

PLAYING-RELATED HEALTH RISKS AMONG STUDENTS AND TEACHERS OF MUSIC DEPARTMENT AT THE KOPER ART SCHOOL

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ABSTRACT

The study of a musical instrument demands several hours of practicing on a daily basis as well as playing and performing. Consequently, the musician can be subjected to various health risks during his or her study process but also afterwards. Health problems depend on the individual physical and mental fitness, but also on the features and structure of the instrument as well as on the playing technique, which consists of repeated movements and mainly of static body position. Because of the possibility of chronic injuries, especially neuromuscular disorders but also others, it is important for the musician to regularly maintain his or her physical and mental fitness and movement performance by preventive and compensating activities and immediate action in case of pain or when noticing the first signs of medical problems or limitations. The study included 43 students (16.7 ± 1.5 year; 31 females and 12 males) and 15 teachers (36.9 ± 8.8 years; 7 females and 8 males) that attend and teach at the Music Department of The Koper Art School, which is a part of The Koper High School. The aim of the study was to recognize the risk factors in health status that occur as a consequence of playing a music instrument. A questionnaire consisting of 26 questions was used in the research. The results of the study showed that a half of the interviewed students practices every day but teachers practice less ($p = 0.04$). Therefore, teachers value the importance of physical ($p = 0.013$) and mental ($p = 0.000$) fitness more than students. Teachers also estimate their current physical and mental fitness to be higher ($p = 0.003$). 89.7 % of the respondents feel pain of discomfort during or after playing, out of these 95.3 % are students, and 73.3 % are teachers. These musicians state that they most frequently feel pain in the back and neck area and in the shoulders and wrists. 36.2 % of the musicians,

41.9 % of students and 20 % of teachers, affirmed to have had strains or pain, both of physical and psychological nature. It is indispensable for both students and teachers to be aware of suitable preventive, practicing and therapeutic measures. Preventive activities and control over risk factors can contribute significantly to the motivation for playing, to the quality of producing and reproducing musical works and to the absence of pain, discomfort and injury occurrences among musicians.

Keywords: musician, health, pain, prevention, education.

ZDRAVSTVENA TVEGANJA IGRANJA NA GLASBENI INŠTRUMENT DIJAKOV IN UČITELJEV UMETNIŠKE GIMNAZIJE KOPER

IZVLEČEK

Študij glasbenega inštrumenta in petja zahteva vsakodnevno in večurno vadbo, igranje ter nastopanje. Posledično je glasbenik v procesu študija, pa tudi kasneje, tako lahko izpostavljen različnim zdravstvenim tveganjem. Pojav zdravstvenih težav je odvisen od psihofizičnih predispozicij posameznika, hkrati pa tudi od značilnosti in zgradbe inštrumenta ter tehnike igranja na inštrument, ki je sestavljena iz ponavljajočih se gibov in pretežno statičnega položaja telesa. Zaradi možnosti pojava kroničnih poškodb, predvsem živčno-mišične narave in drugih zdravstvenih tveganj, je pomembno, da glasbenik redno skrbi za svoj psihofizični status in gibalno zmogljivost tako s preventivnimi aktivnostmi kot tudi s takojšnjim ukrepanjem v primeru pojava bolečine oziroma opažanju prvih zdravstvenih zapletov in omejitev. V študiji je sodelovalo 43 dijakov (16.7 ± 1.5 let; 31 žensk in 12 moških) in 15 učiteljev (36.9 ± 8.8 let; 7 žensk in 8 moških), ki se izobražujejo oziroma poučujejo na Umetniški gimnaziji Koper. Cilj študije je bil prepoznati dejavnike tveganja za zdravstveni status kot posledico igranja na glasbeni inštrument. V raziskavi smo uporabili avtorski vprašalnik s 26 vprašanji. Rezultati raziskave so pokazali, da polovica anketiranih dijakov vadi vsak dan, učitelji manj ($p = 0.04$). Učitelji tako pomen telesne pripravljenosti ($p = 0.013$) kot tudi pomen psihične pripravljenosti ($p = 0.000$) vrednotijo višje kot dijaki. Učitelji prav tako višje ocenjujejo tako svojo trenutno telesno kot tudi psihično pripravljenost ($p = 0.003$). Bolečine oziroma neugodje v telesu med igranjem in po njem čuti 89.7 % vseh v raziskavo vključenih glasbenikov, med njimi 95.3 % dijakov in 73.3 % učiteljev. Glasbeniki navajajo najpogostejše bolečine v predelu hrbta, vratu, ramenskega obroča in zapetstij. O obremenitvah in poškodbah, bodisi telesne ali psihične narave, je poročalo 36.2 % glasbenikov, med temi 41.9 % dijakov in 20 % učiteljev. Ozaveščenost glasbenikov, tako dijakov kot tudi njihovih učiteljev, o ustreznih preventivnih, vadbenih kot tudi tera-

pevskih, ukrepih je nujna. Preventivne aktivnosti in nadzor nad dejavniki tveganja pomembno prispevajo k motivaciji za igranje, h kakovosti ustvarjanja in poustvarjanja glasbenih del ter k odsotnosti bolečin, neugodja in pojavu poškodb glasbenikov.

