the diaphragm expand in all directions, however, in this method nothing

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82 Ibid., 46.
above the floating ribs is engaged. When preparing to play, take a gentle diaphragmatic breath, and let the air push out the thorax, but do not use excess air volume in the lungs. The right amount of air is determined by the musical phrase that the trumpeter plays. If there is too much air pressure in the lungs, the player must constrict the air with the throat; therefore, the player’s sound will be thin and constricted. While the diaphragm and supporting muscles control the speed and volume of the air, the use of the tongue determines the speed and direction of the airstream.\textsuperscript{84} I find this method optimal for classical and small-group jazz repertoire. However, this method may not provide the proper compression for playing the high range of the trumpet that regularly go above Bb5.

Bobby Shew, a trumpet soloist, and world-renowned clinician had repeated injuries before adopting the Complete Yoga Breath. He has taught this method, and it has been used by trumpet players such as Wayne Bergeron, Roger Ingram, as well as many others. In his book, \textit{Basic Study Guide for Trumpet}, Bobby Shew outlines the following processes of the abdominal muscles. There are three layers of muscle from the groin to the sternum, followed by two layers of muscle between the ribs, the diaphragm, which that is a combination of muscles and tendons, the back muscles, and diagonal muscles from the back of each ear to the top of the ribs. All groups act together and raise internal air pressure as the air fills the lungs. The area to focus on is near the navel at the center of the abdominal muscles group. When blowing out the air, all the muscles are involved,

\textsuperscript{84}Ibid., 13-14.
and the amount of compression determines how the air is controlled. Yoga breathing relies on the navel area providing tension under the abdomen and isomeric contracture. When playing commercial music in the upper register, I rely on this method in an effort to keep internal air pressures off of the pelvic floor.

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CHAPTER 3 METHOD

The purpose of this study is to establish a baseline for good posture; to catalog a selected list of performance-related injuries in trumpet players; and to match existing solutions through somatic and traditional physical therapies to reduce pain and possibly prevent future injury. The goal is to maintain the baseline after the addition of grasping and performing with the instrument. This study answers questions using research in postural alignment, performance-related injuries, trumpet pedagogy, somatic, and physical therapies. Because of the additional workload of high-brass players, this group represents the extremes of negative forces used for performance. This study distills a daily routine in order to maintain musculoskeletal alignment and wellness. This study answers the following questions:

1. What are the most common pain or injury complaints for trumpeters?
2. What is considered good musculoskeletal alignment and why is it important in maintaining wellness and good musicianship?
3. What therapies are appropriate to treat common injuries, and what can a player do on a daily basis to prevent injury or relieve pain while enabling the body to produce the most efficient sound possible?

Procedures for Answering the Research Questions

Answering the first question required gathering sources to identify the most common injuries and complaints of pain and discomfort in trumpet players. Answering the second question required comparing texts and methods on posture and alignment to determine a baseline in human beings. Body mapping helps to identify proper alignment while holding a trumpet in a standing and seated position.
Answering the third question requires coordinating texts that identify various treatments and methods which have been identified as the most common complaints of pain and injuries in trumpeters. Each method addresses the musculoskeletal system in a different way. The Egoscue Method uses static postures to strengthen or release tension in the muscles that directly control the skeletal system in a global manner. The Alexander Technique also takes a global approach to body alignment; however, it uses an analysis of proper movement that has been very successful as a modality in the music community. Occupational therapy methods that address specific areas of pain and the needs of musicians, aim to strengthen the nearby musculature. Yoga combines dynamic stretching and strengthening of the musculature to align the body, and can be calming and meditative. This study includes a reverse engineered catalogue of existing therapies based on published alignment modalities that address performance-related musculoskeletal injuries, and may be essential in providing experienced or beginning trumpet players better alignment, and helps provide the author of this essay toward a daily path to wellness and more efficient trumpet playing.
CHAPTER FOUR RESULTS

The purpose of this study is to catalog a selected list of performance-related injuries in trumpet players, establish a baseline for good posture, and match existing solutions through somatic and traditional physical therapies to reduce pain and possibly prevent future injuries. Research will answer the following questions:

1. What are the most common pain or injury complaints for trumpeters?
2. What is considered good musculoskeletal alignment or posture as it relates to the trumpet player, and why is it important in maintaining wellness and good musicianship?
3. What are appropriate therapies to relieve pain or injury, and what can be done on a daily basis to prevent pain?

What are the common pain or injury complaints in trumpet players?

Most people experience pain throughout their lives, but there is a difference between everyday aches and pains and playing-related musculoskeletal disorders known as PRMDs. Christine Zaza, et al., collected data to establish a theoretical difference between PRMDs and normal pain in “The Meaning of Playing-Related Musculoskeletal Disorders of Classical Musicians.”

The results described a PMRD as having six main characteristics. First, it must affect playing, at which point the musician may report the pain for the first time. Second, it must be chronic, meaning the problem is consistent over an individually subjective amount of time, such as days, weeks, or months. Third, symptoms are severe, and the musician may use descriptive terms for the pain, such as stabbing, or burning.
Fourth, PRMD symptoms may be described as unusual, something felt for the first time, or during a specific activity such as holding the trumpet in playing position. Fifth, PRMD complaints are also subjective, as each person must judge if a problem has affected their playing, and each individual’s perception and tolerance for pain varies. Finally, PRMDs are beyond the player’s control. Rest, ice, compression, and elevation are the universal home remedies to control pain, along with massage, NSAIDs, and stretches; however, PRMDs are often resistant to self-improvement methods.  

<table>
<thead>
<tr>
<th>PRMD Characteristics</th>
<th>Normal aches and pains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Playing is affected</td>
<td>1) Playing is not affected</td>
</tr>
<tr>
<td>2) Symptoms are chronic</td>
<td>2) Symptoms occur just once in a while</td>
</tr>
<tr>
<td>3) Symptoms are severe</td>
<td>3) Minor symptoms that heal quickly</td>
</tr>
<tr>
<td>4) Symptoms are unusual</td>
<td>4) Normal</td>
</tr>
<tr>
<td>5) Individually determined (personal)</td>
<td>5) General</td>
</tr>
<tr>
<td>6) Symptoms are beyond musician’s control</td>
<td>6) Symptoms are within the musician’s control</td>
</tr>
</tbody>
</table>

Sixty percent of the symphonic brass players included in a University of North Texas Musician Health Survey experienced one or more musculoskeletal problems as a

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87 Ibid., 23.
result of musical activity. This study reported that the force measured for trumpet players from mouthpiece pressure exceeded 100 newtons, and is enough to affect tooth alignment and injure the obicularis oris muscle. The internal air pressures are high enough to tear the anterior pharynx, to cause laryngoceles, and pharyngeal diverticula. The highest pain levels for trumpeters was reported in the fingers of the left hand, right elbow, left shoulder and the lower back. Female respondents in the trumpet group reported higher injury rates in all categories.

