

The Effects of Kinesio Taping on Posture in Violinists

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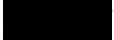
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Abstract

The prevalence of playing-related musculoskeletal disorders (PRMDs) in musicians is high, negatively impacting many of their careers. One of the main risk factors for developing a PRMD is poor posture, yet few interventions consistently address postural problems in musicians. The purpose of this study was to examine the effect of Kinesio Tape (KT) as an intervention for correcting excessive neck flexion in amateur violinists.

Three violinists wore KT on the back of the neck for the duration of one week. Using Dartfish software, videos taken before, during, and three weeks after taping were analyzed for changes in neck and spine angles. The Rapid Upper Limb Assessment (RULA) was used to assess occupation risk throughout the intervention. After one week of wearing KT, the neck flexion angles of the violinists decreased 8 to 9 degrees, reducing their overall occupational risk in RULA. During the three-week follow-up, neck flexion angles increased, falling halfway between pre-taping and one-week taping measurements. Thoracic kyphosis and lumbar lordosis were not consistently affected over the course of the study.

KT had a visible impact on the neck flexion angles of the violinists, lowering their occupation risk. Although more rigorous research designs are needed in this area, these findings suggest that KT could be used as a tool to aid musicians in changing poor posture, thus decreasing their risk of PRMDs.

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List of Abbreviations

CTS	Carpal tunnel syndrome
KT	Kinesio tape
PRMD	Playing related musculoskeletal disorder
ROM	Range of motion
RULA	Rapid Upper Limb Assessment: Employee Assessment Worksheet

INTRODUCTION

The prevalence of playing-related musculoskeletal disorders (PRMDs) in musicians is high, indicating that playing an instrument may be second only to computer use as a risk factor for injury (Morse, Ro, Cherniack, & Pelletier, 2000). Although not life threatening, PRMDs can have a drastic effect on a musician's career and self-identity (Zaza, Charles, & Muszynski, 1998; Bosi, 2017).

Over the last few decades, the modifiable risk-factors that contribute to PRMDs have been widely researched, yet few studies have used that knowledge to design preventative measures. Because of this, the need for preventative strategies, particularly for amateur musicians, has been emphasized in recent literature (Kok et al., 2018; Blanco-Pineiro, Diaz-Pereira, & Martinez Vidal, 2018). One of the most frequently cited modifiable risk-factors among musicians is poor posture (Blanco-Pineiro et al., 2018; Blanco-Pineiro, Diaz-Pereira, & Martinez Vidal, 2015; Guptill & Zaza, 2010). The purpose of this study was to develop an intervention for retraining poor posture in amateur musicians.

In 2018, Cimino, Beaudette, and Brown showed that Kinesio Tape (KT) causes posture-related skin stretching. They hypothesized that the consequent increase in proprioceptive ability could help the wearer to avoid dangerous postures and movements. This hypothesis is supported by the results of several studies showing KT to have positive effects on posture (Kim et al., 2018; Shih et al., 2017; Abbasi, Rojhani-Shirazi, Shokri, & San José, 2017; Dawood, Kattabei, Nasef, Battarjee, & Abdelraouf, 2013). The present study used KT as an intervention for correcting exaggerated neck flexion in amateur violinists. The intent was that if successful, the improvement of playing-related posture in these young musicians would in turn decrease the risk of PRMDs later in their careers.

BACKGROUND RESEARCH

The Prevalence of PRMDs in Musicians

The prevalence of PRMDs in musicians ranges widely throughout the literature. Yearly rates of injury have been found to fall at 68% among amateur musicians (Kok et al., 2018) and between 41 and 93% in the professional population (Kok, Huisstede, Voorn, Schoones, & Nelissen, 2016). The point prevalence of PRMDs in professional musicians is lower than yearly rates, ranging from 9 to 68%, while lifetime prevalence rates fall between 62 and 93% (Kok et al., 2016). The ranges in these statistics are largely due to differences in study designs, populations studied (Kok et al., 2018), and researchers' definitions of PRMDs (Kok et al., 2016). In this study, PRMDs will be defined as the "personal, chronic and disabling health problems that affect the whole person, physically, emotionally, occupationally, and socially" (Zaza et al., 1998, p. 2016). Despite the variations in PRMD statistics, the rates of PRMDs in musicians are still a cause for concern. Even when referencing the lower end of the scale, the majority of musicians will experience a PRMD at some point during their lives, placing the career of a musician as a high risk factor for a musculoskeletal injury.

PRMD statistics differ slightly depending on age, gender, and instrument played. Injuries often begin to develop during high school or an undergraduate degree (Wu, 2007), with incidence peaking in the third and fourth decades of life (Chesky, Devroop, & Ford, 2002). Females have a higher risk of sustaining an injury than males, which is attributable to their smaller anatomy and muscle mass (Kok et al., 2018). Violinists are one of the groups at highest risk of injury (Kok et al., 2018; Kaufman-Cohen & Ratzon, 2011). This may be due to the unstable playing posture of violinists, which requires asymmetric elevation of the arms, together with a combination of static and repetitive movements.

Since musicians use the upper extremities to perform the majority of their work, most of their injuries occur in the upper body (Kok et al., 2016). Within the upper body, the predominant areas of injury vary with the type of instrument played. String players tend to have the widest range of injury locations. As Kok et al. (2018) found, the most

common sites of PRMDs in amateur string musicians, in order of decreasing prevalence, were the shoulders – the left more than the right – the neck, the upper back, the hands and wrists – particularly the left – and the low back. From these statistics, it appears that injuries begin close to the centre of the upper body, and then, as proximal stability fails, they work outwards, both inferiorly and distally. Shoulders may have the highest prevalence of injury due to the large amount of work they perform, with the right shoulder acting as a pivot point for the bow arm, and the left as support for the instrument. The higher rates of injury on the left side of the body could be because the left side is more static than the right, required to hold the arm away from the core of the body in order to support the weight of the violin.

The Impact of Injury

The impacts of an injury on a musician's life are significant. Although injuries are generally not chronic and can be resolved with rest, the process of rebuilding injured body tissue can take between 300 to 500 days (Rietveld, 2013). Large amounts of time spent away from musical pursuits can interfere with a musician's career, harming their technique, finances, and psychological state (Bosi, 2017). Because rest can have such serious consequences, many musicians ignore early symptoms of PRMDs and only seek help when the injury has become severe (Sheibani-Rad, Wolfe, & Jupiter, 2013). If an injury continues to go untreated, it can ultimately force a musician to end their career (Sheibani-Rad et al., 2013).

Mechanisms of Injury in Musicians

In occupational biomechanics, four of the main risk factors that contribute to work-related injuries are force, repetition, duration, and posture (Bridger, 2008). In violinists, force is not generally an issue. A violin does not weigh much more than a pound, and in a well-positioned player, that weight should be distributed through five contact points: the jawbone, the collarbone shelf, the side of the neck, the left hand, and the friction of the bow hair on the string (Johnson, 2009). With an even distribution of the violin's weight between all contact points, only minimal force is required to hold the instrument. During bowing, the weight of the arm provides sufficient force to the strings, and only violinists with poor technique attempt to produce additional force with the musculature. It is the occupational risk factors other than force that are the primary cause

of injury in violinists. Excessive repetition causes dynamic injuries; duration and posture are the mechanisms of static injuries.

Dynamic Mechanisms

Repetition can create micro-damage in the body's tissues, which can eventually accumulate, forming an injury. Our body tissues are viscoelastic, rather than elastic, meaning that our tissues lose energy between loading and unloading. This lost energy is called hysteresis. When loads on body tissues are repeatedly applied and released, their threshold for injury lowers as hysteresis occurs with every repetition. As the threshold for injury lowers, micro-damage begins to occur. If stressors continue to be placed on the tissue before the micro-damage has had time to heal, tolerance for injury decreases and failure occurs. For a violinist spending several hours a day performing repetitive movements, there is a risk that daily micro-damage sustained during practice could accumulate, creating a PRMD. This is why large amounts of playing time, or overtraining, have been associated with increased pain and PRMDs in musicians.

The PRMDs that result from an accumulation of micro-damage fall under the umbrella term of overuse syndrome, also known as repetitive strain injury or cumulative trauma disorder. Overuse injuries to the tendons are collectively known as muscle-tendon syndrome. In addition to repetition, these tendon injuries can be caused by too much force, certain postures, or from a combination of all three factors (Bridger, 2008). One of the common muscle-tendon syndromes among musicians is tendonitis (Lee et al., 2013). Tendonitis occurs largely from repetition, but is more likely when also combined with extreme range of motion (ROM). Extreme ROM preloads the tendons, pressing them against the bones of the wrist and increasing friction during movement (Bridger, 2008). Violinists are susceptible to tendonitis because they perform repetitive movements with both arms as well as moving through a large ROM with their bow arm.

