

Proper chairs for music programs: sitting, playing and staying healthy

JUSTIFYING INVESTMENT IN MUSIC CHAIRS

This white paper addresses the importance of specialized music chairs for at least three key reasons:

- Increasing a musician's health and wellness
- Optimizing musical performance
- Improving a musician's ability to focus and classroom management

It's time that the needs of seated musicians merit the same consideration given to computer workstation furniture, where specialized ergonomic task chairs are accepted by many educational facilities as "de facto" standard equipment. In a similar way, every musician deserves a chair designed to support and optimize music performance.

Medical experts and academic research attest to the fact that music-making is strenuous physical activity. Without proper body support and appropriate equipment, musicians can suffer overuse injuries that inhibit learning and diminish performance. The pain and distractions caused by such discomfort can lead to disruptive classroom behavior in younger students. For older musicians, such irritations may discourage or prevent further music participation.

The "No Child Left Behind Act" classifies music as a core academic subject in K-12 schools, and chairs are key equipment that enable attentiveness and concentration in the music classroom or performance environment.

Why are proper music chairs important? Whether you're a music director, department chair or administrator, ask yourself these questions:

- How happy and healthy do you want your student musicians to be?
- How well do you want them to play?
- How many do you want to still be playing a year from now?

If your student musicians are sitting on uncomfortable, poor-quality chairs, they are going to be unhappy, playing in pain, and playing poorly. Eventually it could predispose them to injury and you might lose them as music students. The right chair helps students fine-tune their instrument to sound the best and perform better.

By:

William J. Dawson

*Associate Professor Emeritus
Department of Orthopaedic Surgery
Feinberg School of Medicine
Northwestern University
Evanston, Illinois*

Nicholas Quarrier

*Clinical Associate Professor
of Physical Therapy
Ithaca College
Ithaca, New York*

Jodi Tuthill

*Product Manager
Wenger Corporation
Owatonna, Minnesota*



Wenger®

Your Performance Partner

IMPORTANCE OF PROPER SEATING

By William Dawson, Northwestern University and Nicholas Quarrier, Ithaca College

Increasing Focus on Student Wellness, School Environment

The overall healthfulness of the educational experience and school environment for students today – of all ages – is carefully monitored, regulated and legislated. For elementary and secondary students, the goal is to promote healthy, well-adjusted children who can fully focus on the learning process and receive maximum benefits from our society's investment in education. If these children later pursue post-secondary education, their objectives will include increased knowledge, focused career/vocational training and further preparation for “real world” responsibilities.

For school facilities and campuses, concerns over violent crime and indoor air quality are just a few issues that make headlines across the country. For student wellness, topics such as nutrition, obesity and physical activity are important concerns of parents, teachers and administrators. The foundation for a healthy lifestyle is established – or undermined – during these formative years.

And there is cause for concern about student wellness. During 1980-2008, obesity rates tripled for children – approximately 17% (or 12.5 million) of children and adolescents ages 2 to 19 are obese.¹

And as American students are getting heavier, so are their school backpacks. This excessive weight has received criticism for causing discomfort and pain for students. One U.S. study of students ages 11 to 15 years found that 64% reported back pain related to heavy backpacks, with 21% reporting the pain lasting more than six months.²

The American Occupational Therapy Association warns that “improper backpack use leads not only to back pain in youths but also impedes proper physiological growth and functions.”

Music Students Also Feeling Pain

Although currently out of the media spotlight, the unique aches and pains being suffered by school music students have been recognized in medical studies. A survey of Australian children studying instrumental music, aged 7 to 17 years, found that 56% reported playing-related musculoskeletal problems (PRMP) within the past month, and 30% reported an inability to play as usual within the last month.³

Seventy-nine percent of incoming freshman music students at a Midwestern U.S. university school of music reported a history of playing-related pain. The pain frequency varied by instrument class, ranging from 61% among voice students to 100% for percussionists. For strings, keyboards, woodwinds, and brass players, it was consistently 84 to 87%. The author suggests the majority of these students had already encountered

music-induced pain as high school students or younger.⁴ Why aren't these injury and pain statistics causing concern? In U.S. schools alone (grades K-12) it's estimated that approximately 40 million students participate in band, choir or orchestra, nearly 70 percent of total enrollment.⁵ In higher education, approximately 20,000 music education degrees are awarded annually.⁶ Why doesn't the subject of pain and injury among student musicians make headlines? One reason may be a lack of appreciation and understanding about the physically demanding aspects of making music.