Table 2. Average Pain Severity Levels

<table>
<thead>
<tr>
<th>Site</th>
<th>Trumpet Mean (SD)</th>
<th>French Horn Mean (SD)</th>
<th>Trombone Mean (SD)</th>
<th>Low Brass Mean (SD)</th>
<th>Total Brass Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right finger</td>
<td>2.29 (1.26)</td>
<td>1.85 (1.08)</td>
<td>2.00 (1.25)</td>
<td>2.03 (1.11)</td>
<td>2.07 (1.18)</td>
</tr>
<tr>
<td>Left finger</td>
<td>2.56 (1.19)</td>
<td>1.72 (1.03)</td>
<td>1.52 (0.79)</td>
<td>2.11 (1.05)</td>
<td>2.06 (1.11)</td>
</tr>
<tr>
<td>Right hand</td>
<td>2.18 (1.29)</td>
<td>1.96 (1.22)</td>
<td>1.65 (0.83)</td>
<td>1.82 (1.33)</td>
<td>1.86 (1.13)</td>
</tr>
<tr>
<td>Left hand</td>
<td>2.19 (1.51)</td>
<td>1.12 (0.99)</td>
<td>1.80 (0.83)</td>
<td>1.91 (1.02)</td>
<td>2.01 (1.14)</td>
</tr>
<tr>
<td>Right wrist</td>
<td>2.19 (1.51)</td>
<td>1.12 (0.99)</td>
<td>1.80 (0.83)</td>
<td>1.91 (1.02)</td>
<td>2.01 (1.14)</td>
</tr>
<tr>
<td>Left wrist</td>
<td>2.07 (1.21)</td>
<td>2.14 (1.23)</td>
<td>1.84 (0.98)</td>
<td>2.52 (1.54)</td>
<td>2.08 (1.20)</td>
</tr>
<tr>
<td>Right forearm</td>
<td>1.88 (1.02)</td>
<td>1.91 (1.64)</td>
<td>1.92 (1.25)</td>
<td>2.23 (1.30)</td>
<td>1.98 (1.15)</td>
</tr>
<tr>
<td>Left forearm</td>
<td>2.07 (1.07)</td>
<td>1.93 (1.03)</td>
<td>1.68 (0.89)</td>
<td>1.57 (0.78)</td>
<td>1.82 (0.95)</td>
</tr>
<tr>
<td>Right elbow</td>
<td>3.00 (1.20)</td>
<td>2.33 (1.15)</td>
<td>2.66 (1.22)</td>
<td>2.28 (1.11)</td>
<td>2.66 (1.18)</td>
</tr>
<tr>
<td>Left elbow</td>
<td>2.16 (1.47)</td>
<td>2.71 (1.11)</td>
<td>2.47 (1.12)</td>
<td>2.87 (1.45)</td>
<td>2.34 (1.22)</td>
</tr>
<tr>
<td>Right shoulder</td>
<td>2.38 (1.25)</td>
<td>2.32 (1.10)</td>
<td>1.70 (0.91)</td>
<td>2.31 (1.13)</td>
<td>2.17 (1.13)</td>
</tr>
<tr>
<td>Left shoulder</td>
<td>2.63 (1.42)</td>
<td>2.26 (1.17)</td>
<td>1.81 (0.94)</td>
<td>2.35 (1.27)</td>
<td>2.15 (1.17)</td>
</tr>
<tr>
<td>Right side of the neck</td>
<td>2.27 (1.20)</td>
<td>2.46 (1.13)</td>
<td>1.90 (0.97)</td>
<td>2.33 (1.00)</td>
<td>2.25 (1.12)</td>
</tr>
<tr>
<td>Left side of the neck</td>
<td>2.21 (1.21)</td>
<td>2.38 (1.20)</td>
<td>1.88 (1.05)</td>
<td>2.56 (1.20)</td>
<td>2.23 (1.17)</td>
</tr>
<tr>
<td>Right upper back</td>
<td>2.00 (1.22)</td>
<td>2.36 (1.46)</td>
<td>1.72 (0.89)</td>
<td>2.08 (0.82)</td>
<td>2.06 (1.13)</td>
</tr>
<tr>
<td>Left upper back</td>
<td>2.31 (1.30)</td>
<td>2.57 (1.42)</td>
<td>1.85 (0.93)</td>
<td>2.21 (0.90)</td>
<td>2.23 (1.15)</td>
</tr>
<tr>
<td>Right middle back</td>
<td>2.15 (1.25)</td>
<td>2.50 (1.09)</td>
<td>1.90 (1.04)</td>
<td>2.11 (0.90)</td>
<td>2.19 (1.08)</td>
</tr>
<tr>
<td>Left middle back</td>
<td>2.27 (1.36)</td>
<td>2.37 (1.08)</td>
<td>1.90 (0.83)</td>
<td>1.84 (0.68)</td>
<td>2.13 (1.06)</td>
</tr>
<tr>
<td>Right lower back</td>
<td>2.75 (1.24)</td>
<td>2.45 (1.31)</td>
<td>1.90 (1.13)</td>
<td>2.43 (1.09)</td>
<td>2.42 (1.22)</td>
</tr>
<tr>
<td>Left lower back</td>
<td>2.57 (1.31)</td>
<td>2.38 (1.27)</td>
<td>2.06 (1.12)</td>
<td>2.57 (1.26)</td>
<td>2.41 (1.23)</td>
</tr>
</tbody>
</table>

A 1996 survey of 2,122 symphony and opera musicians identified 76 percent of musicians reporting a medical problem that affected their performance. Overuse injuries affected over 50 percent of the musicians surveyed. The authors surmised that overuse

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89 Ibid., 3.
90 Ibid., 3.
may lead to the development of reflex sympathetic dystrophy, which can progress into focal dystonia. Focal dystonia can be career ending for a musician and highlights the importance of early treatment for overuse syndrome. Temporomandibular Joint Disorder (TMD) was also prevalent among trumpet players in the survey attributable to overuse.91

This next survey identifies orchestral trumpeters who are required to elevate their arms more than two hours a day. Moderate arm elevation reduces blood flow to the supraspinatus muscle, and may be the cause of the high rates of shoulder injury.92

**Table 3. Orchestral Neutral and Elevated Arm Positions**93

<table>
<thead>
<tr>
<th></th>
<th>Neutral arm position &lt;2 hr per workday</th>
<th>Neutral arm position &gt;3 hr per workday</th>
<th>Elevated arm position &lt;2 hr per workday</th>
<th>Elevated arm position &gt;3 hr per workday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n h</td>
<td>n h</td>
<td>n h</td>
<td>n h</td>
</tr>
<tr>
<td>Bassoon</td>
<td>12 1,9</td>
<td>24 3,3</td>
<td>10 1,7</td>
<td>11 3,3</td>
</tr>
<tr>
<td>Clarinet</td>
<td>13 1,6</td>
<td>18 3,2</td>
<td>12 1,0</td>
<td>25 3,2</td>
</tr>
<tr>
<td>French horn</td>
<td>18 1,6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oboe</td>
<td>10 1,8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trumpet</td>
<td></td>
<td></td>
<td>12 1,0</td>
<td></td>
</tr>
<tr>
<td>Trombone</td>
<td></td>
<td></td>
<td>15 0,4</td>
<td></td>
</tr>
<tr>
<td>Violin</td>
<td>77 3,3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viola</td>
<td>25 3,2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A research article studied the ergonomic position of 441 musicians. Approximately half of the population completed a clinical examination to identify upper extremity musculoskeletal problems. Brass players showed a high occurrence of neck, upper back, and shoulder problems. Lower occurrences were reported in the elbows,

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91 Bejjani, Fadi Joseph, Glenn Kaye, and M. Benham, “Musculoskeletal and Neuromuscular Conditions of Instrumental Musicians,” 408.
93 Ibid., 372.
wrists, hips, knees, and feet. Perceived pain in the lower back was listed as a high occurrence, at greater than 34 percent; however, ten clinical exams reported less than 12 percent; thus, perceived pain was 65 percent higher than the reported rate and therefore, listed as a low rate of occurrence.  

