

**Working with Injury in Music Pedagogy:
How Teaching, Performing, Dystonia, and the Feldenkrais Method, Created a Base for
Reexamining Pedagogy in the Performing Arts**

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I. Violin Playing and Feldenkrais: A Personal Journey

“There is no exercise, though never so healthful and innocent, but what may produce great disorders, if it is used with intemperance,” are the words of Bernardino Ramazzini, who was in 1713 the first to describe an overview of occupational diseases of musicians (Sataloff et al, 2010; Bejjani et al, 1996).

II. Studies of Performance Related Injury in Musicians Since the 1980s

A. Secondary school musicians, university level music students, and conservatory students:

Christine Zara (1997). *Playing-related Musculoskeletal Disorders in Musicians: A Systematic Review of Incidence and Prevalence*. A survey of studies in the 1990s.

- 49% of participating secondary school instrumentalists reported “instrument-related problems, 32% of which described persistent pain.
- 87% of participating university instrumental music students reported performance-related pain.
- 62% of conservatory piano students reported musculoskeletal complaints.

B. Professional Musicians

Laura M. Kok, Bionka M. A. Huisstede, Veronique M. A. Voorn, Jan W. Schoones, Rob G. H. H. Nelissen (2015). *The Occurrence of Musculoskeletal Complaints Among Professional Musicians: A Systematic Review*.

- 21 studies reviewed, representing 5424 professional musicians
- 62%-93% prevalence of musculoskeletal complaints
- 41%-93% prevalence in a 12 month range
- Majority of medical complaints of musicians are performance related
- Physiological, psychological, social, financial impact
- Over half of musicians studied reported sleep disturbances due to musculoskeletal pain

C. Three major studies of professional symphony orchestras 2011-2014

Denmark (2011):

Helene M Paarup, Jesper Baelum, Jonas W Holm, Claus Manniche, Niels Wedderkopp (Oct 2011). *Prevalence and Consequences of Musculoskeletal Symptoms in Symphony Orchestra Musicians Vary by Gender: A Cross-Sectional Study*.

- In a 12 month study of 372 musicians, 97% of women and 83% of men experienced pain/discomfort in the neck, back, shoulders, hands, and/or wrists.

- 55% reported change in daily activities outside of playing, including 49% with difficulty in sleeping due to pain.

Great Britain (2012):

Richard Leaver, E. Clare Harris, and Keith T. Palmer (August 2012). *Musculoskeletal Pain in Elite Professional Musicians from British Symphony Orchestras*.

- Out of 240 musicians, 210 (86%) reported regional pain in a 12 month period, in the neck, low back, and shoulders.
- Anxiety and depression were among the associated conditions; performers reported anxiety and depression in statistical proportion to pain and debilitation from injury.

Australia (2014):

Richard Leaver, E. Clare Harris, and Keith T. Palmer (August 2012). *Musculoskeletal Pain in Elite Professional Musicians from British Symphony Orchestras*.

- Out of 377 musicians in 8 professional orchestras, 84% reported Performance Related Musculoskeletal Disorder (PRMD).
- Performers reported performance anxiety, social anxiety, depression in conjunction with PRMDs, and 22% met requirements for Post Traumatic Stress Disorder.

D. Neurological Considerations for Musicians: Chronic Pain Symptoms and Dystonia

Anna M. Zamorano, Inmaculada Riquelme, Boris Kleber, Eckart Altenmuller, Samar M. Hatem, Pedro Montoya (January 2015). *Pain Sensitivity and Spatial Acuity are Altered in Healthy Musicians as in Chronic Pain Patients*

- Intense repetitive and spatially specific training over many years combined with integration of multi-sourced sensory and motor information creates changes in both the “functional and structural organization of the somatosensory system.”
- Change in plasticity, hyper-plasticity creates conditions for neurological problems like dystonia.
- These changes in plasticity also may lead to conditions in the brain and nervous system similar to chronic pain patients, even among musicians who do not experience pain/injury.
- Most professional musicians have accumulated 10,000 hours of deliberate practice on their instrument by age 20 and exhibit an extremely fine degree of tactile sensitivity.
- Cross-modal feedback and sensitivity to sound differentiation to a similar degree in relation to touch as well as highly developed spatial organization creates a hyper-plasticity far more diversified and complex.
- This hypersensitivity and hyper-plasticity is demonstrated throughout the body, in areas remote to those directly involved in playing, suggesting that the plastic restructuring occurs throughout the brain.