Static Mechanisms

While highly repetitive movements can be one cause of PRMDs, too little movement can also contribute to injury. Figure 1, replicated from Bridger (2008), shows the relationship between movement and health risk. On the right side of the graph, the curve shows that high amounts of movement create a high health risk. Likewise, the left side of the graph shows that too little movement also has a high health risk. Bridger

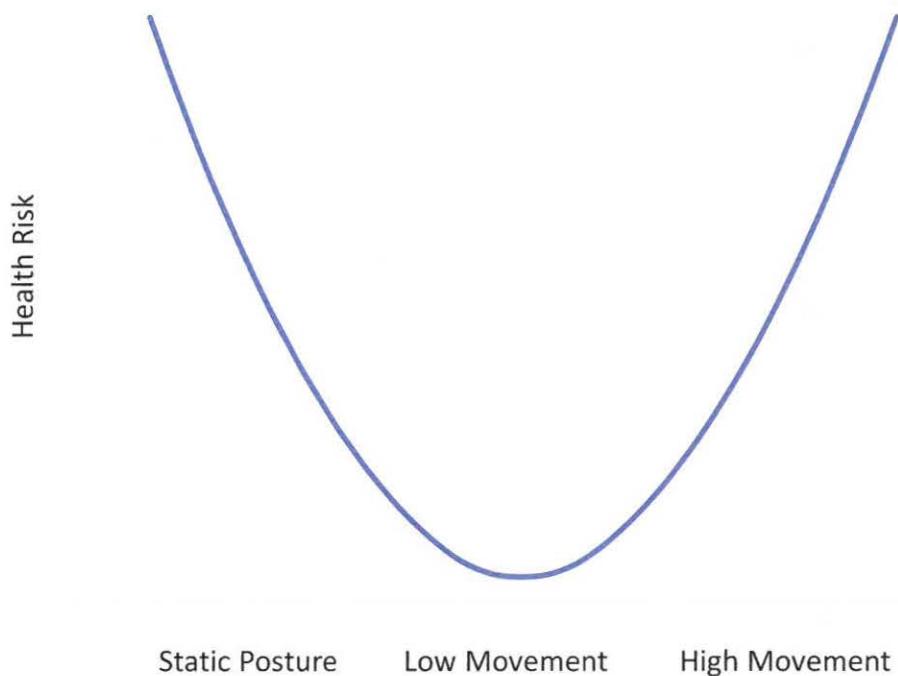


Figure 1: Relationship between static work, repetitive work, and health risk. Replicated from Bridger, 2008.

writes that “humans weren’t designed to stand still” (2008, p. 115). And while remaining in a static posture for long periods of time is bad enough, it is even worse when posture is poor.

Posture is one of the most frequently cited risk factors for PRMDs in musicians (Ramella et al., 2014). Upper string players in particular have more postural problems, and therefore more PRMDs, than other instrumentalists (Kok et al., 2018). The necessity of poor posture in violinists has been debated. Some authors have stated that poor posture in violinists is unavoidable. Violinists are forced to maintain an unnatural position while playing which includes asymmetrical elevation of the arms (Kok et al., 2018). The left arm remains static as it supports the weight of the instrument, while the right repeatedly travels through a large range of motion (Kok et al., 2018). However, other sources maintain that playing the violin can be a natural activity if players only learn to use their body correctly (Johnson, 2009). “If violinists can learn to have centred and balanced alignment, they will be able to move freely without overexertion or stress” (Medoff, 1999, p. 214).

In well-balanced posture, the body’s line of gravity falls through the “external auditory meatus, the bodies of the cervical spine, and acromion” (Singla & Veqar, 2017, p. 220), continuing down through the lumbar spine, the sacral joint, the hip joint, and in front of the knee and ankle joints (Bridger, 2008). The body is never in passive equilibrium, but is constantly counteracting the moments produced by gravity with internal moments produced by the muscles and soft tissues (Singla & Veqar, 2017; Bridger, 2008). Bridger defined a good posture as one in which these “destabilizing movements are minimized and posture is maintained by the resistance of the relatively incompressible bones” (2008, p. 122). When the body is pulled off-balance, superficial muscle are forced contract isometrically in order to help maintain equilibrium (Bridger, 2008).

In her book *What Every Musician Needs to Know about the Body*, Johnson (2009) overviews three ways in which inappropriately distributed muscle activity works against itself. The first occurs when muscles meant to move the body are also used for support. Movement will never feel free if moving muscles are contracting before a movement has even begun. Secondly, when deep muscles are chronically tense, superficial muscles are

forced to work extra hard in order to overcome these involuntary contractions. And lastly, co-contraction of two opposing muscles can create an unnecessary tug-of-war.

The poor muscle coordination that results from a poorly aligned skeleton can worsen posture even further. When muscles struggle to support a poorly aligned skeleton, optimum muscle length is affected (Medoff, 1999). This can cause some muscles to tighten and others to weaken (Medoff, 1999). Tight muscles may pull bones into faulty alignment (Medoff, 1999). Muscles must work hard to support these static, off-balance postures. This develops patterns of greater muscle activity, resulting in chronic tension (Medoff, 1999). Proximal tension in the head, neck, and back occurs first, and then, as proximal stability fails, the tension moves more distally towards the fingers as they try to stabilize (Medoff, 1999). Since stabilization of the extremities comes from farther up the kinetic chain, it is imperative that the core be stable.

Many musicians have poorly aligned skeletons and chronically sore and tense muscles. Blanco-Pineiro et al. (2015) found that some of the most common defects among musicians include excessive lordosis, excessive kyphosis and a forward-shifted axis of gravity. As well as these general defects, musicians often have postural problems that are specific to their instrument (Blanco-Pineiro et al., 2015). Violinists, for example, tend to hold their head forward and to the left as they raise their left shoulder, resulting in thoracic scoliosis, while at the same time placing their weight on the right leg, creating a lumbar scoliosis (Blanco-Pineiro et al., 2018). Another common postural misalignment among violinists is forward head posture, which is caused by protracting the cervical spine for long periods of time. Forward head posture can lead to further postural deviations, such as rounded shoulders and increased thoracic kyphosis, in order to counteract the moment produced by the head (Singla & Veqar, 2017). The combination of these postural misalignments is known as “slouched” or “slumped” posture (Singla & Veqar, 2017).

Chronically poor posture plays a part in many overuse injuries, including compression or entrapment neuropathies. Compressive neuropathies occur when a nerve is compressed, leading to poor blood flow, nerve damage, and problems with the transmission of information (Nordin and Frankel, 2011). It most commonly occurs to the median nerve at the wrist, which is called carpal tunnel syndrome (CTS) or to the ulnar

nerve at the elbow, called cubital tunnel syndrome (Lee et al., 2013). CTS results when the wrist flexor tendons running through the carpal tunnel become inflamed through a combination of repetition and flexion, compressing the median nerve and causing pain, atrophy, and tingling in the median nerve territory of the hand (Chapman & Fraser, 2008). Some musicians have positional CTS, experiencing nerve compression symptoms during playing but not after (Lee et al., 2013). Cubital tunnel syndrome is also influenced by playing position, becoming particularly noticeable when an arm with a flexed elbow is used to support an instrument (Quarrier, 2011). This increases pressure in the cubital tunnel, compressing the ulnar nerve (Quarrier, 2011). Rest is the best treatment for compressive neuropathies, followed by postural modifications when returning to playing (Sheibani-Rad et al., 2013).

Many of the PRMDs experienced by musicians are not easily diagnosable and are referred to as “non-specific” injuries. These non-specific PRMDs often occur in the neck and low back. Although non-specific pain in the neck and back is not a disease, it can be a symptom of one (Bridger, 2009). There is evidence that much of the back and neck pain in society may be due to ergonomic risk factors (Bridger, 2009). Reducing these risk factors could decrease the pain of the people exposed to them (Bridger, 2009). Although non-specific back and neck injuries are sometimes treated more lightly than more diagnosable injuries such as CTS, they can have severe consequences including spinal problems, functional disability, and decreased productivity and quality of life (Matsudaira et al., 2015).

Johnson points out that the diagnostic terms used to identify different types of injuries only identify the primary consequence of a condition (2008). Overuse injury terminology fails to address the root of the violinist’s problem. It obscures the fact that violinists’ injuries come about not *because* they play the violin, but because of *how* they play the violin (Johnson, 2008). With the development of the field of musician’s health over the last 30 years, there has been an increasing emphasis on the need to address the risk factors that lie at the root of violinists’ injuries. Dealing with poor posture has been a particular area of focus. Because poor posture can have such a large impact on musicians’ musculoskeletal health, studies have reiterated the need for postural re-training programs,

particularly interventions that can be implemented by music teachers (Medoff, 1999; Blanco-Pineiro et al., 2015; Blanco-Pineiro et al., 2018).