Playing Music Requires Physical Strength, Dexterity and Endurance

Intense physical and emotional demands are placed on all musicians – whether professionals, amateurs or students. Coordinated physical movements, often performed at a high rate of speed for prolonged periods of time, are required to play a musical instrument. Many instrumental musicians must partially or completely support the weight of an instrument weighing anywhere from 2 to 25 pounds. With certain instruments – such as trombone, strings and percussion – a significant amount of arm motion is also involved. Finger dexterity, fine and gross motor skills and coordination are also required.

Psychological endurance is also necessary, as musicians strive for perfection to please the teacher, conductor, audience, judges or self.

Musicians must often maintain a relatively static, seated position for extended periods of time. Certain instruments require static and awkward positioning, which may contribute to fatigue.

Vocalists and wind instrumentalists must perform rapid diaphragmatic (abdominal) breathing, necessary to move high volumes of air either through vocal cords or an instrument. For wind players, they must maintain the proper facial structure and embouchure (mouth position in relation to the instrument's mouthpiece).

There are many similarities between what the human body is asked to do in sports and in music. Heart rates go up, breathing changes, the body gets ready for the adrenaline response – fight or flight. This is true whether an athlete is running a race or throwing a discus or swimming 100 meters, or a musician is playing an instrument or singing.

All of these physical and emotional demands predispose the musician to postural dysfunctions and overuse injuries.

Proper Posture Crucial for Spine, Respiration

To minimize discomfort and pain, thereby maximizing musicianship potential, the position of the spinal column and respiratory system are crucial:

Spinal Column In the normal standing posture, the spinal column forms what is called a natural sacro-lumbar curve (see illustration below). When this happens, the organs and upper body weight supported by the spine are in balance. This state of balance means the fewest possible muscles are required to maintain this position, freeing up muscles to fully participate in the music-making process.



The standing position offers optimal alignment and balance.

This position permits the diaphragm to function freely and releases muscle tension that occurs when the body weight carried by the spinal column is out of balance. An unbalanced condition results in excessive muscle tension in the back, neck and spine.

Respiratory System Efficient air movement is necessary for playing a wind instrument or singing. In a standing position, the rib cage is freely able to move: air can come out of the lungs at whatever rate is necessary for proper playing or singing.

When a musician is sitting, any limitations to the movement of the torso, or any posture that interferes with the normal expansion and contraction of the lungs, will compromise both airflow and sound production.

Consider Chair as Extension of Musician, Instrument

Standing is considered by many to be the “ideal” posture for music-making, because of how the spinal column and respiratory system are positioned for optimal performance. At music schools, it’s not unusual for students to practice and perform recitals while standing. However, large-group rehearsals and performances are commonly held sitting down. Musicians in professional ensembles primarily rehearse and perform while seated.

In most educational environments, sitting is the only position practical for day-to-day student rehearsals and performances. Since most musicians spend the majority of their practice and performance time in the seated position, the chair becomes a crucial piece of equipment – an extension of the musician and their instrument.

No one questions that athletes need proper equipment, such as helmets, pads and proper footwear, to play – and stay – safe. They function to protect the athletes,

while enabling optimal performance. For musicians, their equipment includes the instrument they play and the chair they sit in.

How well (or poorly) a chair supports the musician will determine whether he or she can get the most from their abilities. Elementary and secondary music students must be able to fully concentrate on the music-making process, without the distractions of physical discomfort or fatigue. For music directors, these student preoccupations often manifest themselves as inattentiveness and discipline problems, which rob a musical group of rehearsal time. Fidgeting is negative primarily when it results from discomfort.

Research in traditional classrooms has found that students also move around to maintain their mental focus; motion facilitates – not inhibits – attentiveness and learning.^{7 & 8} Neurologically, this improved focus relates to connections between the inner ear and cerebellum that gather sensory stimuli and coordinate motor activity.

In higher education, proper seating is vital because longer practice, rehearsal and performance periods pose a risk of injury that could discourage ongoing music participation or even jeopardize a potential career.