- This may lead to “confusion of somatosensory inputs produced by expanded somatosensory receptive fields” due to high-level musical instrument training over many years and affects the majority of musicians.
- Chronic pain sufferers who are non-musicians experience some similar changes due to pain input over time.

Florence C. F. Chang and Steven J. Frucht (January 2013). *Motor and Sensory Dysfunction in Musicians’ Dystonia, Current Neuropharmacology*

- Instrumentalists who develop dystonia have been shown to exhibit traits of hyper-plasticity, increased cortical excitability, abnormal inhibition, and difficulty with sensory integration in other parts of the body unaffected by the dystonia, indicating that these changes are present throughout the brain and nervous system.
- The first record of musicians’ dystonia comes from the diaries of Robert Schumann’s diary in 1830.
- Near-perfect accuracy and the practice required to produce such targeted spatial specificity has been shown to alter plasticity in the cortex.
- Instruments that require higher spatial demands such as violin, viola, piano, and guitar, have a higher rate of dystonia development.
- Brass players who develop embouchure dystonia experience changes in cortical mapping in relation to the lips and tongue.
- Dystonia can spread to the unaffected hand or parts of the jaw, face, neck, spine through faulty surround inhibition.
- Musicians with dystonia demonstrate reduced movement related cortical potentials, meaning that even small movements, once signaled in the brain, are nearly impossible to stop or reverse, even at or just before the moment of initiation.

III. Risk Factors for Injury Specific to Musicians (documented in studies 1980-2015)

- Ergonomic challenges--little variation in neck and trunk for long periods; static and or dynamic shoulder loading; repetitive or loaded wrist flexion and extension; dynamic finger movement
- Training in competitive environments, often since childhood, where standards of proficiency must be regularly achieved and maintained
- Long practice hours - to maintain an elite level of playing, instrumental musicians play one instrument an average of 1300 hours per year; practice involving intense self-scrutiny and repetition, approaching physiological, neurological, psychological limits
- Pressure to perform consistently well on a weekly basis for job security
- Connection of these injuries to necessary function and livelihood
- Training based on tradition and sound rather than physical and other considerations
- String players ranked first, followed by winds, then low brass
- High level of self-consciousness relates to performance anxiety and to attention to physical symptoms
- Memories of “bad” performance experiences, especially as young adults

IV. Why do instrumental musicians continue to suffer high rates of pain and injury?

“Literature documenting the health risks and high rates of injury faced by musicians internationally has been steadily building over the last few decades, and yet the statistics of players suffering performance-related injuries has remained essentially unchanged.”

Bronwen (2014)

- Difficulty evaluating using standard physiotherapy tools because injury is often the result of “hyper-functioning” – increase in size, strength, and range of motion problems often not diagnosable with standard clinical assessment
 - Increased left-arm supination in violinists and violists
 - Right arm dynamic variability in cellists
 - Shoulder development in trombonists
- Lack of research into the specific nature of these injuries in musicians as different from musculoskeletal injury in the general population
- Therapeutic measures currently offer stretching, periods of time away from the instrument, pain medication, but do not address these kinds of changes in the brain and nervous system
- Poor understanding of neurological factors in both medicine and pedagogy--cortical reorganization is demonstrated through studies of musicians affected with neurological disorders
- Diagnosis is often delayed due to difficulty understanding the disease and accompanying complaints
- Many musicians choose self-management of both physiological and psychological issues

V. The Feldenkrais Method

- Moshe Feldenkrais – Judo master, mechanical engineer, pedagogue
- Awareness Through Movement lessons
- Functional Integration
- Use of movement and sensation as a primary tool for learning
- Learning as change, new material
- Feldenkrais on learning, attention, habit
- Work with musicians

VI. Pedagogical Ideas for Injury Prevention – Incorporating into Individual Work

A. Learning how to learn

- Your instrument as a tool for experiential learning
- Discovering the instrumentalist inside you from the inside out—becoming your own best teacher
- Never stealing an opportunity to learn—the challenge of keeping the answers to yourself and asking questions, and allowing yourself to be wrong and the student to be right

