

Is Violin String Players Having Longer Left Fingers?

Joyanta Sarkar¹, Anil Rai²

¹Phd Scholar, ²Assistant Professor, Birla Institute of Technology and Science, Pilani, India

Abstract

Bones are a form of specialized tissue. They are very strong and durable. Bones in our body will elongate and grow starting from the time we are born until adolescence. The rate of development of our bones will also depend on, amongst other things, the amount of nutrition, exercise and exposure to sunlight. Sunlight helps us produce vitamin D - which is important for absorbing calcium. Our bones provide the frame and structural support required to hold our flesh, organs and muscles together. They also provide protection for our vital organs. For example the ribcage protects the heart and lungs, while the skull protects our brains. Bone marrow found at the core of our bones, is used to produce blood cells and to store fat. Bones also act as a reservoir for calcium storage. In this paper, we propose, whether the experienced violinists have longer fingers on their left hand or not. This paper involved violinists who have been playing the instrument for more than 5 years.

Keywords: Bone, Tissues, Ribcage, Skull, Osteoblasts, Osteocytes, Osteoid

Introduction

The violin, sometimes known as a fiddle, is a wooden string instrument in the violin family. Most violins have a hollow wooden body^[1]. It is the smallest and highest-pitched instrument in the family in regular use. The violin typically has four strings, usually tuned in perfect fifths with notes G3, D4, A4, E5, and is most commonly played by drawing a bow across its strings, though it can also be played by plucking the strings with the fingers (pizzicato) and by striking the strings with the wooden side of the bow.

Violins are important instruments in a wide variety of musical genres. They are most prominent in the Western classical tradition, both in ensembles (from chamber music to orchestras) and as solo instruments and in many varieties of folk music, including country music, bluegrass music and in jazz. Electric violins with solid bodies and piezoelectric pickups are used in some forms of rock music and jazz fusion, with the pickups plugged into instrument amplifiers and speakers to produce sound. Further, the violin has come to be played in many non-Western music cultures, including Indian music and Iranian music^[2]. The name fiddle is often used regardless of the type of music played on it.

The violin was first known in 16th-century Italy, with some further modifications occurring in the 18th and 19th centuries to give the instrument a more powerful sound and projection^[3].

Violinists and collectors particularly prize the fine historical instruments made by the Stradivari, Guarneri, Guadagnini and Amati families from the 16th to the 18th century in Brescia and Cremona (Italy) and by Jacob Stainer in Austria^[4]. According to their reputation, the quality of their sound has defied attempts to explain or equal it, though this belief is disputed. Great numbers of instruments have come from the hands of less famous makers, as well as still greater numbers of mass-produced commercial "trade violins" coming from cottage industries in places such as Saxony, Bohemia, and Mirecourt. Many of these trade instruments were formerly sold by Sears, Roebuck and Co. and other mass merchandisers.

The parts of a violin are usually made from different types of wood. Violins can be strung with gut, Perlon or other synthetic or steel strings. A person who makes or repairs violins is called a luthier or violinmaker. One who makes or repairs bows is called an archetier or bowmaker^[5].

Etymology

The word “violin” was first used in English in the 1570s. The word “violin” comes from “Italian violino, [a] diminutive of viola”. The term “viola” comes from the expression for “tenor violin” in 1797, from Italian viola, from Old Provençal viola, [which came from] Medieval Latin vitula” as a term which means “stringed instrument,” perhaps [coming] from Vitula, Roman goddess of joy..., or from related Latin verb vitulari, “to exult, be joyful.” The related term “Viola da gamba” means “bass viol” (1724) is from Italian, literally “a viola for the leg” (i.e. to hold between the legs).” A violin is the “modern form of the smaller, medieval viola da braccio.” (“arm viola”)

The violin is often called a fiddle, either when used in a folk music context, or even in Classical music scenes, as an informal nickname for the instrument. The word “fiddle” was first used in English in the late 14th century. The word “fiddle” comes from “fedele, fydyll, fidel, earlier fitehele, from Old English fīðele «fiddle,» which is related to Old Norse fiðla, Middle Dutch vedele, Dutch vedel, Old High German fidula, German Fiedel, “a fiddle;” all of uncertain origin.” As to the origin of the word “fiddle”, the “...usual suggestion, based on resemblance in sound and sense, is that it is from Medieval Latin vitula.”