Studies of medical problems in professional musicians have garnered most of the attention of researchers; however, a clinic serving 314 student musicians from 1985 to 2002 published a review of medical charts. Prevalence of musculoskeletal injuries in the student population is a precursor to the amateur and professional populations where many maladies begin. Seven of the students treated at the clinic were trumpet players. Five reported problems in the facial area; one reported a wrist problem; and one reported hand or finger pain. The prevalence of the head, neck, and facial muscle complaints may have been from poor technique or overuse.

### Table 4. Student Musculoskeletal Pain

<table>
<thead>
<tr>
<th>Location</th>
<th>Trumpet (n = 7)</th>
<th>Trombone/Tuba (n = 4)</th>
<th>Percussion (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder/scapula</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Elbow</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Forearm</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Wrist</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Hand/fingers</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Thumb</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Head/eyes/ears/nose/throat</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Neck/back</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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96 Ibid., 5.
The body must operate as a unit and may operate differently under stress. Sixteen virtuosi trumpet players were studied while playing in the low register and the high register from their low C4 to high F5. Small changes were noted in the head, neck, torso, and sacrum, while the knee joints showed the biggest movement. High pressures of exhalation are needed in the upper register. What this means for posture is that the obliques and abdomen are engaged, while reducing the lordosis (curve) of the lower back. The obliques also pull the pelvis to the posterior. The flexion of the pelvis is determined by the length of the hip flexors and ham strings, so the bending at the knees releases the pelvis into a fuller posterior position.\(^{97}\) To maintain good posture, we may need to realign the hips, lengthen the hip flexors, and strengthen the hamstrings. Forward head posture, as described in Chapter 2 of *Forward Head Posture Fix*, may be exacerbated by the combination of forward and downward pressure as the trumpet player ascends from low C to high F above the staff as depicted in Figure 3.

**Figure 3. Postural Kinematics While Playing Trumpet\(^{98}\)**


\(^{98}\) Ibid., 442.
Identified as a more common disorder among trumpet, violin, trombone, and tuba players, Temporomandibular Joint Disorder can be an overuse injury from contact or overuse of pressure, or from improper alignment. TMD can cause pain, and in extreme cases, sufferers cannot open their jaw. It is usually caused by misuse of the jaw when forming an embouchure. In cases of overuse of the jaw, rest, occlusal splints, and physical therapy are recommended.\textsuperscript{99} Forward head postures use muscles that are normally used to operate the jaw. This puts the muscles in a constant state of flexion, and when those muscles have become overburdened, the jaw may cease to work.\textsuperscript{100}

Trumpet players, regardless of their style, whether standing, or sitting, are required to work with elevated shoulders more than two hours per day. This alone can weaken the supraspinatus muscles. In addition, rounded shoulders and rotator cuff problems, seriously diminished the use cycle of the shoulders. With the advent of technology, and reduced movement as we get older, the shoulders adapt to a limited range of motion. The pain we feel when we suddenly increase the load on the shoulder joints is the body’s warning signal that the muscles are weak and are not supple enough to support the increase in weight.\textsuperscript{101} The shoulders are supported by the spine, and if the spine is in constant flexion, the shoulders cannot stabilize and as a result they are pulled forward.\textsuperscript{102}

\textsuperscript{99} Bejjani, Fadi Joseph, Glenn Kaye, and M. Benham, “Musculoskeletal and Neuromuscular Conditions of Instrumental Musicians.” \textit{Archives of Physical and Medical Rehabilitation}, Volume 77, No. 4 (April, 1996): 408.
\textsuperscript{100} Egoscue, Pete, Roger Gittines, \textit{Pain Free}, 206.
\textsuperscript{101} Ibid., 141.
\textsuperscript{102} Starrett, Kelly, Juliet Starrett, and Glen Cordoza. \textit{Deskbound}, 121.
The study by Parrup, et al., “Occurrence and Co-existence of Localized Musculoskeletal Symptoms in Work-Attending Orchestra Musicians: An Exploratory Cross-Sectional Study,” confirmed that the brass family, including members of the trumpet, French horn, trombone, and tuba sections, reported musculoskeletal pain complaints in the extremities, which were not specifically attributed to this group in the other studies included in this essay, but the rates were relatively low.\(^\text{103}\)

**What is considered good posture in relation to trumpeters?**

Good posture that aligns the body, and provides optimal movements, applies to everyone; however, the chapter addresses postural behaviors while sitting, standing, and holding the trumpet. In order to correct poor posture habits, one should be aware of what good posture entails. Our bodies adapt to misalignment by making compensations; and as a result, the way we carry ourselves begins to feel normal; therefore, we need an objective way to diagnose our posture. To accomplish this, use a full-length mirror and attach a piece of string from top to bottom down the center of the mirror. While facing the mirror, turn to the side, and line up your ankles with the string. If your knees, hips, waist, shoulder, and the atlanto-occipital joint at the ears, do not line up with the string, you are in misalignment. Next, line up all the joints with the string, and even though you now have good posture, it may feel wrong or uncomfortable. If so, you may be suffering from faulty sensory awareness, a term credited to F.M. Alexander. Pedro de Alcantara, an authority on the Alexander Technique, describes the phenomenon of faulty sensory

awareness as the feeling that the compensations we have made in our posture, are wrong but feel right. The corollary is true where good posture now feels wrong.\textsuperscript{104} The musculoskeletal system is now aligned, but it probably feels awkward, and you may be resistant to adopt a stance that feels that way, unless you can see the evidence, or have the help of an Alexander Technique teacher or physical therapist. Just like the added benefits we get from taking music lessons, hiring a professional to help you correct your posture will always be preferable to exercises from a book. An alternative way to assess your posture is to have someone take your picture and digitally draw a line between the joints. Compare your posture to the pictures in Figure 4. The woman shown on the left is under-corrected with forward flexion from forward-head, collapsed shoulders, and tucked-in hips; in the center picture, she is shown over-corrected with shoulders pulled back in a military style, with the spine in an extension that thrusts the pelvis forward. A person who has adopted an under-corrected stance will eventually experience stiffness, tension, and “dowager’s hump.” Someone who adopts an over-corrected posture will experience lower back pain. Dancers, athletes, yoga practitioners, and regular gym exercisers commonly exhibit over-correction by lifting the chest. This condition can set patterns in the body that will become dependent on constant stretching to maintain flexibility. The woman shown on the far right, in Figure 4, has optimal alignment with each joint being parallel and stacked vertically, distributing her weight in the most efficient manner.\textsuperscript{105}

\textsuperscript{105} Porter, Kathleen. \textit{Natural Posture for Pain-Free Living}, 47-49.
Have someone take a front-view picture of your body, and digitally connect the joints using editing software, and compare the result with the Egoscue Method lattice. The Egoscue Method identifies the body’s framework as a lattice with two vertical lines intersecting with the joints, and horizontal lines joining the bilateral sides of the joints. Layered on this lattice are the nerves, connective tissue and muscles. The bones only do what the muscles tell them to do. This is what makes the body a unit. The resulting 90 degree angles at the joints are the key to our stability and motion. Layered on this lattice are the nerves, connective tissue and muscles. Figure 5a depicts the Egoscue Method lattice, while Figure 5b shows the digital lattice superimposed on the front and side views of the body.