Ključne besede: *glasbenik, zdravje, bolečina, preventiva, izobraževanje*

INTRODUCTION

Music and society have always been closely related. In ancient societies, music was a means for connecting with the spiritual world. At first, humans did not have instruments so they created music with clapping and stomping. Instruments spread widely during the development of the first civilizations. The newly acquired musical profession was highly regarded in society. The Egyptians and Ancient Greeks, as well as other nations, appreciated music very much. Not only did it have an important role in everyday life, professional concert playing was diffused, too. Music developed greatly through history. Since the second half of the 20th century technological progress reflected also in the musical sphere. Mass media, such as radio, television and internet spread music and contribute to its importance in economy (Blažič Primožič & Čerič, 2004; Čerič & Šramel Vučina, 2008). Amateur and professional musicians usually begin their education in elementary music school, most of them by the age between 6 and 8. Education in music schools is part of the public education system in Slovenia. Each year around 25.500 children and youths enrol in music educational programmes (European Music Union, 2010). Some of the children decide to continue their music education in high school or at university; many of them upgrade their knowledge in music institutions abroad. The study of a musical instrument demands several hours of practicing on a daily basis which can lead to various health risks.

Musicians are top athletes who execute, dominate and control tiny movement skills and can undergo tremendous physical, functional and cognitive strain while studying and playing musical instruments both during their performance or other artistic production. In order to produce music with a musical instrument, many years of studying and playing are necessary. It is by playing that we can achieve temporal and spatial precision, moreover, also exceptional control over the execution of fine movements (Plevnik & Geržević, 2015). Playing a musical instrument demands the execution of fine movements, including movements of the hands and fingers, arms, legs and torso. However, it can also involve locomotor movement, such as walking in place or around which is common in wind orchestras or choruses. Playing a musical instrument is therefore a physical activity that puts strain primarily on small muscle groups of fingers and arms, but also on large muscle groups that are responsible for maintaining an optimal body posture, often in forced and non-physiological positions. Pearce and Rohrmeier (2012) talk about a wide range of links between playing music and listening to it on one hand and human cognition on the other. They describe music as a “complex cogni-

tive system". Listening, performing and interacting with music require a wide range of cognitive functions and processes from the musician, including auditory analysis, perception of the musical structure (voice, intonation, rhythm, tempo, volume etc.), attention, learning and memorizing (a composition and its features), shaping expectations, emotions, social cognition etc. A musical performance on a professional level is one of the most demanding tasks for the human nervous system. If we combine this all, we can assume that a musical performance is made at least of the cognitive and motor aspects. The cognitive aspect, along with the general cognitive functions, regards the understanding of the musical structure (harmonies, tonalities, phrasing, auditory perception), whereas the motor aspect concerns the actualisation of a movement within its spatial and timely characteristics (precision, speed, punctuality, rhythm, softness) (Plevnik & Gerževič, 2015).