Construction and Mechanics

A violin generally consists of a spruce top (the soundboard, also known as the top plate, table, or belly), maple ribs and back, two endblocks, a neck, a bridge, a soundpost, four strings, and various fittings, optionally including a chinrest, which may attach directly over, or to the left of, the tailpiece. A distinctive feature of a violin body is its hourglass-like shape and the arching of its top and back. The hourglass shape comprises two upper bouts, two lower bouts, and two concave C-bouts at the waist, providing clearance for the bow. The “voice” or sound of a violin depends on its shape, the wood it is made from, the graduation (the thickness profile) of both the top and back, the varnish that coats its outside surface and the skill of the luthier in doing all of these steps. The varnish and especially the wood continue to improve with age, making the fixed supply of old well-made violins built by famous luthiers much sought-after.

The majority of glued joints in the instrument use animal hide glue rather than common white glue for

a number of reasons. Hide glue is capable of making a thinner joint than most other glues, it is reversible (brittle enough to crack with carefully applied force, and removable with very warm water) when disassembly is needed, and since fresh hide glue sticks to old hide glue, more original wood can be preserved when repairing a joint. (More modern glues must be cleaned off entirely for the new joint to be sound, which generally involves scraping off some wood along with the old glue.) Weaker, diluted glue is usually used to fasten the top to the ribs, and the nut to the fingerboard, since common repairs involve removing these parts. The purfling running around the edge of the spruce top provides some protection against cracks originating at the edge ^[6]. It also allows the top to flex more independently of the rib structure. Painted-on faux purfling on the top is usually a sign of an inferior instrument. The back and ribs are typically made of maple, most often with a matching striped figure, referred to as flame, fiddleback, or tiger stripe.

The neck is usually maple with a flamed figure compatible with that of the ribs and back. It carries the fingerboard, typically made of ebony, but often some other wood stained or painted black on cheaper instruments. Ebony is the preferred material because of its hardness, beauty, and superior resistance to wear. Fingerboards are dressed to a particular transverse curve, and have a small lengthwise “scoop,” or concavity, slightly more pronounced on the lower strings, especially when meant for gut or synthetic strings. Some old violins (and some made to appear old) have a grafted scroll, evidenced by a glue joint between the pegbox and neck. Many authentic old instruments have had their necks reset to a slightly increased angle, and lengthened by about a centimeter. The neck graft allows the original scroll to be kept with a Baroque violin when bringing its neck into conformance with modern standards.

The bridge is a precisely cut piece of maple that forms the lower anchor point of the vibrating length of the strings and transmits the vibration of the strings to the body of the instrument. Its top curve holds the strings at the proper height from the fingerboard in an arc, allowing each to be sounded separately by the bow. The sound post, or soul post, fits precisely inside the instrument between the back and top, at a carefully chosen spot near the treble foot of the bridge, which it helps support. It also influences the modes of vibration of the top and the back of the instrument.