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106 Ibid., 49.
107 Ibid., 15.
Standing is always preferable to sitting in so far as the muscles are all engaged and ready for movement. Also, the stability of the all the joints depends on gravity, especially the ankles that are a combination of bone and connective tissue, however standing all the time is not always an option for an orchestral trumpet player, studio musician, or teacher. Unless the orchestral trumpet player is a soloist, he or she may be seated at most rehearsals, and lesson studio teachers may also be seated the majority of the day. While the dangers of a seated sedentary lifestyle are too numerous to discuss within this topic, how does one sit in alignment? To sit, address the chair from the standing position. The feet should be anchored to the floor and provide a strong base. When the torso is lowered into the chair, the weight should rest on the bilateral sitz bones

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109 Ibid, 12.
at the bottom of the pelvis.\textsuperscript{112} The six steps to sitting properly from a standing position are as follows:

(1) Relax the belly.  
(2) Release the front of the chest downward.  
(3) Roll each shoulder back to the top of the ribs.  
(4) Drop the chin and lean the head back until you feel the balanced position.  
(5) Look at the horizon.  
(6) Breathe normally\textsuperscript{113}.

Once seated the atlanto-occipital joint at the ear, shoulders, and hips should be aligned in a straight line similar to the standing position. Dr. Starrett, a specialist in kinesiology, recommends sitting on the edge of the chair which takes the pressure off the femur and hamstrings. Undue joints pressure is a major cause of hip impingements in adults. He also recommends shifting position often, as well as to stand up and move every twenty to thirty minutes. Walking a short distance or performing a bodywork alignment exercise during each break will encourage blood flow and diminish the damage done by long periods of inactivity.\textsuperscript{114} Figure 6 depicts the proper sitting position.

\textbf{Figure 6. Proper Sitting Position}\textsuperscript{115}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{proper_sitting_position.png}
\end{figure}

\begin{flushright}
\textsuperscript{112} Porter, Kathleen. \textit{Natural Posture for Pain-Free Living}, 236.  
\textsuperscript{113} Porter, Kathleen. \textit{Natural Posture for Pain-Free Living}, 236.  
\textsuperscript{114} Starrett, Kelly, Juliet Starrett, and Glen Cordoza. \textit{Deskbound}, 193-195.  
\textsuperscript{115} Ibid., 194.
\end{flushright}
After identifying reported injuries specific to the left shoulder and fingers of the left hand of trumpet players in selected injury studies included in this essay, there could be a possible correlation of pain to how players sit, stand, and hold the trumpet. In his DMA essay, *Applied Anatomy in Music: Body Mapping for Trumpeters*, Holt demonstrates proper sitting technique while holding the trumpet. He sits away from the back of the chair with hips, shoulders, and atlanto-occipital joint aligned and leaning slightly forward. Sitting perfectly straight can cause lower back pain, while a slight lean frees up the muscles of the torso and neck for optimal efficiency while playing the trumpet as shown in Figure 7.116

**Figure 7. Sitting with the Trumpet**117

The neutral position of the elbows is essential to freeing the breath, helps the atlanto-occipital joint, shoulders, and back stay aligned, properly distributing weight across the torso. When the elbows are compressed, the neck, shoulders, and back must

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117 Ibid., 12.
roll forward into flexion, restricting air, and increasing tension. Referred to as marching band elbows that are lifted way up from the body, this position causes unnecessary grip tension when trying to hold up the trumpet, tense abdominal muscles, locked knees, and contracted leg muscles. As demonstrated in Figure 8, the better position for the elbows is somewhere in between the compressed and over-elevated elbows. Holt encourages players to discover their own balance.\textsuperscript{118}

Figure 8. Standing with Elbows at a Neutral Position\textsuperscript{119}

The way a player holds the trumpet can determine a relaxed grip or one that causes tension and pain. When players align the forearm and thumb, it results in ulnar deviation that can result in cramps, put pressure on nerves, and cause pain in the forearm and fingers that would interfere with fingering the valves normally. Although many famous lead trumpet players use a pistol grip, Holt cautions against it, as it can put undue

\textsuperscript{118} Ibid., 38-41.
\textsuperscript{119} Ibid., 13.
pressure on not only the wrist, but also from the increased upward pressure on the muscles of the embouchure.\textsuperscript{120} Holt shows the recommended grip in Figure 8a, while aligning the pinky finger to the ulna bone as shown in figure 8b.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure9.png}
\caption{Figure 9a. Gripping the Trumpet\textsuperscript{121} Figure 9b Grip Alignment\textsuperscript{122}}
\end{figure}

\textbf{How can alignment be maintained on a daily basis?}

Using the common injury reports and personal experience as a professional trumpet player, I have designed a full body routine that I complete on a regular and ongoing basis to regain alignment. This routine is garnered from many authoritative sources, and may be effective for anyone seeking to improve their posture; however, enlisting the services of licensed yoga, Alexander Technique, and Egoscue Method teachers may be preferable as they can tailor a more personalized routine. The need to complete daily posture maintenance is necessary since our daily activities can work against proper posture, and when aligned, the body’s musculoskeletal system can work without pain or injury. Additionally, when one has suffered an injury, regaining

\begin{itemize}
\item \textsuperscript{120} Ibid., 48.
\item \textsuperscript{121} Ibid., 47.
\item \textsuperscript{122} Ibid., 46.
\end{itemize}
alignment can create a healing environment. When pressure is taken off of a knee with damage to the soft tissues in between the joints, the tissues no longer under stress may cease to hurt or even heal as the body replaces cartilage as many tissues are replenished by the body throughout our lives.\textsuperscript{123} Alexander and Egoscue stress that the mind and body are one system, so the body is the “self.” We cannot say that our back hurts as if it is a separate entity; we can say that something we did made our back hurt. In the same way, we are responsible for our own recovery. Somatic exercise and the therapists trained in the techniques only facilitate the process.

**A Twenty-One Step Postural Routine**

If your body has been in misuse for an extended time, some of the exercises may present a challenge. Consult a doctor or a therapist before engaging in this, or any new exercise plan, and do not perform any exercises that cause pain. The main concept of *Essentrics* is learning how to move without pain, so when performing the exercises stop if you feel any pain, and only do up to the part of the exercise that are pain free. If you cannot do the exercise without pain, then skip the exercise. After doing the postural alignment routine, you may find that your range of motion has increased, and you can add the exercise in without pain. Eventually, the full movement can be attained when pain is not part of your daily practice.

**Step 1: Don Jacoby Breathing**

Successful trumpet playing begins with the breath, and I start the routine with the Don Jacoby method. Everyone who took a lesson with him was first taught this method. Put one hand on the chest and one hand on the abdomen. Take a few gentle but full

\textsuperscript{123} Egoscue, Pete, and Roger Gittines. *The Egoscue Method of Health Through Motion*, 51-52.
breaths and make sure that only the lower hand moves. The diaphragm resembles an upside-down salad bowl and when we take a breath, the vacuum created fills the lungs with air. When the diaphragm lowers, we should be able to feel it in every direction as shown in Figure 10. This keeps us from trying to breathe in the upper chest and as the air moves in, the lower hand over the abdomen moves out. The shoulders should not be engaged, but should move slightly upward from rib expansion. Complete 5 breaths with the routine. Go slowly and avoid hyperventilation.

**Figure 10. Don Jacoby’s Breath Method**

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**Step 2: Bobby Shew’s Complete Yoga Breath**

I am fond of playing all styles of music, but I am a lead trumpet player by trade, and I like to wake up the muscles I use for compression aiding in the ease and speed of airflow in the upper register. I have taken numerous lessons on this technique, also known as the “Wedge,” with Bobby Shew, and he related that the biggest mistake is that people over-emphasize the first step, the five percent prep breath. He also said that Maynard Ferguson was the person who gave him the book on yoga breathing, *The Hindu-

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125 Ibid., 13.
Yogi Science of Breath, and Bud Brisbois taught Shew to apply it to trumpet playing in 1974. The following are Bobby Shew’s directions for the breath as listed in his Basic Study Guide.