Preventative Measures

One of the primary methods used to create awareness about risk factors for injuries in musicians has been through educational articles, which encourage teachers to incorporate prevention strategies into music lessons. Guptill and Zaza's article on injury prevention points out postures that should be avoided and recommends frequent breaks during practice, avoidance of repetition, and awareness of any muscle tension (Guptill & Zaza, 2010). Some music institutions have offered education programs that provide health information specifically for musicians. One such program was implemented by Barton and Feinberg, in a study titled "Educational Program in Health Promotion and Injury Prevention for Freshman Music Majors" (2008). They found that the course increased the students' knowledge and self-perceived application of that knowledge. However, there were no objective measurements of decreased risk of PRMDs.

General education programs such as these have helped to encourage students to practice "smart." Previously, some dedicated music students considered an eight-hour day of practice necessary to their development. Now, this magnitude of practice is considered harmful, and students are encouraged to practice no more than a few hours a day. The changing perception of healthy practice times has helped to address the risk factors of duration and repetition.

With the development of the field of musicians' health, there has been an increasing consciousness of the importance of posture within the music community. Musicians have drawn on postural awareness methods, such as the Feldenkrais method or the Alexander technique to help them combat any risk of injury (Johnson, 2009). In the 1970s, one technique, body mapping, was developed specifically for musicians. The idea behind body mapping is that every person has an internal map of how they believe their body to move, which dictates how they actually move (Johnson, 2009). Although this map is accurate in healthy toddlers, the map can gain inaccuracies soon after, often by emulating adults or by being told how to move. For example, the command "sit up straight" may soon develop the image of the spine as a straight rod, rather than 24 separate vertebrae, linked and forming several curves. Body mapping attempts to locate

these inaccuracies in a musician's internal map and correct them. The process involves education in anatomy and how the body is designed to move.

Even if educational techniques like body mapping are beneficial, they may not be stand-alone interventions. As many music teachers can testify, although identifying a musician's postural problems and educating them on how their body is designed to move may heighten an awareness of posture, it may be difficult for a musician to know what a correct posture feels like. To help create lasting changes in posture, musicians need to know what it feels like to move correctly. That way, they will be able to provide themselves with accurate internal feedback, instead of relying on the external feedback they receive from their teachers. One method that could help to educate the kinesthetic sense could be to enhance proprioception. Methods focusing on stimulating increased proprioceptive feedback have not been a notable area of study in this research area.

Kinesio Taping

One method of proprioceptive biofeedback implemented in sports settings is taping, which applies tape to the skin in order to guide joints in the correct ranges of motion. However, athletic taping, as well as some other forms of taping, use rigid, inflexible tape that can cause some problems. For example, in 2002, Ackerman, Adams, and Marshall conducted a study that examined the effects of scapula taping on the performance of violinists. They found that when participants had their scapulae taped into the correct position with rigid sports tape, both their concentration and performance suffered.

The use of rigid taping methods to help correct posture has presented problems to health practitioners as well as researchers. The kinesiotaping.com website tells the story of Dr. Kenzo Kase, a Japanese chiropractor who attempted to help arthritic patients to position their joints in a way that would be less painful. He found that although using rigid tape was slightly beneficial, it often caused irritation and limited patients' range of motion. To solve these problems, Kase developed Kinesio Tape (KT), a hypo-allergenic and flexible tape, stretching 55 to 60 percent of its original length (Grześkowiak, Szulc, Szwedziak, & Lewandowski, 2014). It was designed to imitate the skin and provide support while not limiting range of motion (Grześkowiak et al., 2014). Today, KT is largely used for rehabilitative purposes. It claims to decrease pain and inflammation by

lifting the skin, thus facilitating lymphatic drainage and blood flow (Grześkowiak et al., 2014). But it has also been used for correcting posture, claiming to re-educate the neuromuscular system through proprioceptive input.

In 2018, Cimino, Beaudette, and Brown set out to examine the truth behind KT's supposed benefits of posture. Beginning with the assumption that KT, which is applied to the skin, would have to initiate any beneficial physiological pathways at the skin's surface, the researchers examined the effects of KT on the skin. Using ultrasound and kinematics, they found that KT on the low back caused skin deformations in the epidermis and dermis, but not the hypodermis. In the epidermis and dermis, KT stretched the skin at its superior and inferior ends and provided a retraction force along its medial and lateral edges. These deformations were dependent on spinal posture. Since it had previously been shown that the proprioceptive sensations generated by skin stretch can lead to corresponding motor responses (Collins et al., 2005), Cimino et al. concluded that it is possible that the increased proprioceptive ability generated by KT could help wearers to avoid postures and movements associated with injury or pain.

KT has been tested as an intervention for correcting posture in several studies. In 2017, Shih et al. conducted a randomized control trial that compared KT and therapeutic exercise as interventions for correcting forward head posture. Sixty subjects with forward head posture were split into three groups: a control, a therapeutic exercise, and a taping group. In all three groups, outcome measures were taken at baseline, after a five-week intervention, and after a two-week follow up. Researchers found that while the control group showed minimal improvements, both the taping and the exercise groups showed significant improvements in static posture. Both groups showed decreases in improvements at the two-week follow up, but the decreases were less in the exercise group.

While Shih et al. compared the impact of KT *versus* posture exercises, the impact KT *in addition* to posture exercises has also been examined. In 2013, Dawood et al. compared the effects of KT and cervical traction on mechanical neck dysfunction. The study included three groups, all of which performed exercises designed to address their neck posture. While the first group only performed the exercises, acting as the control group, the second group wore KT on the back of the neck for four weeks, and the third

group was treated with a cervical traction posture pump over the period of four weeks. The study found that both KT and cervical traction had an equally significant effect in improving cervical spine curvature when compared to exercise training alone. Just like Cimino et al. (2018), Dawood et al. attributed the changes from KT to proprioception, pointing out that the KT-dependent stretch to the skin stimulated cutaneous mechanoreceptors to elaborate signals on joint movement or position.

Although many of the studies examining the effect of KT on posture have presented positive results, their results are not conclusive and the need for more research in this area has been emphasized. One population in need of a postural re-training intervention is musicians, where poor posture is a major risk factor for playing-related injuries. Violinists are particularly susceptible to poor posture and injury, and would benefit from an intervention that could help correct posture. If KT is a reliable method of re-training posture, it could be used to help address poor posture in violinists, as well as in other musicians.

Purpose

The aim of this study was to explore whether KT is a beneficial intervention for correcting posture in amateur violinists. In this study, three violinists were analyzed for posture-related risk. After determining that all three musicians had increased flexion of the neck, KT tape was placed on the neck of participants such that a stretch in the tape was felt during neck flexion. It was hypothesized that the KT would generate proprioceptive feedback, alerting the violinists of poor habits of posture. The continuous biofeedback about their position would help the violinists to improve their posture, decreasing their risk of developing PRMDs.

METHODS

Participants

Three healthy, amateur violinists participated in the study: one 17-year-old female and two 16-year-old males. All three were recruited by word of mouth from a youth orchestra located in Charlottetown, Prince Edward Island. Once the violinists had expressed an interest in participating in the study, each of them was given an information sheet, detailing the process of the study, a consent form, which was signed by a parent, and an assent form, which the participant signed themselves.

Materials

A GoPro Hero video camera was used to record the musicians playing. The videos were analyzed using the Rapid Upper Limb Assessment (RULA) Employee Assessment Worksheet, which is a validated tool for assessment of poor posture during occupational tasks (McAtamney & Corbett, 1993). RULA rates posture on a scale of 1 – meaning acceptable posture – to 7 – meaning change should be investigated and implemented immediately. The overall RULA score is calculated using scores of subcategories within the assessment which include the upper and lower arms, the wrist, the neck, and the trunk. The videos were also analyzed with Dartfish motion analysis software (Dartfish HQ, Switzerland) which was used to measure joint angles on the recorded images of the musicians. KT Tape Pro was used for postural taping. The correct neck flexion angle during tape application was measured using a digital laser goniometer (HALO Medical Devices). Finally, an *ad hoc* pain questionnaire was used by each musician to keep a record of the intensity and location of any pain, as well as any additional comments.

Procedure

Each musician came to the lab for an initial assessment, where they were videotaped playing from anterior, posterior, and both lateral viewpoints. The one minute selection of music that all the violinists played was the first 15 bars of Pachelbel's Canon, which was chosen because it contains a slow, a medium, and a fast speed variation, thus

capturing three different bow speeds. All violinists were familiar with the piece and the excerpt was well below their skill level.