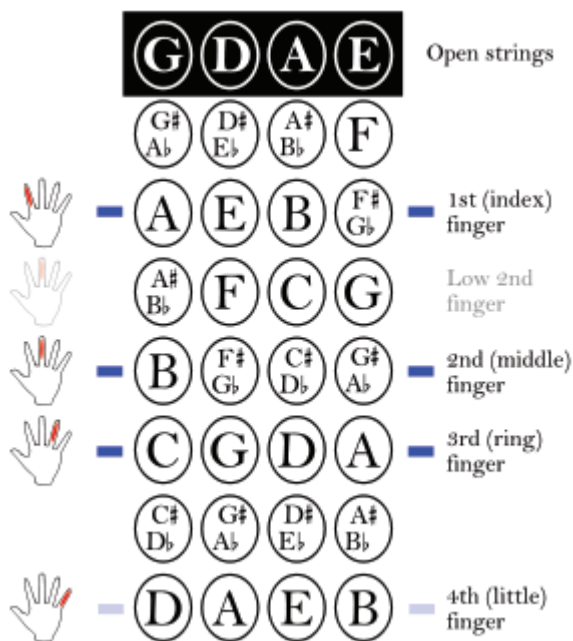
The tailpiece anchors the strings to the lower bout of the violin by means of the tailgut, which loops around an ebony button called the tailpin (sometimes confusingly called the endpin, like the cello’s spike), which fits into a tapered hole in the bottom block. Very often the E string will have a fine tuning lever worked by a small screw turned by the fingers. Fine tuners may also be applied to the other strings, especially on a student instrument, and are sometimes built into the tailpiece. The fine tuners enable the performer to make small changes in the pitch of a string. At the scroll end, the strings wind around the wooden tuning pegs in the pegbox. The tuning pegs are tapered and fit into holes in the peg box. The tuning pegs are held in place by the friction of wood on wood. Strings may be made of metal or less commonly gut or gut wrapped in metal. Strings usually have a colored silk wrapping at both ends, for identification of the string (e.g., G string, D string, A string or E string) and to provide friction against the pegs. The tapered pegs allow friction to be increased or decreased by the player applying appropriate pressure along the axis of the peg while turning it.

stop the strings, as is usual with the guitar, the player must know exactly where to place the fingers on the strings to play with good intonation (tuning). Beginning violinists play open strings and the lowest position, nearest to the nut. Students often start with relatively easy keys, such as A Major and G major. Students are taught scales and simple melodies. Through practice of scales and arpeggios and ear training, the violinist’s left hand eventually “finds” the notes intuitively by muscle memory.

Beginners sometimes rely on tapes placed on the fingerboard for proper left hand finger placement, but usually abandon the tapes quickly as they advance. Another commonly used marking technique uses dots of white-out on the fingerboard, which wears off in a few weeks of regular practice. This practice, unfortunately, is used sometimes in lieu of adequate ear-training, guiding the placement of fingers by eye and not by ear. Especially in the early stages of learning to play, the so-called “ringing tones” are useful. There are nine such notes in first position, where a stopped note sounds a unison or octave with another (open) string, causing it to resonate sympathetically. Students often use these ringing tones to check the intonation of the stopped note by seeing if it is harmonious with the open string. For example, when playing the stopped pitch “A” on the G string, the violinist could play the open D string at the same time, to check the intonation of the stopped “A”. If the “A” is in tune, the “A” and the open D string should produce a harmonious perfect fourth.

Violins are tuned in perfect fifths, like all the orchestral strings (violin, viola, cello) except the double bass, which is tuned in perfect fourths. Each subsequent note is stopped at a pitch the player perceives as the most harmonious, “when unaccompanied, [a violinist] does not play consistently in either the tempered or the natural [just] scale, but tends on the whole to conform to the Pythagorean scale.” When violinists are playing in a string quartet or a string orchestra, the strings typically “sweeten” their tuning to suit the key they are playing in. When playing with an instrument tuned to equal temperament, such as a piano, skilled violinists adjust their tuning to match the equal temperament of the piano to avoid discordant notes.

Left hand and pitch production



First position fingerings. Note that this diagram only shows the “first position” notes. There are notes of higher pitch beyond those indicated.