Health problems are common among musicians; their occurrence depends on several factors, namely: the individual psychophysical predisposition, the characteristics of the instrument and the playing technique (Gaserzer & Neugebauer, 2011). The most common health problems among musicians are musculoskeletal, neurological, auditory, skin and psychological conditions (Heinan, 2008). The listed conditions can hinder a musician from producing and reproducing music effectively and can even prevent him or her from playing the instrument completely due to pain and injuries (Gambichler, Boms, & Freitag, 2004; Gasenzer & Parncutt, 2006; Hansen & Reed, 2006; Hojs & Bilban, 2010; Carli & Bilban, 2012; Lee et al., 2013). Črnivec (2004) conducted a study among the musicians of the Slovene philharmonic orchestra and describes that 50 to 76 % of the musicians suffer from musculoskeletal conditions, mostly because excessive strain on tendons, tendon sheaths and tendon and muscular insertions. Also common are back conditions due to regular strains in non-physiological positions which are the result of the static nature of the task, neurological damage due to excessive pressure and occupational hearing impairment. Musicians of the Slovene philharmonic orchestra claim that the symptoms start occurring after 60 to 93 minutes of playing the instrument. Pain and discomfort usually first occur in the shoulder girdle, followed by the lumbar and lower back area, backline, wrists, elbows, thoracic spine, fingers, lower limbs and forearms (Črnivec, 2004). Leaver, Harris, and Palmer (2010) conducted a study that included professional musicians from the top orchestras in Great Britain and the results showed that 86 % of the musicians experienced pain in the 12 months prior to the research, mainly in the neck, lower back and shoulder area. The study also showed that pain problems occur more often with female musicians and musicians with a general feeling of being unwell; the occurrence of pain also depends on the instrument category. Different studies have shown that approximately one half of professional musicians and music students face musculoskeletal injuries, women more often than men and violinists and pianists more often than other musicians (Robinson & Zander, 2002; Paarup, Baelum, Holm, Mannuche, & Wedderkopp, 2011). Robinson and Zander (2002) state that playing a musical instrument is the second most frequent form of risk exposure for bone and muscle injuries, right after using the computer. A study (Chan, Driscoll, & Ackermann, 2013) conducted among Australian professional musicians in

orchestras, showed that the most common conditions occur in the shoulders, neck and backline, followed by tingling sensation, loss of muscle control and force production (Robinson & Zander, 2002; Norris, 2011).

Overuse injuries can be defined as acute or chronic. Acute overuse injuries occur when a musician overuses the tissue to the extent of feeling the consequences the following day, which can occur in form of muscle pain and rigidity in the areas that were subjected to overuse (e.g. arm, hand). Chronic overuse injuries develop during a longer period of time and in a less obvious manner (Shafer-Crane, 2006). They begin as slightly unpleasant sensations that can advance to severe pain over the period of weeks and months (Norris, 2011). Table 1 shows the most common musculoskeletal injuries linked to playing a specific musical instrument.

Table 1: Musculoskeletal injuries associated with specific instruments (adapted from Robinson & Zander, 2002).

<p>Violin / Viola Neck pain Thoracic outlet syndrome (left) Carpal tunnel syndrome (left) Cubital Tunnel Syndrome (left) Rotator cuff tendinitis (right) Extensor carpi radialis tendinitis (right) Temporomandibular joint dysfunction</p>	<p>Flute Thoracic outlet syndrome (left and right) Ulnar nerve entrapment (left) Extensor carpi radialis tendinitis (left) Back and neck pain De Quervain's syndrome (left and right) Focal dystonia of ring and little fingers (left)</p>	<p>Bassoon Back and neck pain Temporomandibular joint dysfunction Dental problems Strain of the teres major muscle and the pectoralis major muscle (right) De Quervain's syndrome</p>
<p>Keyboards (piano / organ / accordion) Thoracic outlet syndrome Medial and lateral epicondylitis Tendinitis of wrist flexors and extensors Carpal tunnel syndrome De Quervain's syndrome Dorsal wrist ganglion Focal dystonia of thumb, finger, hand, and foot muscles</p>	<p>Percussion Lateral and medial epicondylitis Flexor carpi ulnaris tendinitis Extensor carpi radialis tendinitis De Quervain's syndrome Carpal tunnel syndrome Achilles tendinitis</p>	<p>Guitar Triceps tendinitis (right) Focal dystonia of index and middle fingers and thumb (right) Thoracic outlet syndrome (left) Carpal tunnel syndrome (left) Flexor carpi ulnaris tendinitis (left) Strain of dorsal interosseous (left)</p>

Clarinet Carpometacarpal joint strain (right) Carpal tunnel syndrome De Quervain's syndrome (right) Lateral epicondylitis (right and left) Temporomandibular joint dysfunction	Cello / String bass Neck pain Ulnar nerve entrapment (left) Flexor carpi ulnaris tendinitis (left) Rotator cuff tendinitis (right) Extensor radialis tendinitis (right)	Oboe Extensor carpi radialis tendinitis (right) Lateral epicondylitis (right) Ulnar nerve entrapment (right) Posterior interosseous nerve entrapment (right) Back and neck pain De Quervain's syndrome
Trumpet Maxillofacial and lip trauma Pharyngeal dilatation	Saxophone Back and neck pain Extensor carpi radialis tendinitis (right and left) Temporomandibular joint dysfunction	Vocals Vocal cord strain Facial and neck muscle strain Focal dystonia of vocal cord muscles
Trombone Focal dystonia of lip Lateral epicondylitis (right) Strain of the orbicularis oris muscle		

The reasons for the emergence of pain are mainly long-term playing in a non-physiological position of the body, the presence of stress and psychological pressure, insufficient breaks, the lack of warming up before playing, bad posture while playing the instrument, repetitive movements, muscle tension, too much power used in the body movements and the wrong playing technique. Poor general physical condition of the musician and consequently fatigue also significantly contribute to the occurrence of pain and injuries (Robinson & Zander, 2002; Dragulin, 2011). Playing an instrument of an unsuitable size or one that is ergonomically unsuitable also accelerates the occurrence of pain and injuries (Gasenzer & Parncutt, 2006).