In the week following the initial assessment, the recorded videos were used to analyze the musicians' posture. The videos were first analyzed using the RULA assessment, which screened for occupational risk in the upper limbs. After this postural assessment, it was necessary to determine which high scoring areas on RULA were inherent to playing the violin and which could be modified. Since all three violinists had an exaggerated neck flexion of 26 or 27 degrees, as well as upper back kyphosis, the neck was chosen as the area of posture to target in all three participants.

The violinists then returned to the lab a second time in order to be taped. They were given a brief summary of their general postural analysis. They were informed that the neck would be the area of posture targeted for correction and of the role that KT was expected to have in re-training that area of posture. Then a strip KT tape was applied to the violinists' skin. One strip was anchored at T5/T6 and then split in two, with each strip running on opposite sides of spine to the top of the neck. A second strip of tape was placed horizontally, across the base of the neck (Figure 2). This tape placement was identical to the neck placement video on the original Kinesio tape website - kinesiotaping.com. It was also the exact placement used by Dawood et al. (2013), who found it to have a positive impact on the posture of the cervical spine.

Although KT is usually applied over fully flexed joints, it was applied to each musician with their neck flexed to only 10 degrees. The goal of taping was that the violinists flex no further than 20 degrees. Taping the neck in 10 degrees of flexion ensured that the sensation of stretch to the skin caused by the tape would be present at a neck flexion of 20 degrees. Flexion of the neck was measured with a laser goniometer (HALO Medical Devices).

The KT tape remained on the violinists' skin for one week. In other studies, the length of time that the KT remained on the skin ranged from one day, providing immediate mechanical correction (Shih et al., 2017), to five weeks, where improvements in posture remained throughout a two week follow up (Han, Lee, & Yoon, 2014). This study examined the effects of the tape after one week of application, comparing the lasting effects of this smaller time frame to the five-week application. During the one

week of wearing the tape, each participant videotaped themselves playing the one minute section of Pachelbel's Canon from the right lateral viewpoint. They recorded each video at the beginning of a practice session. They also filled out a brief pain questionnaire every day and kept a record of any additional comments on their experience.

One week after the KT tape had been applied, the violinists came to the lab for a second assessment, where they were re-videoed from all four sides as done in the initial assessment. Then they removed the tape. On day 7 and day 14 after the taping intervention, the participants filled out a pain questionnaire and videotaped themselves practicing Pachelbel's Canon. On day 21, three weeks after taking the tape off, the violinists came to the lab one final time where their performance was recorded from all viewpoints, just as in the two previous assessments. At this time, the participants handed in any remaining videos or pain assessments that they had recorded.

Data Analysis

Using Dartfish software, neck flexion, upper back kyphosis, and lower back lordosis angles were measured in all the videos taken from the right lateral viewpoint. The absolute neck flexion angle was measured by taking the line from the acromion to midpoint of the head with respect to vertical. Kyphosis was measured by taking the relative angle between the line extending from T4/5 to C7 and T4/5 to parallel with the thoracic vertebrae. Lordosis was measured by taking the relative angle between the line running from T5 to L5 and the line running from L5 and along the line formed by the tilt of the pelvis. All angles were measured a minimum of three times. The angles in the three lab assessment videos were measured ten times and the median score was taken. Each angle was measured when the participant was in mid down-bow, when the right upper and lower arm were at ninety degrees to each other. The angles were measured at several different points throughout the slow variation of the music, but always when the violinist was in mid down-bow. The angles were graphed in three line graphs in order to obtain a visual representation of angle changes over time.

Videos taken pre-tape, after one week of taping, and at the three-week follow-up were assessed using RULA. After scores were calculated, the results were compared for differences. Information from the pain questionnaires was summarized.



Figure 2: KT neck placement

RESULTS

Angle Changes in the Neck and Spine

In the initial assessment, all three violinists had 26 to 27 degrees of neck flexion, as is shown in Figure 3. After KT was applied, the neck flexion of the violinists decreased immediately and remained roughly constant throughout the week of taping, largely falling below 20 degrees. On the last day of wearing the tape, the musicians' neck flexion angles measured 18 degrees – 8 to 9 degrees less than in the initial assessment and falling below the goal of 20 degrees. After the three-week follow-up, the violinists' neck flexion measured 21 to 23 degrees, roughly halfway between the initial and taping neck flexion angles and just above the goal of 20 degrees. Figures 6 to 8 show the neck flexion of the participants while playing.

Among the three violinists, changes in thoracic kyphosis over the course of the study varied (see Figure 4). Both Participants 2 and 3 experienced little change. Participant 1 had a small but consistent decrease in the angle of his upper back, which decreased to 10 degrees below the initial measurement. His thoracic kyphosis increased again in the second week of follow-up, ending up close to that of the initial assessment.

As is shown in Figure 5, there were no consistent changes in the violinists' lumbar lordosis angles over the period of the study.

RULA Scores

In the initial assessment, the violinists had the highest possible overall RULA score of 7, meaning that change should be investigated and implemented immediately (see Appendix B). While a large portion of this high score came from postures that were inherent to playing the violin, some of the high scoring postures were avoidable. The exaggerated flexion of the neck was prominent among these. In RULA, neck flexion of 0 to 10 degrees is scored as 1, 10 to 20 degrees as 2, and 20+ degrees as 3. All the participants had a neck flexion of over 20 degrees, giving them a score of 3 for neck flexion. The goal in taping the neck was to reduce flexion to below 20 degrees.