The left hand determines the sounding length of the string, and thus the pitch of the string, by “stopping” it (pressing it) against the fingerboard with the fingertips, producing different pitches. As the violin has no frets to

The fingers are conventionally numbered 1 (index) through 4 (little finger) in music notation, such as sheet music and etude books. Especially in instructional editions of violin music, numbers over the notes may

indicate which finger to use, with 0 or O indicating an open string. The chart to the right shows the arrangement of notes reachable in first position. Not shown on this chart is the way the spacing between note positions becomes closer as the fingers move up (in pitch) from the nut. The bars at the sides of the chart represent the usual possibilities for beginners' tape placements, at 1st, high 2nd, 3rd, and 4th fingers.

Methodology

The materials required for this experiment:
 - 10 participants 12 to 20 years old who have played the violin for at least 5 years

- 10 participants 21 to 30 years old who have played the violin for at least 5 years

- 10 participants 31 to 40 years old who have played the violin for at least 5 years

- 10 participants 12 to 20 years old who are non-violinists

- 10 participants 21 to 30 years old who are non-violinists

- 10 participants 31 to 40 years old who are non-violinists

- 1 ruler

- 1 wooden block



Figure 1: Fingering Set-Up-1



Figure 2: Fingering Set-Up-2



Figure 3: Fingering Set-Up-3



Figure 4: Fingering Set-Up-4

1. For this experiment, the independent variable is the age of the participants and whether or not they have played the violin for at least 5 years. The dependent variable is the difference in the length of their left and right fingers. This is determined by measuring the length of their fingers using the ruler and wooden block. The constants (control variables) are the number of years for which they have played the violin and the method used to measure the length of the fingers.

2. Sixty participants are required for this project out of which 30 participants are required to have played the violin for at least 5 years and the remaining 30 participants are non-musicians. Out of the 30 participants, 10 of them will be from each of the age groups 12 to 20 years, 21 to 30 years and 31 to 40 years old.

3. The length of the participant's index, middle, ring and little fingers are measured on the left and right hand. The measurements are taken by placing a wooden block at the tip of the finger and using the ruler to measure the distance from the base of the finger to the edge of the wooden block.

4. The difference in length between the left fingers and right fingers is calculated as follows:
 Finger length difference = Length of left finger (index) – Length of right finger (index)
 The measurement is compared between the

same fingers, i.e. left index to right index finger. 5. The differences in finger lengths are recorded. After completing the measurements for all 60 participants, the average difference in finger length for each group is obtained by totaling the differences in finger length, and dividing the total by 10. The finger measurement which shows the most significant difference is used and the calculated results are recorded in the table given below.

Results and Analysis

It was observed that violinists have longer left fingers than their right fingers by about 7mm. Non-musicians have longer right fingers compared to their left fingers by about 8mm. Their age did not make a significant difference in finger length.

Table: Difference in left finger and right finger length for different age groups (mm)

Condition	Difference in left finger and right finger length for different age groups (mm)		
	Age 12-20	Age 21-30	Age 31-40
Violin players	6.7	7.0	7.1
Non-violin players	-8.0	-8.3	-8.4

The graph below represents the results of our experiment:

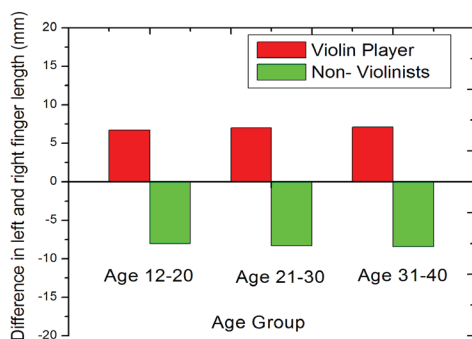


Fig: Finger length of Violinists and non-Violinists Player

Conclusion

Bones are a vital part of our body for many reasons. Involvement in sports and activities that result in stress on our bones, like baseball or playing musical instruments, are believed to increase the length and size of our bones. The hypothesis that violinists have longer fingers on their left hands, while non-violinists have shorter left hand fingers, is proven to be true.

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Conflict of Interest – Nil

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