The aims of this study were to use the questionnaire to identify: 1) the occurrence of early health problems of students and 2) the difference between students and teachers in health status and their approach to playing and practicing the musical instrument.

METHODS

Subjects

The sample consisted of 43 students (16.7 ± 1.5 years; 31 females and 12 males) who were enrolled in the academic year 2014 / 15 in the first, second, third or fourth year of Music Department of The Koper Art School, a part of The Koper High School,

and their 15 teachers (36.9 ± 8.8 years; 7 females and 8 males). The participation in the survey was voluntary. 75 % of the respondents were students and 52 % were teachers. The study included all groups of instruments, namely string instruments ($N = 8$), wind instruments ($N = 16$), brass instruments ($N = 11$), percussions ($N = 1$), plucked string instruments ($N = 5$) and keyboard instruments ($N = 16$).

Project Procedure

For the purpose of this research we developed a questionnaire with 29 questions. The questions were divided in several parts, namely a) main characteristics about the subject and his / her playing habits and musical traditions, b) questions about lifestyle, c) questions about anxiety, fatigue and injuries and d) approaches to playing a musical instrument and medical particularities of the musician. Questionnaires were distributed in printed form to students and teachers.

Data Analysis

The data was analysed and edited in Microsoft Office Excel 2013. We used the method of descriptive statistics, Spearman's rank correlation coefficient and the t-test for independent samples for calculating the analysis of the mean differences. The data is presented as an arithmetic mean \pm standard deviation (AM \pm SD).

RESULTS AND DISCUSSION

The study results show many differences in the answers to the research questions between students and their teachers. The answers significantly identify the causes underlying the health problems as well as differences in the approach to playing and practicing musical instruments between the students and their teachers.

At the time of the study, the students had practiced their musical instrument on average 9.3 ± 2.1 years, while their teachers 27.7 ± 9.9 years ($p = 0.000$). Among the students, the shortest period of playing is 2 years and the longest is 15 years, whereas among the teachers, the shortest period is 15 years and the longest period is 45 years. Among students, the beginning of formal musical education by enrolling in the music school is on average at the age of 7.4 ± 2.1 years and among teachers 9.3 ± 2.2 years. The students play on average 6.1 ± 1.2 days per week, whereas the teachers 5.5 ± 0.8 days ($p = 0.04$). A half (49 %) of the students practice every day, meanwhile, only 2 teachers practice regularly every day. The students practice an average of 3.1 ± 1.2 hours per day; on the other hand, the teachers practice 2.8 ± 1 hour per day. Most students and teachers take a break while playing and practicing the musical instrument. Students' breaks are slightly longer (15 ± 10.3 min; 11.9 ± 6.6 min), all of them usually take 2

breaks. Statistically, there are no significant differences in the duration and frequency of breaks between the students and the teachers. Musicians, participating in the survey, evaluated the importance of physical and mental fitness for their work on a scale from 1 (“not important”) to 6 (“very important”). Musicians also assessed their physical and mental fitness and state of health on a scale from 1 (“low”) to 6 (“extraordinary”). There is no statistically significant difference in evaluating the health status among students and teachers (4.3 ± 1.2 ; 4.5 ± 0.9).

Table 2: Assessment of the importance of physical fitness and current physical fitness.

	Assessment of the importance of physical fitness	Assessment of current physical fitness
Students	4.7 ± 1.3	2.9 ± 1.1
Teachers	5.4 ± 0.8	3.5 ± 1.3
Total	4.8 ± 1.2	3.1 ± 1.2
	$p = 0.013$	

Teachers evaluate the importance of good physical fitness higher; their own assessment of their physical fitness was also better (Table 2). Teachers also give a higher value to the importance of good mental fitness; their assessment of their own current mental fitness is also higher (Table 3). Both, students and teachers, evaluated the importance of physical and mental fitness higher in comparison to their assessment of their actual physical and mental fitness. A distinct decrease in physical (movement and functional) capacity can be seen in this period, due to the consequences of many individuals' lifestyles in the modern society (World Health Organization, 2014).