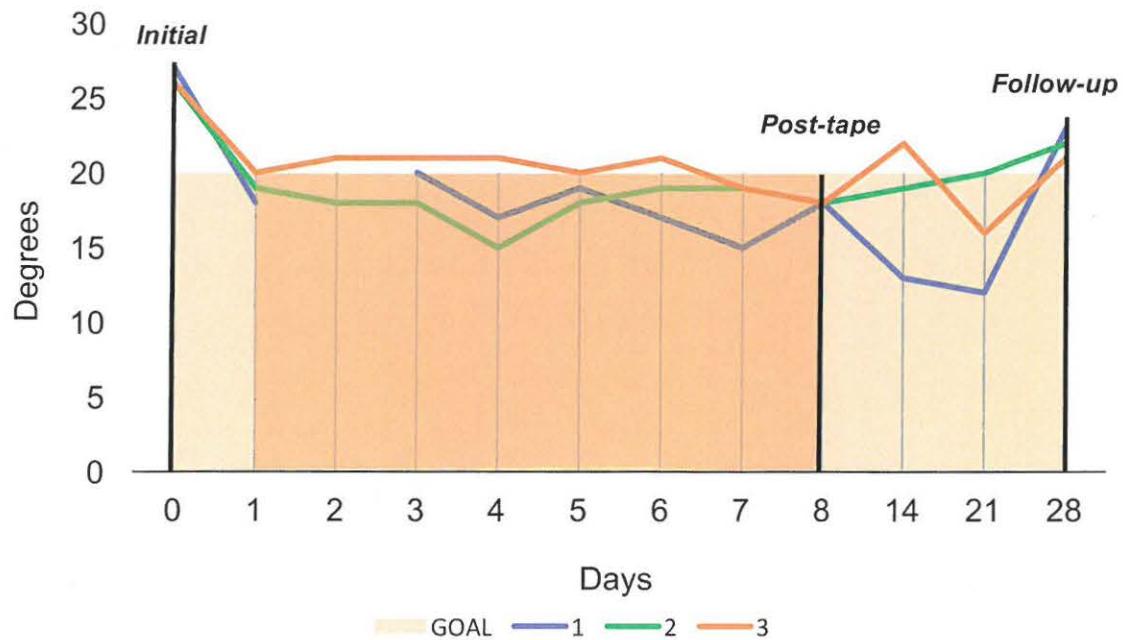


Figure 3: Neck flexion angles of violinists before, during, and after taping

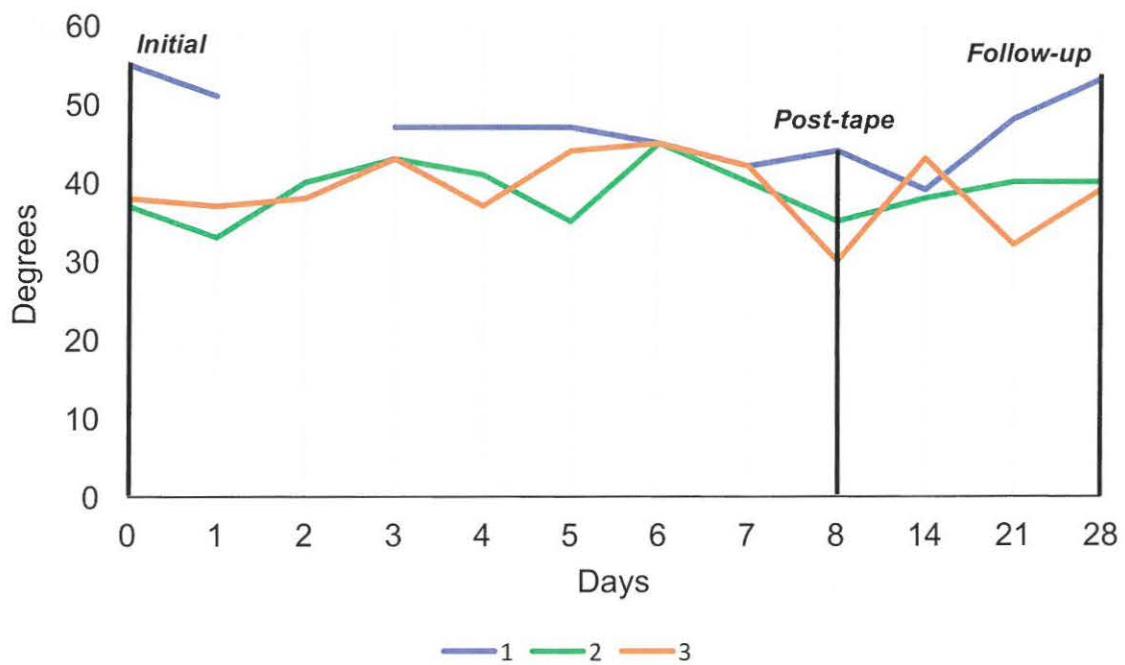


Figure 4: Thoracic kyphosis of violinists before, during, and after taping

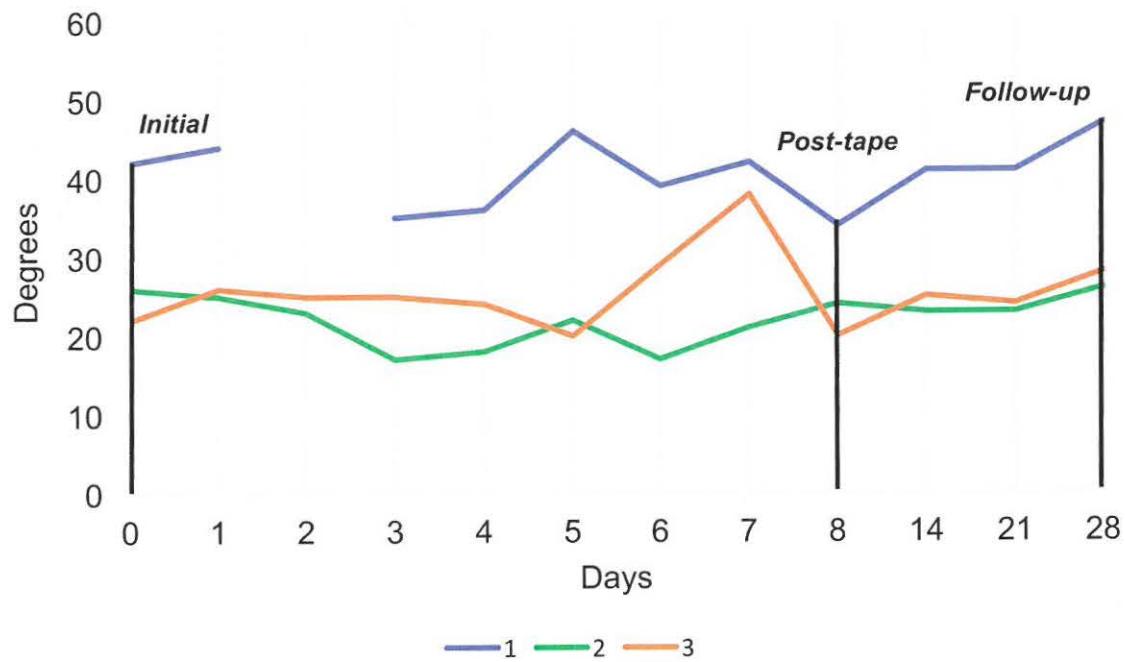


Figure 5: Lumbar lordosis of violinists before, during, and after taping

In the second assessment, after a week of taping, the violinists had a neck flexion of under 20 degrees, giving them a neck flexion score of 2. This changed the overall RULA score from 7 to 6, meaning “further investigation, change soon”. Three weeks after taping, the neck flexion angles of the violinists increased to above 20 degrees, giving them a neck flexion score of 3 and an overall score of 7, just as in the initial assessment

Pain Assessments and Comments

According to the pain assessments the participants filled out before, during, and after the week of taping, there were no changes in their reported pain levels. Participant 2 had no playing-related pain during the month. Participants 1 and 3 often reported level “1” or “2” pain in their upper extremities, but it was unconnected with taping.

The pain assessment had space for participants to write daily comments about their experience wearing the tape. After less than a day, Participant 1 reported habituation to the sensations caused by tape stretching, even though he had felt the sensations almost to the point of irritation when the tape was initially applied. After three days, all three musicians could no longer feel the tape, except in extreme flexion. Participants 1 and 2 did record, however, that even though they could not feel the tape, it continued to serve as a reminder to have good posture when practicing.

The KT Tape Pro is supposed to last from five to seven days, but all three musicians reported that it started coming off before day four. This was likely due to disregarding the manufacturer’s recommendation of washing and shaving the skin prior to taping. However, the majority of the tape did remain on the skin for the entire week, still causing movement dependent stretch of the skin.

During the follow-up period, Participant 2 noted that although she attempted to be aware of her playing posture, she generally forgot once she got involved in practice. Participant 3 wrote that following the intervention, he noticed that he was more aware of his neck craning forward, and attempted to correct it.

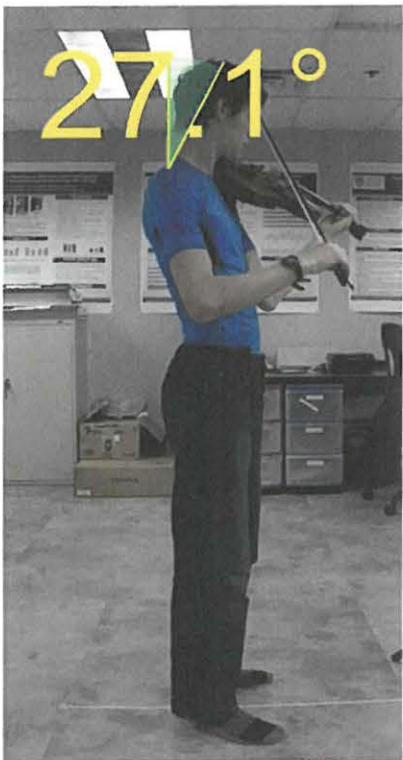


Figure 6.1: Participant 1 prior to taping

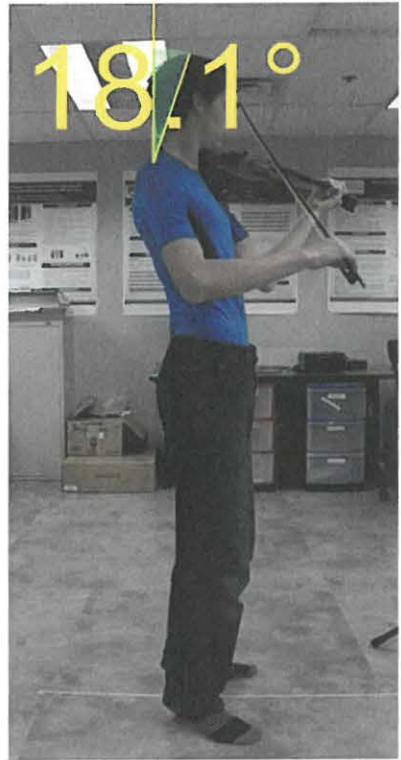


Figure 6.2: Participant 1 after week of taping



Figure 6.3: Participant 1 at three-week follow-up



Figure 7.1: Participant 2 prior to taping



Figure 7.2: Participant 2 after week of taping



Figure 7.3: Participant 2 at three-week follow-up



Figure 8.1: Participant 3 prior to taping



Figure 8.2: Participant 3 after week of taping



Figure 8.3: Participant 3 at three-week follow-up

DISCUSSION

The aim of this study was to explore whether KT is an effective intervention for changing injury-inducing postures in violinists; specifically, exaggerated flexion of the neck. It was hypothesized that KT would create a stretch to the skin, stimulating proprioceptive feedback about joint position. This feedback would then help the violinists to avoid harmful postures. The results supported this hypothesis, showing that the violinists' neck flexion decreased during the week that they wore KT, reducing their risk of injury.