Freedom of Motion Important to Avoid Muscle Pain

Rigidity or tensed muscles result from sustained muscle contractions, which can lead to ischemic pain. (Ischemia is a lack of oxygen in the tissue.) Without oxygen, muscles become very sore and painful. Musicians who sit very still or rigid in their torso area can easily cause their extremities to become rigid as well. If ischemic pain is ignored, eventually the muscle, tendon, or nerve may become inflamed, resulting in an acute or chronic inflammatory condition. To prevent ischemia and inflammation, it’s critical to elicit frequent movement in tense or rigid body parts.

Wanted: ‘Ideal’ Music Posture Chair

The following help-wanted ad could be written about the ideal music posture chair:

Wanted: *Ideal music chair designed to promote proper alignment of spinal column, eliminating long-term sitting discomfort while providing the necessary freedom for the diaphragm and accessory respiratory muscles to endure the demands of rapid breathing. This chair should also promote a natural freedom of movement necessary for the upper body, arms and hands to properly support and manipulate an instrument. It should also allow a degree of body movement for all extremities, both to help prevent prolonged muscle contractions that can lead to ischemic pain and to help promote attentiveness. The chair should support proper positioning of the feet and legs, so that sitting comfortably does not require the feet to maintain the body’s position.*

THE EVOLUTION OF A SOLUTION

By Jodi Tuthill, Wenger Corporation

First ‘Music Posture Chair’ Introduced

Founded in 1946, Wenger Corporation introduced the first music posture chair in 1978. This chair was a logical addition to its line of music education equipment and furniture. This chair was designed to address the posture needs of musicians. When musicians were seated on it properly – positioned all the way back in the seat – this chair helped musicians enjoy standing-position benefits. The hips were placed slightly forward, putting the spine in its strongest, most naturally comfortable position. The rib cage was raised as if in standing position, giving the diaphragm unrestricted movement. It was difficult for musicians to slouch and easy for them to concentrate on mechanics and performance.



However, when musicians were seated at the front, in a “perched” position, the posture benefits of this chair were significantly diminished.

Searching for ‘A Better Mousetrap’

The study of ergonomics and its application to office furniture and human comfort and performance accelerated in the 1980s and 1990s, related in part to computer usage. The field of performing arts medicine also grew and developed, focused on the unique physical wellness issues of musicians and risks of overuse-type injuries. The Performing Arts Medicine Association was founded in 1988 to “improve health care of the performing artist.”

For more than 30 years, the Wenger Corporation has learned – through observation in the field and customer research – that more than 50 percent of school music directors prefer their students to sit forward in their seat, perched on the front edge of the chair, in part to encourage attentiveness and discourage slouching. There is no medical or ergonomic justification for such a seating position, but it’s traditional, particularly for upper string players.

Wenger decided to remedy this situation by developing a multi-position chair that could accommodate both seating preferences while providing important posture benefits.

Wenger research also found that ALL music directors observe their students shifting positions in their chairs throughout rehearsals and performances. This restlessness was attributed, in part, to the “fidget-factor” of active children and adolescents. As noted earlier, students move for a variety of reasons, including to increase mental focus and decrease physical discomfort. Increasing blood flow with frequent movement helps prevent muscle tension and rigidity, reducing the likelihood of painful inflammation.

Nota® Music Posture Chairs Developed

Wenger specifically designed Nota® chairs for optimal comfort, flexibility and proper body support. In addition, the design team also decided that these chairs should strive to accommodate the varied seating demands of different instrumentalists.

Through focus groups and other customer research, Wenger explored a variety of chair options, designs, materials and finishes. Wenger also consulted with medical experts about posture principles and key ergonomic issues related to seating.