Table 3: Assessment of the importance of mental fitness and current mental fitness.

	Assessment of the importance of mental fitness	Assessment of current mental fitness
Students	5.2 ± 1.0	3.8 ± 1.3
Teachers	5.9 ± 0.4	4.8 ± 0.9
Total	5.4 ± 0.9	4.1 ± 1.3
	$p = 0.000$	$p = 0.003$

36 % of the musicians participating in the survey, namely 17 students and 4 teachers, believe that they exaggerate when practicing the musical instrument. The most common reason for exaggeration are upcoming concerts, followed by their own high expectations and an increase in the repertoire (Figure 1). What is interesting is that 12 % of the students state that the reasons for their exaggeration are the demands of others, parents or teachers.

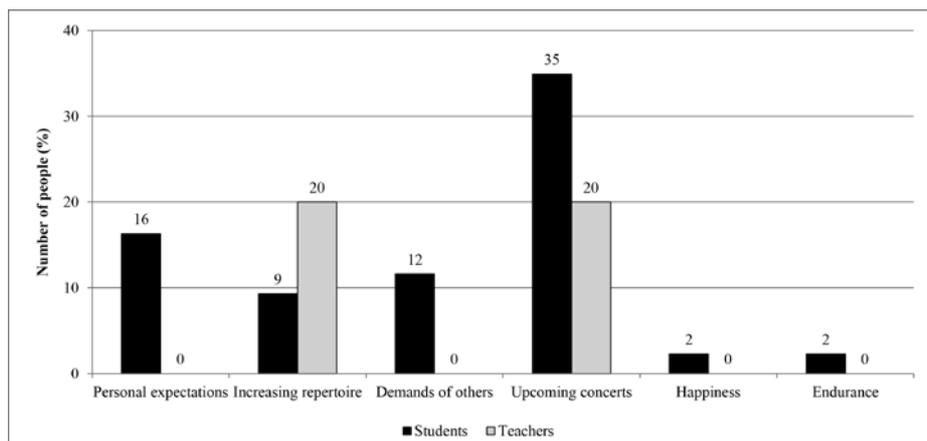


Figure 1: Reasons for exaggerations in playing.

Students and teachers experience fatigue after playing an instrument. Both, students and teachers assessed it with the average value of 3.7 ± 1.1 , on a scale from 1 (“not tired at all”) to 6 (“very tired”). The musicians who express a higher degree of fatigue after playing also assessed their general health status to be worse ($r = -0.537$, $p = 0.000$, $N=58$). Statistically, the link between the assessment of fatigue after playing and the evaluation of their own physical capability is not expressed. The phenomenon of stage anxiety before performances is present with both students and teachers. The students, on a scale from 1 (“never”) to 6 (“always”), evaluate the frequency of the presence of stage anxiety with the assessment of 4.9 ± 1.4 , meanwhile the teachers evaluate it with the assessment 3.3 ± 1.5 ($p = 0.003$). On the scale from 1 (“not present”) to 6 (“very strong”), the students evaluate the intensity of the stage anxiety with the assessment of 4.4 ± 1.3 , meanwhile the teachers assessed it lower 3.3 ± 1.5 ($p = 0.02$). Students are engaged in physical activity in an average of 2 ± 1.8 days a week, the teachers on the other hand in an average of 3.1 ± 2.8 days a week. Among all the participating musicians, 26.7 % of them is not engaged in any kind of physical activity – 13 students and 3 teachers. Figure 2 shows the most common forms of physical activity among students and teachers.

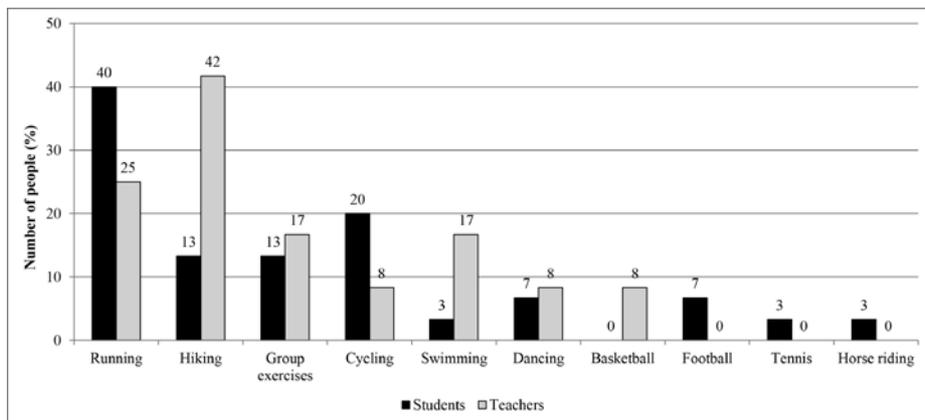


Figure 2: Students' and teachers' engaging in physical activity or sport.