The finding that KT appeared to have a positive effect on neck posture coincides with the results of several similar studies. Shih et al. (2017) found that in participants with forward head posture, a five-week application of KT improved static posture of the neck. Likewise, Dawood et al. (2013) found that a four-week application of KT to the neck improved the posture of participants with mechanical neck dysfunction. Most recently, Kim et al. (2018) found that KT improved neck posture in participants with forward head posture, but that the improvement was not significant. The lack of significance in Kim et al.'s study may have been because the total application time of the KT was not continuous: participants wore KT for only eight hours, three times a week for four weeks.

Although the present study found that KT had an impact on posture during the week that it remained on the skin, these effects began to reverse as soon as the KT was removed. By the end of the three-week follow-up, the violinists were displaying a neck flexion almost as large as before the tape was applied. This reversal of KT's effects was also seen by Shih et al. (2017). They found that although participants showed significant improvements in forward head posture immediately post taping and after a two-week follow-up, the difference at follow-up was smaller. However, neither Shih et al.'s study nor the present study had a follow-up period long enough to observe how long, if at all, it took for neck flexion to completely revert back to the original angle. Abbasi et al. measured the effects of KT on posture one day after its removal. They found no decreases in improvements. Since the maintenance of postural improvements do linger for at least a

short period after KT's removal, this could indicate that KT does help with learning new habits of posture.

A possible reason that improvements in posture do eventually fade soon after KT is removed may be due to the time frame of the tape's application. It takes an average of just over three months to form a new habit, although between individuals, that number varies between less than three weeks to over eight months (Lally et al., 2010). The longest period of KT application found in this study's literature review was five weeks (Shih et al., 2017), which is much less than the average time it takes to form a habit. This may explain why the effects of KT decreased after the tape was removed and the constant reminder was no longer present. Another reason for the lack of retention could be due to the passive nature of the reminder. When Shih et al. (2017) compared the effects of KT versus exercise on forward head posture, they found both equally effective on static posture. But during follow-up, they found that the exercise group had better retention. They suggested that this was because exercise stimulated active muscle involvement, and therefore provided a more ingrained learning of posture control (Shih et al., 2017).

In addition to Shih et al., there have been a number of studies that have compared KT to other posture interventions. El-Abd, Ibrahim, & El-Hafez (2017) compared KT versus posture exercises for improvements in mechanical neck dysfunction. They found that while KT was more effective for reducing neck disability, both interventions had similar effects in reducing axioscapular muscle fatigue. Dawood et al. (2013) performed a study that divided participants with mechanical neck dysfunction into three groups: a control group, a KT group, and a cervical traction group. In addition, each of the three groups received an exercise program. The results showed equally significant improvements to cervical curvature in both the KT and the cervical traction groups, but not in the control group. This indicated that both KT and cervical traction were more effective than exercise alone. Kim et al. (2018) conducted a similar study looking at KT versus myofascial release on forward head posture. Participants were divided into three groups. The first group was given the interventions of postural exercises and KT, the second, exercises and myofascial release, and the third, exercises, KT, and myofascial release. The only group that had a significant difference after the intervention was the third group, which combined all interventions. The findings from all these studies seem to

indicate that KT has equivalent value to many other interventions, and that it may be most effective when used in conjunction with several different methods.

In this study, using KT as an intervention did not lead to any negative changes in the violinists' pain. In fact, shortly after application, the violinists reported habituation to the tape. This contrasts with the effects of rigid tape. In 2002, Ackermann, Adams, and Marshall used rigid tape to correct scapular position in violinists. The tape negatively impacted the violinists' concentration and comfort, as well as the quality of music performed.

Although KT did not cause pain in the violinists, several other possible side effects to overall posture were observed. Over the course of the assessments, participants 1 and 2 increased the level at which they held their violin, initially holding it a little lower than horizontal, and in the follow-up assessment, holding it horizontal or higher. In addition, participants 1 and 2 appeared to be gradually shifting their weight posteriorly over the course of the study. However, since this change did not show up in the lordotic and kyphotic spine measurements, which did not consistently change over the intervention, no conclusive statements can be drawn. If the violinists did shift their overall body weight backward, it may have been due to an increased awareness of their poor neck posture. The violinists had been told that they had forward head posture while playing. It is possible that while attempting to pivot their head posteriorly, they also pivoted backwards on their feet, moving their entire line of gravity posteriorly. It is also interesting to note that while the violinists' neck flexion decreased after removal of the tape, this apparent shift in body weight did not. This further suggests that it may have been caused by an awareness of poor posture and an attempt to fix it, rather than feedback from the tape. However, before any conclusions can be made about the influence of KT on line of gravity, there would need to be sufficient evidence from kinetic data, such as centre of pressure. Kinetic data could then inform researchers whether the effects of KT were positive, translating throughout the body, or negative, narrowing focus to one area of the body at the expense of other areas.

It already appears that KT has an influence on centre of pressure. Abbasi et al. (2017) looked at the effects of KT on centre of pressure displacement and velocity in subjects with non-specific chronic low back pain. They found that there was a significant

decrease in centre of pressure displacement and velocity in the experimental group, indicating that KT had a positive effect on postural control.

Any influence that KT has on whole body posture, rather than just taped areas, could come down to the location of the tape placement. In this study, while determining where to apply the KT, priority was given to the core of the body. Since the core is the anchor for all movement, it was thought most beneficial to address the poor posture of the core. As part of the spine, the neck was considered part of the core and was therefore chosen as the area to focus on. However, after noting that there may have been shifts in the body weight of the violinists, it is possible that applying KT closer to the true core of the body would have had greater and more positive effects on overall body posture. When using the extremities, stabilization comes from pelvis. The pelvis is a muscle attachment site for 57 muscles and contains the body's centre and line of gravity (Medoff, 1999). The pelvis is crucial in the support and transfer of weight, as well as the initiation and control of movement (Medoff, 1999). Since the pelvis and its supporting muscles are the primary source of movement and posture, it makes logical sense that the pelvis should be the primary target when attempting to correct posture. If the core is stable and correctly positioned it can only influence other areas of posture positively. If KT had been applied over the low back, or another area close to the pelvis, there may have been a greater likelihood of positive effects translating throughout the body, and less likelihood that other areas would become misaligned from a focus directed to the centre of the body's movement.

Limitations

This study was an exploratory in nature, thoroughly examining three participants. One of the major limitations of this design was that conclusions could not be made, both because of the small sample size of three, and the lack of a control group. A larger sample size would have made the findings more generalizable. A control group would have helped control for confounding variables such as an increased awareness of posture.

Within the experimental procedure, there were several factors that decreased the reliability of the measures. The skin of the participants was not cleaned or shaved before applying the tape, causing the tape to loosen prematurely. Cleaning and shaving the skin according to the KT manufacturer's directions would have helped to prolong the KT's

adherence. Another limitation was the durability of the tape. By the end of the week of taping, many of the elastic fibres within the tape had snapped. This may have decreased the stretch caused by the tape. If the tape had been reapplied half-way through the week, this problem could have been avoided.

A final limitation during the experimental procedure was the visibility of the violinists' posture. Although the participants were instructed to wear tight clothing, one of them did not, and the other two could have had worn even tighter clothing. To further increase visibility, it would have helped if the violinists had been videotaped in front of a contrasting background. It would also have helped measurement accuracy if markers had been placed on the acromion and on the top of the head.

Future research

In order to confirm the effects of KT on posture that were found in this study, future research would need to use a variety of methodology such as including more participants and a control group. In addition, it would be beneficial to take measurements that would examine the intrinsic effects on KT, both to whole body posture, and to muscle activation.

For example, although this study observed several changes in whole body posture, specifically, a shift in the axis of gravity, it was not possible to confirm this observation. Future research could use force plate data to determine whether KT has an impact on the centre of pressure.

It would also be interesting to measure muscle activation at the neck in order to ascertain if KT initiated any changes in muscle activation. When the head is held forward, more muscle activation is needed to maintain its position. If the neck extensors are overused, this could lead to tension headaches. By measuring muscle activation of the neck, it would be possible to see if KT decreases the activation of the neck flexion muscles, thus decreasing risk of injury.

Finally, future research should explore a variety of KT application methods, including the optimal time frame and area of application. Wearing KT over a longer time frame could positively influence the maintenance of KT-induced changes in posture. And applying KT closer to the core could affect the outcome of any side effects to other areas of posture.

CONCLUSION

This exploratory study examined the effects of KT application to neck flexion in violinists. The three violinists in this study did experience visible changes in their neck flexion during KT application, but improvements decreased during the three-week follow-up. The changes that the violinists experienced suggest that KT could be – not a cure-all – but a supplementary intervention for helping violinists change poor posture through heightened posture awareness. More studies are necessary to confirm both the optimum time frame and placement of tape application, as well as exploring the evidence for any negative or positive side-effects to overall posture.