These medical personnel included:

- Bronwen Ackermann, BAppSc PhD, Physiotherapy, The University of Sydney, Australia
- Dr. Alice Brandfonbrener, Assistant Professor, Department of Medicine, General Medicine Division Department of Physical Medicine and Rehabilitation Northwestern University’s Feinberg School of Medicine, Chicago, Illinois
- Dr. William J. Dawson, Past President of the Performing Arts Medicine Association; Associate Professor Emeritus of Orthopaedic Surgery, Northwestern University’s Feinberg School of Medicine, Chicago, Illinois
- Babette Lightner, Director, Stones in Water – A Movement Education and Learning Methods Center Educator, River Falls, Wisconsin
- Nicholas Quarrier, Clinical Associate Professor of Physical Therapy, Ithaca College, Ithaca, New York
- Jonathan Reynolds, PhD, PT, Co-owner and Founder, Reynolds Rehabilitation Enterprises, Minneapolis, Minnesota

Revolutionary Features of the Nota Chair

From market research and product engineering, the Wenger design team believes the Nota chair has several revolutionary features unavailable in any other music-specific chair:

Position-Transition Seat with Dual Seating Zones

The two distinct seating zones in the Nota chair can accommodate either front- or rear-seating preferences. This provides uncompromising comfort and posture support in each position, and facilitates easy movement between positions.



Forward

Back

Narrow Convex Back This uniquely shaped back bows outward toward the seated musician, helping to encourage the natural sacro-lumbar curve of the spine. The convex shape also means that it offers this support even when musicians sit at an angle on the chair. Its narrow shape provides greater freedom of movement, both for the upper arm/torso and rib cage/diaphragm.

Dynamic Cantilever Frame The new Nota conBRIO™ model features a unique frame design that offers dynamic seating benefits. Musicians can now engage their entire body in music-making, with the chair's kinetic capabilities fostering artistic flexibility and freedom. This movement can also improve focus and concentration.

Accommodating Angled Seating

Musicians may choose an angled seating position on a chair for a variety of reasons. Those musicians playing certain instruments – such as French horn, violin/viola, flute or larger saxophone – require an angled position to prevent their elbows, or in some cases their instruments, from hitting their chairs. Two musicians who are sharing one music stand may also need to sit slightly sideways in order to see correctly.



Forward

Back

The Nota chair, with its rounded front corners and “waterfall” front, accommodates angled seating preferences without uncomfortably constricting the legs. (Chairs with sharply angled front corners restrict angled positioning.)

Proper Leg Support

Proper support for the legs and thighs impacts the circulatory and nervous systems. With chairs that are

concave-shaped in the front, the likelihood increases that musicians will complain about numbness, tingling or irritation in their legs because nerves are being compressed. The Nota chair provides proper support and promotes better circulation. In addition, the conBRIO model's uniquely designed cantilever frame creates an openness under the seat, allowing the musician to shift positions even more.

Accommodating Range of Motion

The Nota chair allows the musician's body to be more fluid than regular chairs. With the pelvis tipped slightly forward, the body is more apt to “teeter totter” or sway slightly in different directions. The unique shape of the seat also fosters this motion. By utilizing more muscle activity, it assists in circulation and reduces the likelihood of muscle rigidity caused by sustained contractions. The cantilever design of the conBRIO model offers additional flexibility and freedom of movement.

Nota conBRIO™ Improves Postural Response

All Nota posture chairs encourage the proper skeletal alignment for the musician, and the conBRIO model adds an element of dynamic mobility. Proper skeletal alignment supports better circulation and aligns joints for more efficient movement. The conBRIO model enhances both of these qualities and more.

The body has what it is referred to as a postural response⁹. The trunk makes small continuous movements automatically adjusting to arm movements; this helps produce more efficient arm movement. This postural response is critical for extremity function and helps maintain the body in a more balanced position. Without this response, or when the response is restricted in a more stable chair, trunk movement is restricted and the extremities may have to rely on compensatory movements to move. Compensatory movement may cause muscle fatigue and eventual muscle imbalances.

The trunk makes anticipatory postural adjustments immediately prior to onset of voluntary extremity movement, serving to prevent or minimize displacement of the body's center of gravity associated with the movement. Studies have shown increased reach distances with earlier and larger postural adjustments. As the arms move through greater range of motions, increased trunk postural response is required¹⁰.

Fine motor extremity dexterity (such as playing a musical instrument) is controlled by the cerebellum. The cerebellum is also the key brain structure involved in the learning of anticipatory postural adjustments¹¹. As a musician practices their instrument seated in the conBRIO chair, the cerebellum is working automatically to adjust the shoulder, arm, and hand to function for efficiency. If the anticipatory adjustments are restricted, as in a fixed, stable chair, less efficient, compensatory movement may occur, with its negative side effects.