1) Intake (small) abdomen (the area around the navel) moves outward slightly but relaxed.
2) Intake (large), abdomen moves inward (horizontally toward the spine) to create a “wedge” position of the abdominal muscles. Tension should be minimal, just enough to hold the muscles in position.
3) Intake (large) abdomen hold position from step 2 (not tense), shoulders lift straight up toward ear lobes while breathing inward.
4) Grip (isometrically) abdomen muscles, maintaining innermost position (wedge) of abdominal muscles (from step 2).
5) Relax and lower shoulders to comfortable and desired playing position.
6) Blow, as if spitting rice or blowing out a candle.

Do the above six steps (without the trumpet) 90 times per day, for at least 21 days using a mirror that shows at least the torso. As soon as possible, close your eyes to internalize and memorize the six steps. The breath should eventually be one smooth movement, eliminating the pauses between steps. Start slowly and gradually increase the speed of the breathing motion. If you have any problems, go back to the previous step and go slowly. When the Yoga Breath feels comfortable, do the breath with the trumpet. Play licks, scales, etc., but avoid excessive high register playing at first. Lock in low high C first. Complete 5 breaths with the alignment routine. Avoid hyperventilation. All six steps are depicted in Figure 11.

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Step 3: The Semi-Supine Position

The semi-supine position is recommended by Alexander Technique teachers to cultivate awareness and improve *Primary Control* known as the relationship of the head, shoulders, and spine. Lie down on a mat, not a bed, with at least a two and one-half inch stack of books to rest behind the head. Add or subtract books until the head is neither tipping back, nor cramped forward. Be aware of any tension in the body. Without tensing the neck, bring up each leg to a bent position with the feet flat on the floor, and hips-width apart. Align each big toe with the corresponding knee. Do not adjust your position,
but be aware of any tension and balance problems. Pause, think, and visualize the following three directions, as listed by Alexander Technique teacher and author Sherry Bergeron. First, “neck-free:” visualize letting the muscles and vertebra of the neck ease back toward the floor using gravity. Second, think “two ends of the spine easing away from each other.” As the neck becomes free, visualize the tailbone and head gently moving away from each other. Third, think “Back spreading wide to breathe:” As your spine eases in both directions, visualize your back softening so it can spread wide into the floor space, then, allow inhalation without effort. Repeat the three phrases several times while visualizing the effect lengthening and widening will have on the body. Try to stay awake even while in deep rest, and if you stop focusing on the directions, pause and start the three phrases again. Since the head leads where the body follows, the semi-supine sets us to feel the upward motion, and gives us a connection to the “self.”

Hold this position for 5 minutes as shown in Figure 12.

**Figure 12. Semi-Supine Position**

![Semi-Supine Position](image)

The human spine can support great amounts of weight, and is capable of a wide range of movement. Each joint of the vertebra is capable of a four-degree range of

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128 Bergeron-Oliver, Sherry, and Bruce Oliver, 70-72.
129 Ibid., 70.
motion. Unfortunately, the health of the spine is dependent on movement. If we move less, the back becomes weaker, and the modern lifestyle of sitting, driving, and hours of playing video games is more likely to explain the epidemic of back pain rather than the design of the spine which has lasted since our inception as a species.\textsuperscript{130} The secret to the strength and versatility of the spine is the gentle S-curve that enables us to carry heavy weights and distribute the weight effectively. The spine is the base for the motion in the hips and shoulders; and when the spine does not move as a unit, stability is lost and restricts the movement in the extremities.\textsuperscript{131} The four main sections of the spinal column with the characteristic S-curve is shown in Figure 13.

\textbf{Figure 13. Spinal S-curve}\textsuperscript{132}

\begin{center}
\includegraphics[width=0.5\textwidth]{spinal_curve.png}
\end{center}

When we take a breath to play the trumpet, the spine also plays a supporting role. Unfortunately, I have noticed many players are unaware how the spine moves during

\textsuperscript{130} Egoscue, Pete, Roger Gittines, \textit{The Egoscue Method of Health Through Motion}, 10.
\textsuperscript{131} Starrett, Kelly, Glen Cordoza, \textit{Becoming a Supple Leopard}, 36.
\textsuperscript{132} Ibid., 36.
inhalation by raising the shoulders and leaning back lengthening the spine and leaving much less room for air intake. Do not confuse this unnecessary raising of the shoulders with step 3 of the Complete Yoga Breath that helps generate the air compression needed for high velocity playing. Body mapping encourages us to be aware that when we breathe the spine flexes to make room for expansion and shortens the torso. When we exhale the spine returns to a neutral position, and the torso lengthens as shown in Figure 14.

**Figure 14. Spinal Movement During Breathing**

Step 4: The Egoscue Towel Position

In order to maintain the S-curve of the spine and set up the stability of the rest of the exercises, I have added the Egoscue Towel position as shown in Figure 15. Take two bath towels, and fold them in half then roll the long way into a tight roll about 9 inches. Adjust the towels for comfort as long as the curves in the back are supported. When the loss of curve in the back is severe, then start with smaller rolls since returning the spine to a full curve suddenly may be uncomfortable. Lie on your back with the knees bent and feet flat on the floor and put one roll under the neck. Put one hand behind your back to

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find the lumbar curve, and remove your hand and insert the towel. Finding the curve first increases the chance that you will place the second towel correctly. Stay in this position for 3 to 5 minutes, or more if the dysfunction is severe.¹³⁴

**Figure 15. Egoscue Towel Position**

![Egoscue Towel Position](image)

**Step 5: The Bracing Sequence**

The bracing sequence sets up the next set of standing exercises and should only require one minute of your time, but is vital to get into the neutral position in conscious awareness. The directions are as they appear in *Becoming a Supple Leopard*. Step 1: Stand normally and while keeping your feet straight, and while not moving the feet, engage from the hips, and screw the feet into the ground in an outward motion. This will stabilize the hips, and the ankles and knees will follow. Step 2: Squeeze the glutes that support the pelvis and the spine. This will cause the hips to move into a neutral position. Step 3: Take in a deep diaphragmatic breath. If necessary, reread the section on the Jacoby breathing. Step 4: Balance your ribcage over your pelvis and tighten your abdominal muscles as you exhale. This isometric tightening is not for breathing, but in this case, you are creating intra-abdominal pressure in order to make the junction of

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movement, or lever at the hips and base of the spine more rigid. Step 5: Set the head and shoulders in neutral position. First, draw the heads of the arm bones back, spreading the collar bones wide as you externally rotate your shoulders and turn your palms toward the sky. As you do so, center your head over your shoulders, focusing your gaze straight ahead. Think about aligning your ears over your shoulders, hips and ankles. Step 6: Let your arms fall to the side with your thumbs facing forward and your shoulders externally rotated. The goal is to have your ears over the shoulders, your ribcage over your pelvis, and your hips over your knees and ankles.\(^{135}\) The graphic representation of the bracing sequence is depicted in Figure 16 Part 1, and Part 2.

**Figure 16. Bracing Sequence Part 1\(^{136}\)**

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\(^{135}\) Starrett, Kelly, *Becoming a Supple Leopard*, 40-41.