89.7 % of all the participating musicians feel musculoskeletal discomfort, among them 95.3 % of the students and 73.3 % of the teachers. The average time of reporting pain in the locomotor system after the starting point of playing on an instrument among the interviewed musicians is 64 ± 47 minutes, wherein the beginning of the occurrence of problems with the students is on average 61 ± 41 minutes (onset between 5 and 180 minutes), with the teachers on average of 75 ± 64 minutes (between 20 and 240 minutes). There are no statistically typical differences in the time of occurrence of pain among the students and the teachers. The musicians cite the most common pain in the back, neck, shoulder girdle and wrists (Figure 3). Back pain occurs with mostly all instruments, flutists, violinists and pianists are the ones who most frequently feel neck pain and pain in the shoulder girdle, violinists and pianists also sense pain in the lower back, pianists can also feel pain in the upper arm, forearm and wrists, finger pain occurs with mostly keyboard instrument players, violinists and guitarists, lip pain with the players of wind instruments and finger skin pain with violinists and guitarists.

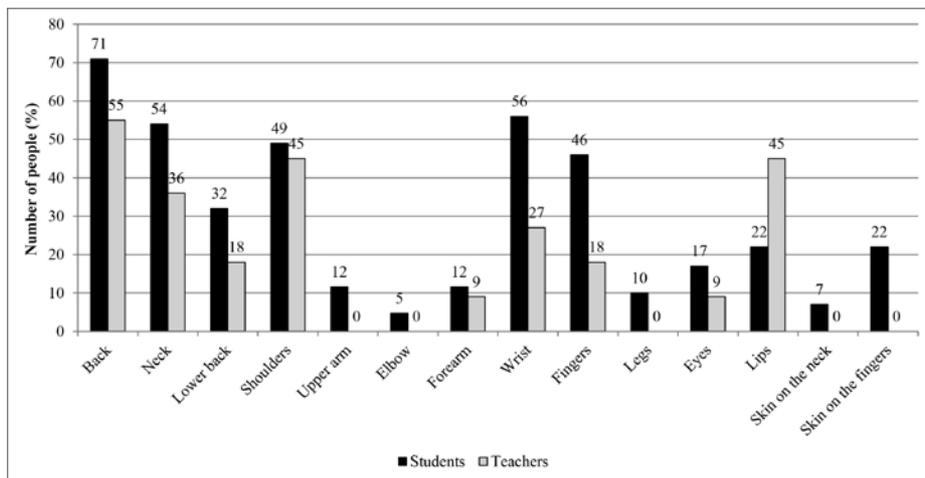


Figure 3: Occurrence of pain or discomfort while playing the instrument.

When the pain occurs, 67.3 % of musicians immediately take measures, namely 61 % of the students and 90.9 % of the teachers ($p = 0.001$). Most often, the musicians take a break when the pain occurs; some of them stretch and take exercise, massage themselves or correct their posture. 36.2 % of musicians, among them 41.9 % of the students and 20 % of the teachers, report load and injuries, either of physical or psychological nature. The most common load reported by musicians is stress, followed by tendinitis and tendon sheath (Figure 4).

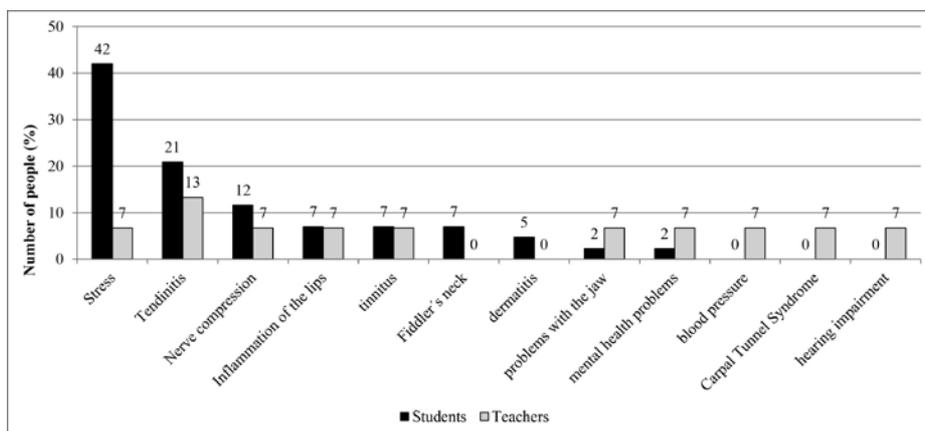


Figure 4: Loads and injuries reported by the participating musicians.