Other Supportive Chair Attributes

Transition/Movement The transition (middle) area on the seat makes it easy for musicians to move between front (perched) or rear (engaged) positions on the seat, or change their sitting angle.

Spinal Curvature To maintain the spine's natural sacro-lumbar curve, the recessed seat contour of the rear (engaged) position of the seat helps angle the pelvis slightly forward, preventing it from rolling backwards – which happens when people slouch. The recessed seat area offers fewer pressure points by more naturally cradling the body's contours.

Breath/Circulation When the pelvis is slightly forward and the spinal column properly aligned, the rib cage is not compressed, allowing for maximum ventilation and breathing capacity.

Height Accommodation The Nota chair's rounded waterfall front accommodates musicians of different heights more easily than average classroom chairs. In order to help keep the thighs sloping downward, the Nota chair is also higher than average classroom chairs. The 19" Nota chair will be the size best suited for most musicians, but Wenger also offers 14.5", 16", 17.5" and 20.5" models to accommodate musicians throughout the height spectrum.

Professionals, Other Musicians Can Benefit

The benefits of Nota chairs extend far beyond school-age musicians. Professional musicians also struggle with music-related difficulties. More than three-fourths of orchestra musicians in a national survey suffered at least one musculoskeletal problem severe enough to affect performance.¹² The prevalence of injury is due, in part, to the extended playing time professionals must endure in rehearsals and performances.

While the potential for fatigue is greatly increased for professionals, the proper chair can help minimize problems. Musicians who are seated comfortably with the capability for movement will be able to withstand longer playing sessions with a decreased risk of adverse musculoskeletal and respiratory consequences.

By promoting proper posture and good health, the management of professional music organizations can help minimize musician downtime. This proactive approach saves money by reducing the need to hire substitute musicians or pay disability expenses.

Many woodwind players and orchestra pit musicians are "doubblers" – playing two or more instruments during a session. The Nota chair enables these musicians to easily and comfortably transition to suit different instruments.

Amateur musicians who play in community bands and similar organizations can also benefit from proper music chairs. The adults in these performing groups, which usually rehearse in schools, will be less likely to experience music-related difficulties.

FEATURE

BENEFIT

NARROW CONVEX BACK

- Allows for greater freedom of movement
- Provides greater lumbar support
- Allows the musician to sit straight or angled on the chair and still get back support

ROUNDED WATERFALL FRONT

- Promotes better lower extremity circulation, reduces nerve compression
- Encourages a natural lumbar curve, even in the forward position
- Allows one height of chair to accommodate a greater variety of body sizes



POSITION-TRANSITION SEAT

- Promotes good posture in either the forward "perched" or rear "engaged" position
- Contour allows musicians to sit straight or angled on the chair
- Transition area makes it easy to move from an engaged to a perched position



DYNAMIC FRAME (CONBRIO™ MODEL ONLY)

- Easily responds to movement
- Provides stable, yet fluid foundation
- Enables freedom to fully engage in music

Comments About the Nota® Chair

Music directors and medical personnel who have experienced Nota chairs firsthand offer strong opinions about their benefits:

"I really like how the Nota chair positions the student correctly for proper posture. The chairs help me reinforce that lesson. These chairs have worked out very well."

Fred Trumpy, Band Director, Bernards High School, Bernardsville, New Jersey

"With the Nota chair, you're not sitting – you're poised for action. It seems to put you in the exact spot you need to work. You can forget where you are and focus all your energy on your music, rather than squirming, wiggling and trying to get comfortable. I can sit longer and practice more."

Lora Lynn Snow, Manager, Founder and Principal Oboist, The Ohio Valley Symphony, Gallipolis, Ohio

"I loved the Nota conBRIO chair from the first moment I sat in it. With other chairs I have to adapt to fit the chair, but this chair fit me. It definitely provided flexibility and support without any cumbersome limitations to body movement. Your legs can move, your upper body can swivel or sway. I felt more connected to my feet and core muscle groups, which supports proper breathing and better music-making. The cantilever design also gives a lot more room for my legs."

