

# All-State: Shoulder Disorders and Other Common Problems in String Players: Research, Prevention and Treatment

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String players need to be conscious of how they are using their body as they play, and in turn, the ways those movements affect their bodies. There are many different kinds of movement involved in playing an instrument. Dr. Reynolds presented specifically on violinists, with research on the bow arm of the player.

The first portion of the presentation was dedicated to helping us understand the shoulder—the various parts of the shoulder, common ailments in the shoulder, possible causes, and some terminology in the field. Throughout the presentation, he emphasized that each injury is unique to the person, and should be treated as such. He also believes in a holistic approach to treatment, incorporating knowledge of the muscle, nervous, and skeletal systems in the diagnosis and treatment of the injury. Some common disorders of the shoulder that were addressed include myalgia (muscle pain), arthritis, adhesive capsulitis (frozen shoulder), subacromial impingement syndrome (rotator cuff tear, bursitis, spurs, etc.), and thoracic outlet syndrome (compression of artery nerves running from neck through shoulders). Numbness and tingling in your fingers is usually a symptom of thoracic outlet syndrome.

The shoulder area is a fairly complicated system, involving several bones and muscle groups that perform specific functions in shoulder movement. The rotator cuff, commonly referred to when people have surgery in this area, is actually a stabilizer muscle. This muscle should be strengthened for endurance using very light weights. The deltoid muscle is located on the top outside corner; the trapezius consists of an upper, middle and lower along the shoulder blade; the rhomboid, levator scapulae and the pectoralis muscles all engage in various shoulder movements.

It is important to train the muscles carefully—the shoulder blades are held into place only by the muscles, and their position can be affected by inequality within the system. For example, too much tension or strength in the pectoralis muscles can compress the artery and veins in the shoulder, causing pain or distortion in the blade. Pseudo-fatigue, or shortened muscles that are weakened, can cause the shoulder blades

to pancake, especially in younger persons.

Other factors impact the ability of the shoulders to move in a more normal fashion, such as age, disease, high levels of stress or performance anxiety, gender and age. Older individuals are more prone to injury as muscles lose elasticity and tone, and bones become more fragile. Females are also more prone to injury than males.

Dr. Reynolds presented that research indicates the incidence of shoulder injuries is more common in the left than the right (due to the positioning of the instrument); more common in violists than violinists (due to size); and more common in females than males. The presence of other diseases is a huge factor preventing people from absorbing vitamin B12, or calcium, leading to more injuries. Medications, such as acid-controlling medications, hinder calcium absorption. People need a daily exposure to sunshine as this can increase levels of vitamin D. Just as we have trainers who work with our athletes, we need trainers to work with orchestra students. Education is the key to preventing injuries.

There are many possible causes of injury—a few from the list include technique, fatigue, posture, sudden increases in practice time, and high levels of “antagonist” activity. Agonist activity refers to the muscle doing the activity, and antagonist activity refers to the opposing muscle getting involved in the activity. Vibrato is an example—there is a co-contraction of the muscles, using both muscles at the same time, which is difficult for the brain to manage. There are other possible causes, but those listed above are most commonly cited.

The amount of exposure affects the likelihood of injury. The example was given of standing next to a speaker at a rock concert. If a person did this for 3 minutes there would be no injury to your hearing, however if a person did this everyday for a month, the hearing could be damaged.

Force is a risk factor in injuries. Repetition contributes to exposure. Duration, intensity are also risk factors. Tissue tolerance differs from individual to individual. You can manage these exposure factors to keep it below the tissue tolerance. Practice for shorter times, take breaks, and mix up the high intensity playing. If you push the

point of your tissue tolerance, you're already injured. Normalize posture, limit the force, cut down to 5-minute duration, and slowly creep things up. If the intensity goes up, cut down on the duration. It's common sense, but takes discipline to implement.

Muscles and nerves are not detachable. The one is dependent on the other. If you cut off the nerve supply to a muscle it stops working. Muscles are plastic; they can be shortened and lengthened. If muscles fatigue they don't function properly. Seventh position on the violin is an example of weakening the muscle in the arm. Low frequency fatigue typically results after a two-hour rehearsal; a fairly long rest time is needed to recover. High frequency activity for shorter periods allows muscles to recover more quickly.

There are a few common categories of injury to the shoulder. These injuries can be caused by playing, but they can also result from activities that do not involve violin playing, with the resulting injury affecting a person's ability to play. Rotator cuff tendinitis or tears affect the alignment of the shoulder blades, as the muscle is no longer performing its duty. This creates a muscle imbalance causing other muscles (trapezius, rhomboid, levator scapulae) to take over the duties of the rotator cuff. The result is overuse of other muscles, causing further injury. Frozen shoulder is caused by inflammation in the space between the bones of the shoulder and can be painful. Motion is limited, and can seriously affect the playing ability of an upper string player. Scapular dyskinesia (faulty motion) refers to the motion of the shoulder blades on the rib cage, including the direction and fluidity of the motion.

It is important that one understand muscular function when diagnosing and treating any of these injuries to the shoulder. A detailed examination, including bringing in the instrument and doing a performance assessment, is critical for successful progress. Dr. Reynolds suggested managing exposure to the activities during and as a part of treatment. Frequent breaks during rehearsal, alternative practice activities, stretching time and short practice times are all changes that can have a positive impact on one's ability to recover and continue

playing. Physical therapy can include work with the soft tissues, joints and muscles to help regain the natural movement of all components within the shoulder area. Correcting alignment and reinforcing correct movement of the muscles are also important in the healing process.

Dr. Reynolds' research analyzed the movement of the bow arm in violinists with both slow and fast repertoire. Many musicians might be able to ascertain on their own that playing slow repertoire can cause more stress on the body than faster repertoire, and some of the research substantiated those ideas, along with providing some other interesting data. The flatness of the instrument can cause aggravation to an injured player; it can help to tilt the instrument slightly forward on its long axis. Holding the instrument towards the front, using the weight of the arm to apply force

to the bow, playing with attention towards a "tall" posture stance, and some strength training can all help to provide support for violinists with shoulder injuries.

If you are injured, rest is necessary but stopping playing is not. Cutting back is advised. Rotate your repertoire. Go back to basic stuff to give yourself a rest from the difficult stuff. Manage rehearsal time by taking frequent breaks. Reynolds says 45 minutes is the max time to practice after which you should take a total break of 15 minutes. Stretches need to be appropriate and held for 30 seconds. Reynolds teaches mental imagery because research has shown that if you imagine yourself playing without doing the actual activity your brain is learning the activity. Mental imagery cuts down on the physical stress and can be a way to practice.

Red flags in students are rounded

shoulders and hunching forward with the head. Shoulder blades should be moving in symmetry with each other as students raise hands up together. Raising the shoulder to meet the instrument results in uneven shoulders. The risks of exposure start early. We need to educate parents on postural abnormalities so they can pick them up at a treatable time. Teacher, clinician and parent must not pull the injured student in different directions. Everyone needs to be working together in the best interest of the student's physical needs.

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