\(^{136}\) Ibid., 40.
Step 6: Neck Extension Exercise with a Towel

Referenced earlier in the essay, the forces that are placed on the front on the head by the pressures of the front of the head, reaching up to 22.5 pounds of force, approximating the motion of a neck flexion weight machine. In order to strengthen and balance the muscles of flexion, I have gotten considerable relief from strengthening the neck extension muscles. Many books recommend the chin-tuck exercise to strengthen the muscles that support the neck in extension; however, I do not feel that it provides an antagonistic motion to pulling the weight of the trumpet into the skull. The neck extension weight machine, as shown in Figure 17a, provides a closer antagonist, but few gyms have them available and makes the doing the postural alignment routine in this essay difficult to do at home. Instead, perform the neck extension exercise with a towel,

137 Ibid., 41.
and wrap it around the curve of the neck as shown in Figure 17b. Hold the ends of the towel and gently add tension. Extend the neck back over the towel and look up. Finish by returning the head to a normal position. Do the exercise in three sets of 10 repetitions. Do not pull excessively, or pull into any pain. If you have had surgery on the cervical, or thoracic spine skip this exercise, or consult your physician for a viable alternative.

**Figure 17a. Neck Extension Machine**

**Figure 17b. Neck Extension With Towel**

Step 7: Levator Scapulae Stretch

This step is useful for neck strain, especially after playing lead trumpet for an hour or more. Use only the weight of the head to stretch, as forcing the head down can over-stretch the levator and the eleven other muscles that are activated. The directions are as they appear in *Forward Head Posture Fix* and shown in Figure 18. This movement can be done while sitting or standing. The key is to make sure the shoulder is depressed or

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anchored down and that is why sitting is preferred. Then, rotate the head like you are looking into the front pocket opposite the depressed shoulder. Hold a light stretch for 30 seconds, and perform once on each side and progress to performing twice on each side.  

**Figure 18. Levator Scapulae Stretch**

![Figure 18. Levator Scapulae Stretch](image)

**Step 8: Lateral Neck Stretch**

This stretches the levator scapulae, and the trapezius, with lesser action in the sternomastoideus, scalenus anterior, medius and posterior. Look forward with the head looking at the horizon. Slowly move your ear to the shoulder while keeping your hand behind your back. Keep the shoulders down during this movement. Hold for 30 seconds, and repeat with the opposite side as shown in Figure 19.

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140 Kaselj, Rick and Mike Westerdal, *Forward Head Posture Fix*, 46.
141 Ibid., 46.
Step 9: Jaw Mobilization (optional)

Palpate the area around the jaw, and add this to the routine if you feel stiffness or pain. As a result of pressure to the jaw, overuse, misuse, or sudden increases in practice time; there can be tension in the jaw, or in extreme cases resulting in Temporomandibular Joint Disorder. Dr. Starrett uses a form of trigger point therapy that he calls mobilizations. Using a lacrosse or firm ball, position it on the jaw joint right in front of your ear. Maintain steady pressure, and twist your hand. Move the jaw up and down, and side to side. You can clench your teeth to contract and then relax, pressing the ball deeper into the muscle as shown in Figure 20.

\[143 \text{ Ibid, 34.}\]
Step 10: Anterior and Posterior Neck Mobilization

After a long performance, I use the anterior mobilization immediately afterwards, and the next day, I rarely feel stiff after a performance. I also use the mobilization on the back or posterior of the neck as well, and both techniques are shown in Figure 21 and 22. Tightness in this area can have a detrimental effect on the jaw as well. Tilt your head to the side, and pin the ball to the side of the neck while applying pressure. While pressing the ball into the neck, bind up the tissue by twisting the ball in place. Tilt your head away from the ball and move your head in different directions. The target area here runs from the jaw down to the collarbone and in front of the neck as shown in Figure 21. Mobilize the back of the neck by anchoring the ball and sliding it up and down each side as shown in Figure 22.

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Step 11: Arm Rolls

This is an Egoscue Exercise that strengthens the upper back muscles that help control the ball-and-socket of the shoulder. This exercise should help relieve tension from keeping the arms elevated while holding the trumpet; and when sitting at length, this exercise can refresh the muscles of the upper back, especially if you have a tendency to collapse your shoulders. The following are the directions as they appear in *Pain Free*.

Stand with your head up, feet squared, and arms at your sides, with fingers flexed, and thumbs extended as in a golfer’s grip. Lift your arms until they are level with the

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145 Ibid., 258.
shoulders. If one shoulder wants to wobble forward or pop up, lower both until they stay level. Now squeeze the shoulder blades together slightly, and rotate the arms in the direction that the thumbs are pointing in a six-inch-diameter circle as shown in Figure 23a. Do these 25 times and reverse the circles by turning the palms up and thumbs back, shown in 23b. Repeat for 25 times, and complete 1-2 sets.\footnote{Egoscue, Pete, and Roger Gittines, \textit{Pain Free}, 217.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{forward_reverse_shoulder_roll.png}
\caption{Figure 23a. Forward Shoulder Roll Figure 23b. Reverse Shoulder Roll\footnote{Ibid., 217.}}
\end{figure}

\section*{Step 12: Pectoralis Stretch}

Rolling in the shoulders, rounding the back, and leaving the head forward causes the pectoralis major and minor muscles to shorten; and one must loosen them in order to reverse the forward flexion. This stretch restores the length of the pectoral muscles, and make sure the stretch is not in the shoulder joint. The directions are as they appear in \textit{Fix Your Own Pain}, and as shown in Figure 24. Face a wall with one elbow bent about ninety degrees, out to the side. Place the inside of your arm against the wall. Turn your feet and

\footnote{Egoscue, Pete, and Roger Gittines, \textit{Pain Free}, 217.}
\footnote{Ibid., 217.}
body away from the wall, letting your arm be braced back by the wall so it stretches. Keep breathing. Stretch until it is comfortable, not tense. The stretch should feel good in the front muscles of the chest and underarm, and do not crane the neck forward or arch your back. Keep your shoulder down, and hold for 30 seconds, then change sides.\textsuperscript{149}

\textbf{Figure 24. Pectoralis Stretch}\textsuperscript{150}

\begin{figure}
\centering
\includegraphics[width=0.3\textwidth]{pecoralsis.png}
\end{figure}

\textbf{Step 13: T-Spine Smash}

In my own playing, I noticed how much my thoracic spine flexed forward, especially in the high range, and the constant stretching of the upper back muscles have resulted in hypermobility and stiffness. In searching for a remedy, I noticed how common this posture is, even in some of the most successful working trumpet players to date: Arturo Sandoval (25a), and Wayne Bergeron (25b). Upper thoracic flexion is not universal, as shown by Roger Ingram (25c) who shows remarkably good posture.

\textsuperscript{149} Bookspan, Jolie, \textit{Fix Your Own Pain Without Drugs or Surgery}, (Monterey, CA: Healthy Learning, 2006), 124.
\textsuperscript{150} Ibid., 124.
Dr. Starrett’s T-Spine Smash is tailored to mobilize the upper back to relieve tension. The directions are as they appear in *Deskbound*, and are demonstrated in Figure 26. In addition to using this mobilization, I visualize the Alexander Technique Primary Control Principles of *neck-free, spine lengthen and widen*. To complete the T-Spine smash, sit on the floor and position a roller on your back at the base of your ribcage. Next, wrap your arms over your chest in a big hug. This takes up the soft tissue slack in your upper back and pulls the scapulae out of the way, allowing you to target your thoracic spine. Keep the roller in the same spot and arch your back. From this position, take a big breath and try to arch farther over the roller as you exhale. You can also elevate your hips to increase the pressure.  