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Appendix A

Pain Assessment

Name:

Sex:

Age:

Date:

In the diagram provided below please mark the areas which best represent the location of any pain you are experiencing. Use the symbols illustrated below.

Numbness
ooooo

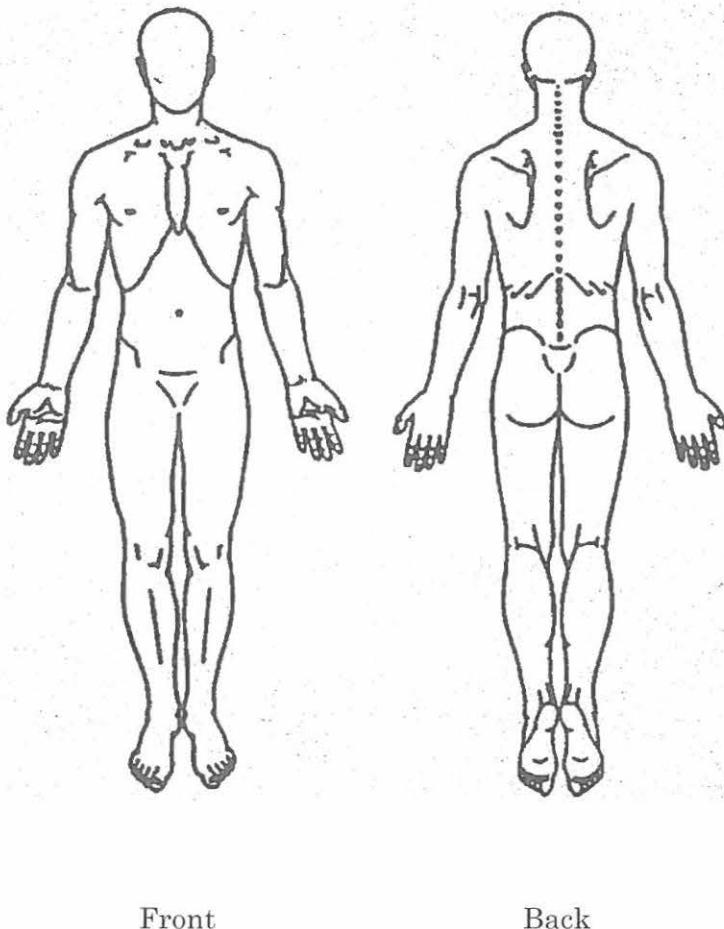
Burning
xxxxx

Dull & Aching
+++++

Pins & Needles
.....

Stabbing & Sharp
//////

Stiff & Tight
22222



Please rate the intensity of your pain by circling the one number that best describes your pain at its worst in the last 24 hours.

No Pain	Mild Pain	Moderate Pain	Severe Pain	Intolerable Pain
0	1	2	3	4

Additional Comments:

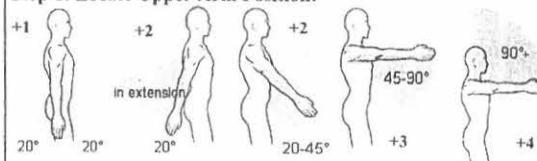
Appendix B

RULA Employee Assessment Worksheet

based on RULA: a survey method for the investigation of work-related upper limb disorders, McAtamney & Corlett, Applied Ergonomics 1993, 24(2), 91-99

A. Arm and Wrist Analysis

Step 1: Locate Upper Arm Position:



Step 1a: Adjust...

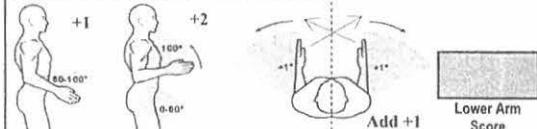
If shoulder is raised: +1

If upper arm is abducted: +1

If arm is supported or person is leaning: -1

Upper Arm Score

Step 2: Locate Lower Arm Position:

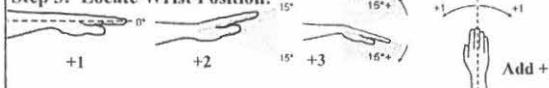


Step 2a: Adjust...

If either arm is working across midline or out to side of body: Add +1

Lower Arm Score

Step 3: Locate Wrist Position:



Step 3a: Adjust...

If wrist is bent from midline: Add +1

Wrist Score

Step 4: Wrist Twist:

If wrist is twisted in mid-range: +1

If wrist is at or near end of range: +2

Wrist Twist Score

Step 5: Look-up Posture Score in Table A:

Using values from steps 1-4 above, locate score in Table A

Step 6: Add Muscle Use Score

If posture mainly static (i.e. held>10 minutes),

Or if action repeated occurs 4X per minute: +1

Posture Score A

+

Muscle Use Score

+

Force/Load Score

=====

Wrist & Arm Score

Step 7: Add Force/Load Score

If load < .44 lbs (intermittent): +0

If load 4.4 to 22 lbs (intermittent): +1

If load 4.4 to 22 lbs (static or repeated): +2

If more than 22 lbs or repeated or shocks: +3

SCORES

Table A: Wrist Posture Score

Upper Arm	Lower Arm	1	2	3	4
		Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist
1	1	1	2	2	2
	2	2	2	2	3
	3	2	3	3	3
2	1	2	3	3	4
	2	3	3	3	4
	3	3	4	4	5
3	1	3	3	4	4
	2	3	4	4	4
	3	4	4	4	5
4	1	4	4	4	5
	2	4	4	4	5
	3	4	4	5	6
5	1	5	5	5	6
	2	5	6	6	7
	3	6	6	7	7
6	1	7	7	7	8
	2	8	8	8	9
	3	9	9	9	9

Table C: Neck, trunk and leg score

Wrist and Arm Score	1	2	3	4	5	6	7+
	Legs						
1	1	2	3	3	4	5	5
2	2	2	3	4	4	5	5
3	3	3	4	4	5	6	6
4	3	3	4	5	6	6	6
5	4	4	4	5	6	7	7
6	4	4	5	6	6	7	7
7	5	5	6	6	7	7	7
8*	5	5	6	7	7	7	7

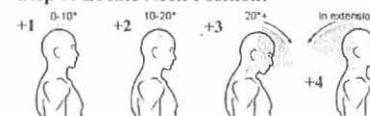
Scoring: (final score from Table C)

- 1 or 2 = acceptable posture
- 3 or 4 = further investigation, change may be needed
- 5 or 6 = further investigation, change soon
- 7 = investigate and implement change

Final Score

B. Neck, Trunk and Leg Analysis

Step 9: Locate Neck Position:



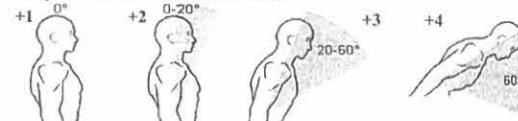
Neck Score

Step 9a: Adjust...

If neck is twisted: +1

If neck is side bending: +1

Step 10: Locate Trunk Position:



Trunk Score

Step 10a: Adjust...

If trunk is twisted: +1

If trunk is side bending: +1

Step 11: Legs:

If legs and feet are supported: +1

If not: +2

Leg Score

Neck Posture Score	1	2	3	4	5	6
	Legs	Legs	Legs	Legs	Legs	Legs
1	1	3	2	3	4	5
2	2	2	3	4	5	6
3	3	3	4	4	5	6
4	5	5	5	6	7	7
5	7	7	7	7	8	8
6	8	8	8	8	9	9

Step 12: Look-up Posture Score in Table B:

Using values from steps 9-11 above, locate score in Table B

Posture Score B

Step 13: Add Muscle Use Score

If posture mainly static (i.e. held>10 minutes),

Or if action repeated occurs 4X per minute: +1

Muscle Use Score

Step 14: Add Force/Load Score

If load < .44 lbs (intermittent): +0

If load 4.4 to 22 lbs (intermittent): +1

If load 4.4 to 22 lbs (static or repeated): +2

If more than 22 lbs or repeated or shocks: +3

Force/Load Score

Step 15: Find Column in Table C

Add values from steps 12-14 to obtain

Neck, Trunk and Leg Score. Find Column in Table C.

Neck, Trunk & Leg Score

Task name: _____

Reviewer: _____

Date: _____ / _____ / _____

provided by Practical Ergonomics

This tool is provided without warranty. The author has provided this tool as a simple means for applying the concepts provided in RULA.