Demands for excellence and the highest level of professionalism among both the young as well as older academic musicians are increasingly exceeding the limit of loads that men are capable of withstanding without negative effects on their body. In the last decade, this shows as a significant increase in injuries as a result of overloading due to playing the instruments and is reflected in the most demanding forms of chronic injuries of world-class musicians (Črnivec, 2004; Elliott, 2012). An increasing number of typical injuries, particularly those of muscle-skeletal apparatus, which are typical for top musicians, could be detected already among the youngest musicians at the beginning of their artistic career (Ranelli, 2012).

Both the students and the teachers evaluated the importance of preventive measures on a scale from 1 (“not important”) to 6 (“very important”). These are, according to both, the teachers and the students, arranged according to their importance, from the most important to the least important: optimal technique of playing, adjustment of the length of playing according to an individual’s abilities, adequate breaks, warming-up before playing, gradual increase in the amount of playing or avoidance of sudden increase in the amount of playing, implementation of mobility exercises during breaks and the use of ergonomic devices (Figure 5). Statistically, there are no differences in the assessments of the teachers and the students.

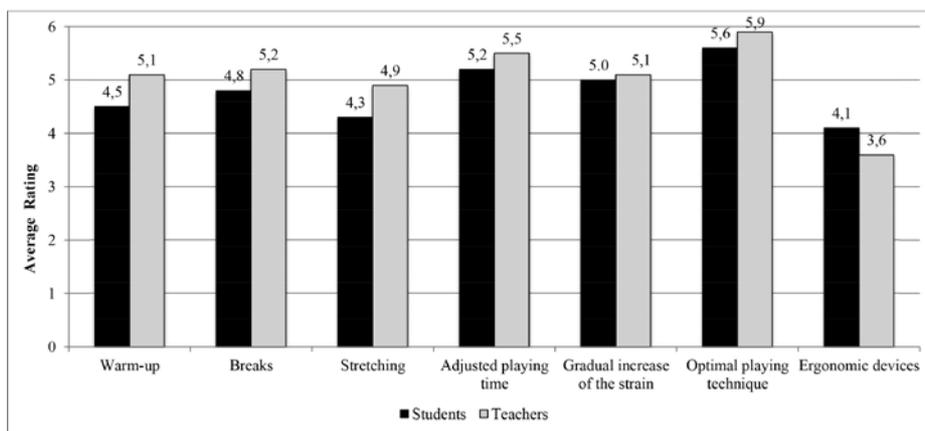


Figure 5: Assessments of the importance of preventive measures, according to the students and the teachers.

Regular physical exercise oriented either towards prevention or therapy helps improving health conditions, general well-being and physical condition (Bejjani, Glenn, & Benham, 1996; Ackermann, 2013; World Health Organization, 2010). Physical exercise also affects cognitive processes (Gasenzer & Parncutt, 2006), which are of great importance for creating and performing music. In her study, Ackerman (2013) demon-

strated that if one engages in physical activity at least 2 times a week, this already has a positive effect when playing the instrument. Adequate physical activity and exercises is the first preventive measure, which should be taken into account by every musician (Norris, 2011). A special attention must be paid to the exercises of hands and fingers, which are distinctively strained while playing, but are usually the least taken care of (Ackermann, 2013). To prevent pain and injuries it is important to shift between the strain periods, i.e. playing the instrument, and suitably long and active breaks (Moharić, 2014). Good mental fitness and stability are important for optimal musical performance and keeping to the chosen strategy of practicing (Lockwood, 1989).

Professional instrument playing causes a considerably increased heart rate (beats / min), which is also connected to body mass index, tempo of music and characteristics of the instrument (Vellers, Irwin, & Lightfoot, 2015). Iñesta, Terrados and Garcia (2008) report that while playing an instrument the heart rate rises on average up to 72 % of the highest heart rate (the highest measured heart rate 85 %). The achieved heart rate depends on the playing characteristics, the complexity of the music and the psychophysical abilities of the musician.