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154 Starrett, Kelly, *Deskbound*, 261.  
155 Ibid., 261.
Step 14: Upper Spinal Trunk Twist

Over the course of the day, one may not use the full range of motion of the spine due to constant sitting, driving, and even playing the trumpet is mostly a front-facing activity. In order to mobilize and stretch the spine, I use the Egoscue Upper Spinal Trunk Twist as shown in Figure 27. This position also puts the shoulders and the arms on the same plane. The directions are as they appear in Pain Free. Lie on your side with your knees bent, to form a right angle to the trunk. Extend both arms along the floor level with the shoulders, keeping the elbows straight with the palms together and parallel with the bent legs. Slowly lift the upper arm up and over to rest behind you on the floor, palm-up while you turn your head to face the ceiling. Adjust this arm position, if necessary, by finding a shoulder slot that is comfortable, while relaxing and breathing deeply. Allow gravity to settle the arm to the floor along its entire length from fingers to shoulder. Meanwhile, make sure the knees do not slide apart. You can hold them in place with the other hand. When the shoulders have leveled out right to left, lift the extended arm and return it to the starting position while exhaling. Reaching the ground with the legs may take several sessions. Hold this position for 1 minute and repeat on the other side.\textsuperscript{157}

\textsuperscript{156} Ibid., 261.  
\textsuperscript{157} Egoscue, Pete, and Roger Gittines, Pain Free, 220.
Step 15: Static Back

Adjusting the hips is essential in setting up the support of the torso and the alignment of the legs, and there may not be a machine at the gym that can accomplish this as easily as performing Static Back, as shown in Figure 28. This Egoscue exercise uses gravity to settle the hips, back, and shoulders to return them to a neutral position. The directions are as they appear in *Pain Free*. Lie on your back, with both legs bent at right angles on a chair or block. Rest your hand on your stomach or the floor, below shoulder level, with palms up. Let the back settle into the floor. Breathe from the diaphragm, and the abdominal muscles should rise as you inhale, and fall when you exhale. Hold this position for 5 minutes. If there is remaining pain or stiffness in the hips, increase time as needed.

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158 Ibid., 220.
Step 16: Yoga Cat Pose

This movement encourages movement along the joints of the spine, and creates mobility. The directions are as they appear in *Yoga as Medicine*. Start by kneeling on all fours, with the spine in neutral position, knees directly underneath your hips, and hands beneath your shoulders. Exhale and gently raise your spine (Figure 29a), then inhale and round your back (Figure 29b). Complete 10 repetitions.

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159 Ibid., 70.
161 Ibid., 34.
Step 17: Downward Facing Dog

*Yoga as Medicine: The Yogic Prescription for Health and Healing* cites a study that identifies downward dog as one of the postures that contributes to strengthening bones, and the subjects of the study reported bone density gains after six months of yoga practice.162 Also, the position builds awareness of your breathing and muscle tension. High blood pressure and carpal-tunnel syndrome are contraindicated for downward dog. Seek the help of a yoga therapist for modifications.163 Pete Egoscue credits downward dog with reestablishing the neural communication from your wrists to your feet, as shown in Figure 30. Directions are as they appear in *Pain Free*. Remain in the neutral Cat position, and curl your toes under and push with your legs until you are off your knees, and your weight is on your hands and feet. Keep pushing until your hips are higher than your shoulders and have formed a tight, stable triangle. Your knees should be straight, and tighten your calves and thighs. Keep your feet pointed straight ahead in line with the hands, which need to stay in place. The back should be flat, not bowed, as the hips push up and back on the heels. Breathe. If you cannot bring your heels to the floor, do what you can to narrow the gap while keeping the thighs tight, and do not force them. Hold for 1 minute.164

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162 Ibid., 196
163 Ibid., 23.
164 Ibid., 196.
Step 18: Quad Stretch

Sitting for extended periods of time such as school, work, practice, performance, and teaching shortens the quadriceps from lack of use. In order to regain normal muscle length, follow the directions as they appear in *The Anatomy of Stretching*. The movement is depicted in Figure 31. Stand upright while balancing on one leg. Pull your other foot up behind your buttocks and keep your knees together while pushing your hips forward. Hold on to something for balance. Hold for 30 seconds, and repeat on other side.166

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165Ibid., 196.
166Ibid., 23.
Step 19: Air Bench

This Egoscue position puts the hips, knees, and ankles simultaneously under load, and may help reverse the effects of sitting down for extended periods. Stand with your back to the wall. The directions appear in Pain Free and the position is demonstrated in Figure 32. Wear shoes for traction, and press your hips and small of your back into the wall, and walk the feet out and sliding down into a sitting position until you have reached a ninety degree position. The knees align over the ankles and not the toes. If you feel any pain, raise the body back up the wall to relieve the pressure. Press the low and mid-back into the wall to feel the quads working along the top of the thigh. First hold for as long as possible, and work up to holding the position for one minute to two minutes.¹⁶⁸

Figure 32. Air Bench¹⁶⁹

¹⁶⁸Ibid., 117.
¹⁶⁹Ibid., 23.
Step 20: Calf Smash

According to Dr. Starrett in *Becoming a Supple Leopard*, whatever your occupation is, the calves take a beating, and the average active person takes 10,000 steps per day. Activities like running, sports, and climbing stairs add to the load. If there is any misalignment in the musculoskeletal system, the forces on the calf muscles are multiplied, causing tightness and possible injury. He recommends the Calf Smash using a roller, as shown in Figure 33. His directions are as follows: Position your calf and heel cord on a roller, cross your opposite leg over your shin to add pressure, and then roll your leg from side to side. You can also contract, relax, and point your toes. If you desire more pressure, ask a friend to apply pressure on top of the leg on the roll.\(^\text{170}\)

**Figure 33. Calf Smash**\(^\text{171}\)

Step 21: Foot Circles

The final step is the Egoscue Method foot circles and point flexes, and are intended to restore ankle flexibility, and strengthen the flexion and extension muscles that control your feet. The directions are as they appear in *Pain Free*, and shown in Figure 34. Lie on your back with one leg extended flat on the floor, and the other one bent toward the ceiling. Clasp your hands behind your bent knee, and circle your foot clockwise 30

\(^{170}\)Starrett, Kelly, Becoming a Supple Leopard, 426.

\(^{171}\)Ibid., 426.
times. Meanwhile, keep the other foot straight towards the ceiling. Reverse direction of the circling foot and repeat. Change legs, and repeat. Make sure the knee stays still, with the movement coming from the ankle only. For point flexes, stay in the same position, and bring the toes back toward the shin to flex; then, reverse the direction to point the foot. Switch legs and repeat 20 times.¹⁷²

**Figure 34. Foot Circles**¹⁷³

You have now completed a head to toe workout, hopefully in the order presented. This postural alignment routine is intended to provide a suggested routine for those who play an instrument, and expose themselves to possible misalignments and problems that have been identified in the reviewed studies. This plan was not intended to be all encompassing, or to replace a live coach, therapist or teacher. Each of the somatic methods utilized and discussed have hundreds of detailed movements and pictures for non-surgical solutions to a variety of misalignments, pain complaints, and to cultivate better body awareness. This plan is intended to provide an informed self-directed path to musculoskeletal alignment, therefore enabling better health and wellness.