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Appendix C

PARTICIPANT INFORMATION

Title of Project: THE EFFECTS OF KINESIO TAPING ON POSTURE IN VIOLINISTS

Investigator: Abigail Simmonds, Major in Honours Kinesiology

Institution: Applied Human Sciences, University of Prince Edward Island

Contact Person: Abigail Simmonds, Email asimmonds@upei.ca, Tel: 902 675 2181

The object of this research study is to determine if using Kinesio tape to alert violinists of poor postures helps to change those postures for the better. You have been invited to participate in this study because you are an amateur violinist between the ages of 16 and 22 who plays for at least six hours a week. This study aims to evaluate three violinists.

Procedure

All research will be conducted at the UPEI Biomechanics Laboratory located in room 118 of the Steel Building.

Arrive at the laboratory wearing comfortable, non-baggy attire that allows for movement.

We would ask that you come to the lab for an initial assessment bringing your violin. The assessment will last roughly 15 minutes and will consist of you playing an easy piece for two minutes while being video taped. The music will be provided.

Several weeks later you will be asked to come to the lab again where the researcher will summarize the outcomes of your analysis and apply Kinesio tape to one of the areas of posture that could be improved. Kinesio tape is not painful and flexible with movement, alerting the wearer of extreme ranges of motion while not restricting them. The tape is waterproof and can remain on for three to five days. Since we will be asking you to keep it on for one week, you will need to return to the lab half way through the week for reapplication. We will also ask that you return to the lab at the end of the week for a second video assessment, which will last up to 15 minutes.

Every day of the week that you are wearing the Kinesio tape, we would ask that you video tape two minutes of your practice session and complete a brief pain questionnaire. For three weeks after the tape application, we would ask that you continue to fill out the pain questionnaire daily and video tape your practice session for two minutes weekly.

Lastly, we would ask that you return to the lab a final time where your performance will be reassessed in the same way as your initial assessment. All of the videos and questionnaires that you have collected over the four-week period can be given to the researcher at this time.

In total, you will contribute about two hours to this research. One hour of that time will be spent in four visits to the lab, and the remaining time will be spent in videotaping part of your practice sessions and keeping a daily pain journal.

Risks

There are minimal risks associated with participating in this study. Kinesio tape is a well-known intervention used by athletes and health practitioners and is considered a safe measure.

Benefits

The benefit you may gain from this study is an understanding of the risks associated with any areas of poor posture that you may have when playing your instrument. Your posture may be improved through the use of the Kinesio tape, decreasing your risk of playing-related pain and injury.

Conflict of Interest:

The researchers involved in this study declare that they have no conflict of interest with the purpose and results of this study.

Results of this study:

The results of this study will be included in an honours thesis. There will be no commercial application of the results of this study. Participants will receive a summary of their results after the study has been completed.

Rights and Welfare of the Individual:

Your confidentiality will be respected. No records which identify you by name or initials will be allowed to leave the Investigators' offices.

You have the right to refuse to participate in this study. It is understood that until the results are analyzed, you are free to withdraw from any or all parts of the study without penalty. Your information will remain confidential and your participation will be kept anonymous. All individual records and results will be analyzed and referred to by number code only and kept in a locked cabinet in the Biomechanics Laboratory at the University of PEI. This lab will remain locked and only those directly involved in the study will have access to your records and results. You will not be referred to by name in any study reports or in any research papers. Any identifying information in video recordings will be blurred. Your individual results will remain confidential and they will not be discussed with anyone outside the research team.

Please be assured that you may ask questions at any time. We will be glad to discuss your results with you when they have become available and we welcome your comments and suggestions. Should you have any concerns about this study or wish further information, please contact Abigail Simmonds (902-675-2181). If you have any concerns about your rights or treatment as a research participant, please contact the University of PEI Research Ethics Board (902) 620-5104, or by e-mail at reb@upei.ca.

If you are interested in participating in this investigation please complete and sign the consent form.

We thank you for your interest and participation in this study.

PARTICIPANT ASSENT

I, _____, understand the purpose and procedures of this investigation and consent to participate in this study.

I understand that I do not have to participate even if parental consent is given. I understand that at any time during the study, I will be free to withdraw and/or not answer questions without jeopardizing any of my educational opportunities. I understand that I do not waive my legal rights by signing the consent form. I understand the contents of the consent form, the proposed procedures and possible risks. I have had the opportunity to ask questions and have received satisfactory answers to all inquiries regarding this investigation. I will receive a signed and dated copy of the assent form.

Printed Name of Participant

Signature of Participant

Date

I consent to being video recorded according to the procedures of this study.

Signature of Participant

Date

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Printed Name of Principal Investigator
or/ designated representative

Signed Name of Principal Investigator
or/ designated representative

Date

PARENTAL INFORMATION

Title of Project: THE EFFECTS OF KINESIO TAPING ON POSTURE IN VIOLINISTS

Investigator: Abigail Simmonds, Major in Honours Kinesiology

Institution: Applied Human Sciences, University of Prince Edward Island

Contact Person: Abigail Simmonds, Email asimmonds@upei.ca, Tel: 902 675 2181

The object of this research study is to determine if using Kinesio tape to alert violinists of poor postures helps to change those postures for the better. Your child has been invited to participate in this study because they are an amateur violinist between the ages of 16 and 22 who plays for at least six hours a week. This study aims to evaluate three violinists.

Procedure

All research will be conducted at the UPEI Biomechanics Laboratory located in room 118 of the Steel Building.

Your child will be asked to arrive at the laboratory wearing comfortable, non-baggy attire that allows for movement.

We would ask that they come to the lab for an initial assessment bringing their violin. The assessment will last roughly 15 minutes and will consist of them playing an easy piece for two minutes while being video taped.

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Every day of the week that your child is wearing the Kinesio tape, we will ask that they video tape two minutes of their practice session and complete a brief pain questionnaire. For three weeks after the tape application, we would ask that they continue to fill out the pain questionnaire daily and video tape their practice session for two minutes weekly.

Lastly, we would ask that they return to the lab a final time where their performance will be reassessed in the same way as their initial assessment. All of the videos and questionnaires that they have collected over the four week period can be given to the researcher at this time.

In total, your child will contribute about two hours to this research. One hour of that time will be spent in four visits to the lab, and the remaining time will be spent in videotaping part of their practice sessions and keeping a daily pain journal.

Risks

There are minimal risks associated with participating in this study. Kinesio tape is a well-known intervention used by athletes and health practitioners and is considered a safe measure.

Benefits

The benefit that your child may gain from this study is an understanding of the risks associated with any areas of poor posture that they may have when playing their instrument. Their posture may be improved through the use of the Kinesio tape, decreasing their risk of playing-related pain and injury.

Conflict of Interest:

The researchers involved in this study declare that they have no conflict of interest with the purpose and results of this study.

Results of this study:

The results of this study will be included in an honours thesis. There will be no commercial application of the results of this study. Participants will receive a summary of their results after the study has been completed.

Rights and Welfare of the Individual:

Your child's confidentiality will be respected. No records which identify them by name or initials will be allowed to leave the Investigators' offices.

Your child has the right to refuse to participate in this study. It is understood that until the results are analyzed, they are free to withdraw from any or all parts of the study without penalty even if parental consent is provided. Their information will remain confidential and their participation will be kept anonymous. All individual records and results will be analyzed and referred to by number code only and kept in a locked cabinet in the Biomechanics Laboratory at the University of PEI. This lab will remain locked and only those directly involved in the study will have access to their records and results. Your child will not be referred to by name in any study reports or research papers. Any identifying information in video recordings will be blurred. Their individual results will remain confidential and they will not be discussed with anyone outside the research team.

Please be assured that you may ask questions at any time. Should you have any concerns about this study or wish for further information, please contact Abigail Simmonds (902-675-2181). If you have any concerns about your rights or treatment as a research participant, please contact the University of PEI Research Ethics Board (902) 620-5104, or by e-mail at reb@upei.ca.

If you consent to your child participating in this investigation please complete and sign the consent form.

PARENTAL CONSENT

I, _____, understand the purpose and procedures of this investigation and consent to my child's participation in this study.

I understand that my child does not have to assent to participate in this study even if parental consent is given. I understand that at any time during the study, my child will be free to withdraw without jeopardizing any of his or her educational opportunities. I understand that I do not waive my child's legal rights by signing the consent form. I understand the contents of the information form, the proposed procedures and the possible risks. I have had the opportunity to ask questions and have received satisfactory answers to all inquiries regarding this investigation. I will receive a signed and dated copy of the consent form.

Printed Name of Parent

Signature of Parent

Date

I give my consent to having my child video recorded according to the procedures of this study.

Signature of Parent

Date

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Printed Name of Principal Investigator
or/ designated representative

Signed Name of Principal Investigator
or/ designated representative

Date