B. Awareness Through Movement

- Thinking, Feeling, Sensing, Moving—the concept of integration in learning
- Why Movement? Why we use movement to explore everything else, and how I incorporate movement into instrumental pedagogy
- Developing the self-image—recognizing and clarifying new parts of ourselves
- Working with developmental concepts and play—play is learning, and can also create recognizable analogies to fundamental concepts particular to the instrument; I always go for the familiar when working on a new technique
- Variation and choice—providing new tools, but not overwhelming,
- Intention and initiation—the need to connect to actual function on the instrument; using small distinctions to make connections movement to function directly on the instrument
- Embodiment—integrating the whole mind/body and all of the senses into the action, including, breath, posture, power, balance, everything that makes up the self-image to serving the music itself

VII. Pedagogy in the Classroom – Illustrations and Ideas

A. Public School Settings

- Providing some kind of movement away from the instrument
- Asking questions, letting the group lead the direction of the learning
- Finding something new in each lesson

B. Workshops

- National Association of Schools of Music requirements for accreditation in the United States
- Addressing the individual interests and needs of faculty and students
- Building an interest in further exploration over time—asking questions, challenging puzzles in ATM work, challenging ideas and traditions of learning, leaving these questions open-ended and not coming to conclusions/answers

C. Summer Festivals

- Weekly or daily ATM classes—exploring movement in detail away from instrument has proven very successful in rate of injury over the course of these intensive summer programs; many students have talked about doing parts of these lessons on their own during the year
- Instrument specific workshops—working with faculty to devise lessons around playing issues and bringing into functional application—I have done brass and woodwind workshops each of the past 4 summers
- Encouraging individual questions—I find that addressing a group with a broad range of leaning needs in ATM classes helps students begin to identify their individual learning needs and brings them forward with specific questions for application; opening the door to these kinds of questions is the first step in learning how to learn

VIII. Age and Experience Specific Pedagogy

A. Suzuki workshops, and little ones—ages 3-10, critical formation

- Developmental play—filling in the gaps to make instrumental playing easy and fun
- Animals, balancing acts, pretending to conduct, tongue twisters
- Involving the parents in this kind of learning, assisting, playing along, explaining developmental concepts and their connection to the demands of instrumental playing

B. Middle school and high school students—ages 11-18, creating a foundation

- Learning how to ask questions of themselves in practice
- Not needing to find the right answers, only to hone the questioning ability
- Discovering the inside out way of learning; how is it different from some of the learning they do in school
- Developing a relationship with music and their instrument that is individual and sustaining—trusting in this interaction
- Listening—to your instrument, to yourself

C. University and graduate music students—ages 18-whenever!

- What you already know—how to question and reevaluate throughout your career so that change is always possible
- Practicing to grow, not to maintain
- What you don't know you don't know—exploring the most direct path to learning

IX. Questions for Further Exploration

- How can anecdotal information in cases like mine and others play a role in the research of dystonia and other musicians' injuries?
- Can we as educators and researchers encourage injured performing artists to participate and share their experiences, making injury less stigmatized and more open to understanding?
- How can we begin to involve more modalities like the Feldenkrais Method, among others, not prescriptively, but for continued investigation of their assets and challenges in performing arts teaching at all levels?
- Can evaluating various applications of our traditional approaches to pedagogy provide alternative ways of working with musicians and provide insight into more ways of preventing or recovering from injury?
- How can we improve our communication with clients/students to create options/language/openness for sharing serious concerns and difficulties?
- Finally, can we begin to incorporate more movement based and experience based learning in the classroom, in private teaching, in clinics, and even in academic settings as an alternative to some of the outdated static models, achievement oriented, and product oriented approaches to teaching and practice in the performing arts?