¹⁷²Egoscue, *Pain Free*, 57.
¹⁷³Ibid., 57.
After multiple injuries while serving as a musician in the U.S. Army’s premiere touring band for twenty-one years, I found that restoring the body’s musculoskeletal alignment was preferable to having three surgeries, and many months of occupational and physical therapy. I strive to improve and regain good posture every day, and encourage the readers of this essay, colleagues, and students to avoid the negative effects of gravity and misuse thrust upon the body, and that all may achieve better postural awareness, good health, and pain free performances.
CHAPTER 5 CONCLUSION

The purpose of this essay is to define good posture and its benefits to musicians; to identify pain and misuse problems in the musculoskeletal system; and to provide a daily postural improvement routine to address the needs of trumpet players using existing postural alignment methods. Various sources are cited to establish the meaning of good musculoskeletal alignment or posture and how it relates to the trumpet player. Good posture must precipitate proper breathing, tone, projection, and beautiful artistry in trumpet players. There are many sources that address the problems of string players and vocalists; however, it is difficult to find solutions provided specifically to reverse the negative effects of conformance of the musculoskeletal system to playing the trumpet.

According to the article, *Minding the Body: An Interdisciplinary Theory of Optimal Posture for Musicians* by Shoebridge, et al., musicians are aware of the benefits of good posture as being fundamental to proper technique. However, the article states that many studies focus on biomechanics or what the Alexander Technique defines as *end-gaining*.

Many studies identified the injuries trumpet players suffer can be categorized as overuse, or postural misuse, rather than problems with technique. This essay identifies complicating factors that are unique to trumpet players created by the force of pressure on the embouchure, use of extreme isometric forces from exhalation compared to other wind instruments, sedentary-related collapsing postures, and the biomechanical stresses unique to holding the trumpet. Somatic therapies provide not only the biomechanical alignment protocols, but also cultivate awareness of posture, postural behavior modification, and stress relief.
Future Research Studies

From this essay, one could pursue many other studies. Elements of yoga have been included in many of the methods used in this essay. Yoga is possibly the oldest known somatic method reference in early Asian texts. Yoga, like music, has many different genres including some recently developed variations. Different forms of yoga should be studied and compared for the benefit of musical performance, as each style may have a different balance of the mental and physical aspects of yoga practice. While yoga is widely used in studies affecting stress and performance anxiety reduction, one could assess how each style of yoga could benefit a musician's creativity, focus, endurance, and resilience.

Also evolving from Asian roots, studies of the benefit of martial arts could be pursued toward improving posture and wellness for musicians. Each of the moves in this particular martial art are aptly called postures, and the non-contact element of this form may appeal to musicians. Tai Chi promotes good flexibility, breathing, calmness, and overall effects on health, pain relief, and performance might be analyzed and perhaps contrasted with other forms of martial arts or yoga.

Only two forms of breathing methods are included in this essay, and they relate mainly to the maximizing function of exhalation for trumpet or brass players in general. Many individual studies of breathing methods could be researched, or the various methods could be compared and contrasted. This may require measuring physical characteristics such as improvements in capacity, blood oxygen levels, and performing longer phrases. In addition, a rubric could be utilized to compare and contrast the effects breathing exercises have on various subjective elements of music performance including...
style, timbre, and intonation. Music instructors may benefit from knowing the positive and negative effects that breathing exercises have upon the artistry of a vocalist or wind player to achieve a balance.

One possible study could be to research the effects of the current trend in elementary schools that start beginners on trumpet instead of the cornet. The tubing length and weight of both are comparable; however, the overall length of the trumpet shifts the center of gravity outward. The result of this shift for the young student, increases the difficulty of lifting the horn to a proper height, and can put undue stress on the jaw and upper thorax. The somatic habits formed by students may last throughout their careers, and establishing the best practices can allow many who continue music to avoid pain and injury. Data should confirm or deny that reducing the increased effort of lifting the trumpet may be eased by returning students to the cornet as the introductory instrument. Also, the study should include an appropriate body size or age to recommend a switch back to trumpet, if the data is confirmed.

In conclusion, the somatic methods, which are included in this essay, provide multiple published menus to align the body, and specific exercises have been matched to provide a unique full-body postural improvement routine that incorporates many modalities. Most of the sources cited in this essay have identified that performing music, exercising, or movement in general, when the body is misaligned, can prematurely cause damage to the muscles, connective tissues, and the joints. The twenty-one step postural routine, included in this essay, is not only beneficial to the author as a trumpet player, but may be beneficial for anyone who completes this plan, or any daily postural maintenance plan, to alleviate the constant stresses on good posture.
REFERENCES


APPENDIX A: TWENTY-ONE STEP POSTURAL ALIGNMENT ROUTINE

This appendix is provided for convenience and quick reference. Do not attempt these movements without reading each author’s directions provided from the original sources in Chapter Four.

Materials:

Yoga mat or carpet
Foam Roller
Lacrosse or yoga ball
Bath size towel
3 books: 1.5-2 inches thick

Step 1: Don Jacoby Breathing
Take 5 slow diaphragmatic breaths
Do not hyperventilate

Step 2: Bobby Shew Complete Yoga Breath
Do 5 CYBs. Go slowly
Do not hyperventilate
Step 3: The Semi-Supine Position
Place 1-3 books under head until it is in a neutral position
Hold for 5 minutes
Think: Neck Free, back elongate, and widen

Step 4: The Egoscue Towel Position
Hold for 3-5 minutes, or more depending on level of dysfunction
Step 5: The Bracing Sequence
Follow the five steps as directed
Step 6: Neck Extension Exercise
Using a bath towel around the back curve of the neck, pull the ends up, and return to neutral by pulling the arms down
Complete 10 reps
Step 7: Levator Scapulae Stretch
Use gravity, not force to stretch the neck. Hold 30 seconds each side

Step 8: Lateral Neck Stretch
Ear to shoulder, and hold 30 seconds each side

Step 9: Jaw Mobilization (optional)
Palpate jaw area. Mobilize for soreness

Step 10: Anterior and Posterior Neck Mobilization
Find tension, twist, and slide up and down
Complete front and back of neck

Step 11: Arm Rolls
Shape the hands in a golfer’s grip, thumbs forward, rotate clockwise. 25 medium circles
Change directions, thumbs back, rotate counter-clockwise
1 set in each direction

Step 12: Pectoralis Stretch
Brace against a doorway, step in, and do not arch back.
Feel a gentle stretch in the chest. Hold for 30 seconds.

**Step 13: T-Spine Smash**
Use roller at base of ribs, wrap arms around chest. Arch back, breathe and arch farther back.

**Step 14: Upper Spinal Trunk Twist**
Lie on side with legs bent in a 90 degree angle. Clasp hands, move top arm to other side until shoulder and arm touch floor. Grab leg with other hand. Hold 1 minute each side.
Step 15: Static Back
Lie on floor with legs on a chair or block
Hold for 5 minutes, or more if necessary

Step 16: Yoga Cat Pose
Kneel on all fours, inhale and round back
Exhale and return to arch
1 set of 10 reps

Step 17: Downward Facing Dog
Start in cat pose, curl toes under and push into a triangle position
Hold 1 minute, return to cat pose
Step 18: Quad Stretch
Hold onto wall if necessary
Grab ankle and pull behind back
Do not arch back
Hold for 20 seconds

Step 19: Air Bench
Do with shoes on for traction.
Sit against wall
Hold for 1-2 minutes
Slide up if any pain in knee
Step 20: Calf Smash
Put calf and heel cord on roller
Add weight with other leg
Roll up and down, and side to side, complete at own pace

Step 21: Foot Circles
Lie on floor, grab bent knee
Rotate ankle clockwise 20 times, rotate counter-clockwise 20 times
Point and flex foot 20 times
Switch legs, repeat
Keep leg still

End of Routine