Injury prevention includes awareness and control over risk factors that cause pain and influence the emergence of injuries. Prevention also includes identifying and taking appropriate action when first symptoms and signs of injury occur (Robinson & Zander, 2002; Zupan, 2007). It is very important that musicians know their psychophysical abilities and they do not exceed them to the disadvantage of their own health. To avoid illness and injuries they have to control and maintain their health, physical condition and appropriate diet (Bragge, Bialocerkowski, & McMeeken, 2006). The most important preventive measures include maintaining good health and good physical condition, properly organised practicing and playing the instrument, the choice of appropriate ergonomic tools and instruments, proper lifting, holding and carrying the instrument and good awareness of the body (Robinson & Zander, 2002; Norris, 2011). According to Plevnik and Geržević (2015), preventive actions also include implementing complementary tasks using a variety of training therapeutic devices while playing the instrument.

One of the major causes of injuries is also a sudden increase of the amount of playing. When planning the instrument playing and practicing we need to take into account if a concert date is approaching in order to rearrange the quantity and the intensity of practice and preparation. It is very important that the amount of practice gradually increases before concerts and competitions and that we do not exaggerate with playing the instrument. A gradual change in the intensity of activity allows the body to adapt to it and enables musicians to recognise when their limits are exceeded and identify the signs and symptoms of injuries (Robinson & Zander, 2002; Roset-Llobet, Rosines-Cubells, & Salo-Orfila, 2000). In case of a sudden increase of the repertoire we divide practice into several shorter practice sessions; they will be more effective than one long practice. Fatigue is the indicator of excessive practise. We may also experience pain when fatigue occurs, therefore, we must be very attentive to posture, frequency and length of breaks and playing time. Nevertheless, the environment in which we play also

plays a significant role in successful instrument playing (temperature, brightness of the room etc.) as well as a quality of sleep, a healthy diet, a healthy lifestyle, avoiding stress and adequate hydration (Robinson & Zander, 2002).

Due to a high occurrence of injuries, it is very important that the musicians are aware of the possibility of injuries or diseases that may arise as a result of playing (Parncutt, 2007; Potter & Jones, 1995). It is also very important to know the preventive measures that can prevent injuries and to know how to take action when the pain already arises. Rising awareness about the consequences of playing the instrument should be carried out from the first contact with a musical instrument, as this would significantly contribute to the acquisition of the optimal technique of playing a musical instrument in the early years and would, thereby, reduce the occurrence of injuries and health problems in the later years of the musical career.

CONCLUSION

The purpose of the study was to determine differences between approaches in the strategies of practicing musical instruments of students and teachers of Music Department The Koper Art School. There is a statistical difference in the quantity of instrument playing time between the students who practice more and their teachers. ($p = 0.04$). No statistically significant differences in the duration and frequency of breaks between the students and the teachers were detected. An important finding in the study concerns the assessment of the importance of physical and mental preparation in relation to the demands and needs of playing the music instrument. The teachers value the importance of physical and mental fitness higher ($p = 0.013$; $p = 0.000$), and at the same time they estimate the level of their own physical and mental fitness to be higher as well. According to the surveyed musicians, the assessment of their own health condition is significantly associated with a greater degree of fatigue during and after the completion of playing ($r = -0.537$, $p = 0.000$). 89.7 % of all surveyed musicians feel pain or discomfort in their body, among them 95.3 % of students and 73.3 % of teachers. The musicians state that the most common pain occurs in the back, neck, shoulder and wrists. 36.2 % of musicians, among them 41.9 % of the students and 20 % of the teachers reported about strains and injuries, either of physical or psychological nature. However, the reported injuries were not confirmed by a medical doctor. The most common strain reported by the musicians is stress, followed by tendinitis and tendon sheaths inflammation. Stress is connected to the occurrence of stage anxiety, the musicians report. The students reported a higher frequency and greater intensity of stage anxiety before performances compared to their teachers ($p = 0.003$; $p = 0.02$). As the most important preventive measures, musicians expose the acquired optimal technique of playing the instrument, adjusting the length of the individual playing abilities and adequate long breaks during practice. Regular physical exercise oriented either towards prevention or therapy helps improving medical health, general well-being and physical fitness (Bejjani, Glenn, & Benham, 1996; Ackermann, 2013; World Health Organization, 2010). Among all the

musicians involved in the study, 27.6 % of them engage in physical activity less than once a week. Based on the study results, we find significant differences between the strategies for instrument playing approaches between the students and their teachers. The teachers are more aware, not only of the technicality and specificity of the music, but also of the importance of and adequate physical and mental fitness. They are also more physically active and they express significantly lower frequency and intensity of stage anxiety of performances. Also, the teachers report a lower rate of pain and discomfort occurrences, as well as damage occurrences as a result of playing a musical instrument. Based on the mentioned study, we recommend that teachers include raising the awareness about risk factors of injuries in the learning process and that they teach students the basics of preventive action in the event of the occurrence of pain, discomfort and injury while playing.

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