Dr. Dylan Chmura-Moore, Professor of Music, University of Wisconsin-Oshkosh, Oshkosh, Wisconsin

"It is critical to have postural alignment for musical performance. This chair supports the ability to sit up in a better alignment – better position. With the contoured seat and the back support it offers, you can sit longer with less fatigue and therefore, less ability to slouch."

Nicholas F. Quarrier, MHS, PT, OCS, Clinical Associate Professor, Department of Physical Therapy, Ithaca College, Ithaca, New York

"A chair like the Nota chair, that allows a musician to sit comfortably and play efficiently and easily, can certainly help musicians maintain their good health."

Dr. William J. Dawson, Past President of the Performing Arts Medicine Association; Associate Professor Emeritus of Orthopaedic Surgery, Northwestern University's Feinberg School of Medicine, Chicago, Illinois

"Posture is the basis for everything you do as a musician, and having the right posture alleviates problems for students. And if the students are comfortable, they are going to focus on their playing."

Michael Eddy, Fine Arts Coordinator, Henry County School System, McDonough, Georgia

"The Nota chair will give student musicians a better chance at succeeding than will a regular chair, helping them to develop – through good posture – the habits necessary for great musicianship."

Dr. David Gregory, Director of Bands, Reinhardt College, Waleska, Georgia

"Good posture is absolutely critical and it is critical not just for wind players but also for string players and for vocalists...for all musicians...The Nota music posture chair allows for wonderful alignment. It keeps the musician very centered and keeps the spine properly aligned."

Robert W. Rumbelow, Director of Wind Ensemble Activities, Columbus State University - Schwob School of Music, Columbus, Georgia

"Once you sit in the Nota chair, it seems like magic. It seems to naturally align your hips – especially for violin. Even when you are sitting back or forward it puts the body in the right alignment. And it's just the right height. I fully support using the Nota™ chair for myself and my students!"

Susan Waterbury, Associate Professor, Violin, Ithaca College, Ithaca, New York

Bibliography

- ¹ U.S. Centers for Disease Control and Prevention (<http://www.cdc.gov/obesity/data/trends.html>) and (<http://www.cdc.gov/chronicdisease/resources/publications/AAG/obesity.htm>).
- ² University of California, UC Newsroom: Back to school; heavy packs endanger kids' health, study shows (Press Release, August 2004) Retrieved from <http://www.universityofcalifornia.edu/news/article/6575>, November 2011.
- ³ Ranelli, S, Smith, A, Straker, L: Playing-related Musculoskeletal Problems in Children Learning Instrumental Music: The Association Between Problem Location and Gender, Age, and Music Exposure Factors. *Medical Problems of Performing Artists* 2011; 26:3:123.
- ⁴ Brandfonbrener, A: History of Playing-related Pain in 330 University Freshman Music Students. *Medical Problems of Performing Artists* 2009; 24:1:30.
- ⁵ U.S. Department of Education, National Center for Education Statistics (www.nces.ed.gov), including Fast Response Survey System. Data extrapolated by National Association for Music Education, November 2011.
- ⁶ Data supplied by National Association of Schools of Music (www.arts-accredit.org), November 2011.
- ⁷ Rapport, MD, et al: Hyperactivity in Boys with Attention-Deficit/Hyperactivity Disorder (ADHD): A Ubiquitous Core Symptom or Manifestation of Working Memory Deficits? *Journal of Abnormal Child Psychology* 2009; 37:521-534.
- ⁸ Fedewa, A, Erwin, H: Stability Balls and Students with Attention and Hyperactivity Concerns: Implications for On-task and In-seat Behavior. *American Journal of Occupational Therapy* 2011; 65:393-399.
- ⁹ Ryerson S, Levit, K: *Functional Movement Reeducation*. New York, Churchill Livingstone, 1997.
- ¹⁰ Moore S, et al: Investigation of Evidence for Anticipating Postural Adjustments in Seated Subjects Who Performed a Reaching Task. *Physical Therapy* 1992; 72:335-343.
- ¹¹ Shumway-Cook A, Woollacott M: *Motor Control*, 3rd Ed. Philadelphia, Lippincott Williams & Wilkins, 2007.
- ¹² Middlestadt, S, Fishbein, M: The Prevalence of Severe Musculoskeletal Problems Among Male and Female Symphony Orchestra String Players. *Medical Problems of Performing Artists* 1989; 4:1:41-48.