Bibliography

- Ackermann, Bronwen J., Dianna T. Kenny, Ian O'Brien, and Tim R. Driscoll. "Sound Practice: improving occupational health and safety for professional orchestral musicians in Australia." *Frontiers in Psychology*. (2014): 1-17. doi: 10.3389/fpsyg.2014.00973.
- Altenmüller, Eckhardt, and Hans-Christian Jabusch. "Focal Dystonia in Musicians: Phenomenology, Pathophysiology, Triggering Factors, and Treatment." *Medical Problems in Performing Art* 25 (2010): 3-9.
- Bejani, Joseph, Glenn M. Kaye, and Melody Benham. "Musculo-skeletal and neuromuscular conditions of instrumental musicians." *Archives of Physical and Medical Rehabilitation*. (1996) 77:406-13.
- Blakeslee, Sandra, and Matthew Blakeslee. *The Body Has a Mind of Its Own: How Body Maps in Your Brain Help You Do (Almost) Everything Better*. (New York: Random House, 2007): 71-97.
- Bogousslavsky J., and F. Boller. "Neurological Disorders in Famous Artists." *Frontiers in Neurology and Neuroscience*. (2005): 19, 1-10.
- Burrell, Lisa. "My Journey with Dystonia and the Feldenkrais Method: Beginning a Discussion on Contraindications for Aspects of Our Practice." *The Feldenkrais Journal*, No. 28. (2015): 7-19. Republished online at <http://www.feldenkrais.com/journal-burrell-rubin-rep>.
- Byl, Nancy, S. Nagarajan, and A. L. McKenzie. "Effect of Sensory Discrimination Training on Structure and Function in Patients with Focal Hand Dystonia: A Case Series." *Archives of Physical Medicine and Rehabilitation* 84/10 (2003): 1505-1514.
- Chang, Florence C. F., and Steven J. Frucht. "Motor and Sensory Dysfunction in Musicians' Dystonia." *Current Neuropharmacology* (2013): 1-14. doi: 10.2174/157015913804999531.
- Cott, Jonathan. "Glenn Gould: The Rolling Stone Interview Part I: The classical pianist talks about his influences, his unconventional style and his anxiety dreams." *Rolling Stone Magazine*. August 15, 1974. Reprinted at <http://www.rollingstone.com/music/features/the-rolling-stone-interview-glenn-gould-part-one-19740815>.
- Farias, Joaquin. *Intertwined: How to Induce Neuroplasticity, A New Approach To Rehabilitating Dystonias*. (2012): 54.
- Feldenkrais, Moshe. *Awareness Through Movement*. Harper Collins (1977) republished in 1990.
- Grilley, Paul, and Suzanne Grilley. "Bone Photo Images" from Yin Yoga Teacher Training with Paul and Suzee Grilley." (2013): <http://paulgrilley.com/bone-photo-gallery>.
- Kok, Laura M., Bionka M. A. Huisstede, Veronique M. A. Voorn, Jan W. Schoones, Rob G. H. H. Nelissen. "The Occurrence of Musculoskeletal Complaints Among Professional Musicians: A Systematic Review." *International Archives of Occupational and Environmental Health*. (2015): 1-15. doi: 10.1007/s00420-015-1090-6.
- Leaver, Richard, E. Clare Harris, and Keith T. Palmer. "Musculoskeletal Pain in Elite Professional Musicians from British Symphony Orchestras." *Occupational Medicine*. (2012): 549-555.
- Merzenich, Michael. *Interview with Cliff Smythe on Neuroscience, Learning, and the Feldenkrais Method*. (2012): <https://www.youtube.com/watch?v=rupZ-wlRdA0&feature=youtu.be>
- Paarup, Helene M., Jesper Baelum, Jonas W Holm, Claus Manniche, and Niels Wedderkopp. "Prevalence and Consequences of Musculoskeletal Symptoms in Symphony

- Orchestra Musicians Vary by Gender: A Cross-Sectional Study." *BMC Musculoskeletal Disorders*. (2011): 1-15. doi: 10.1186/1471-2474-12-223.
- Palatty, Biju Urumese, Raveendranath V., and Manjunath K.Y. "Anatomical Study of Extensor Tendons of Medial Four Fingers in Adults and Fetuses-A Cadaveric Study." *Peoples Journal of Scientific Research*. (2015): 1-13.
- Peterson, David A., Terrence J. Sejnowski, and Howard Poizner. "Convergent Evidence for Abnormal Striatal Synaptic Plasticity in Dystonia." *Neurobiology of Disease* 37 (2010): 558-573.
- Quartarone, Angelo, and Mark Hallett. "Emerging Concepts in the Physiological Basis of Dystonia," *Movement Disorders* 28/7 (2013): 958-967.
- Wise, R.A. "Addictive Drugs and Brain Stimulation Reward." *Annual Review of Neuroscience* 19 (1996): 319-340.
- Zamorano, Anna M., Inmaculada Riquelme, Boris Kleber, Eckart Altenmüller, Samar M. Hatem, Pedro Montoya. "Pain Sensitivity and Tactile Spatial Acuity are Altered in Healthy musicians as in Chronic Pain Patients." *Frontiers in Human Neuroscience*. (2015): 1-14. doi: 10.3389/fnhum.2014.01016.

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