



# MSA BUDVA 2017



UCG  
Univerzitet Crne Gore



14th International Scientific Conference on  
**Transformation Processes in Sport**  
**SPORT PERFORMANCE**

# BOOK OF ABSTRACTS

30th March - 2nd April 2017, Budva - Montenegro

# University of Montenegro



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**14<sup>th</sup> International Scientific Conference  
on Transformation Process in Sport “Sport Performance”**

**MONTENEGRIN SPORTS ACADEMY**

**30 March – 2 April 2017, Budva – Montenegro**

# **BOOK OF ABSTRACTS**

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## Welcome

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Dear colleagues and friends,

on behalf of the Montenegrin Sports Academy (MSA), I am aware of the distinguished honor to announce Budva, the metropolis of Montenegrin tourism, as the host city of the 14th International Scientific Conference on Transformational Processes in Sport, entitled "Sport Performance". I also wish to welcome academicians and students from all over the world on 30 March to 2 April, 2017.

Since the first event in Bar in 2003, the MSA Conference has been a huge success, providing a great opportunity to promote and develop Sports Sciences through networking, study and research. This year, under the traditional patronage of the Ministry of Science, the Ministry of Sport and the Ministry of Education and in collaboration with Faculty of Sport and Physical Education at University of Montenegro as well as Faculty of Sport and Physical Education at University of Novi Sad, International Science Culture and Sport Association from Turkey, Asian Exercise and Sport Science Association from Iran and European College of Sports Science, we have put together a high profile scientific programme with plenary and parallel sessions (oral and poster), accompanied by social events and free time to discover and enjoy the amazing city of Budva. The upcoming conference aims to contribute to the development of global approaches in the different specialized areas and to provide an even broader view of Sports Sciences. Hopefully, sport scientists will be able to find the best paths through the field.

We are confident you will enjoy the whole conference experience, the sharing of knowledge and contribution this will make to our institution and to our field of study and work.

Budva is an open city: open to the various people, to various cultures, to the world and to science. What better place in which to join forces in developing sport performances.

See you to Budva and Adriatic Coast!

Prof. Duško Bjelica, PhD  
Conference President





## Organization

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## Invited Presentations

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### **EFFECT OF TWO WEEKS SAND BASE INTERVAL TRAINING WITH BLOOD FLOW RESTRICTION ON AEROBIC PERFORMANCE AMONG YOUNG SOCCER PLAYERS AT TRANSITION PHASE.**

**Amani, AR.<sup>1</sup>, Sadeghi, H.<sup>2</sup>, Behi, A.<sup>1</sup>**

*<sup>1</sup>Shomal University (Amol, Iran), <sup>2</sup>University Putra (Seri Kembangan, Malaysia)*

**Introduction:** The purpose of current study is investigating effect of sand-interval Blood Flow Restriction Training on aerobic performance among young soccer players during transition phase of periodization. Several researchers have been reported improving some aspects of athlete's performance by blood restriction during exercise. Most of studies were focused on anaerobic power and capacity, muscle hypertrophy and muscle strength. Improving aerobic performance and preventing of downfall after competition phase are critical for many coaches and scientists. The current research has examined effect of low intensity sand base interval training on the aerobic performance during Bruce protocol. **Methods:** Twenty eight young male soccer players were recruited in this study. Subjects were randomly divided into three groups: control (CTL; n=9), Normal Interval without Kaatsu (NIWK; n=9), and Interval with Kaatsu (IWK; n=10). Exercise protocol was based on aerobic interval at 400 meters with maximum effort for 3 sets in per sessions (week one) and 4 set (week 2). Maximum oxygen uptake was measured during Bruce protocols with gas analyzer (Metalyzer). Burg's scale (16 points system) was applied to determining rate of perceived exertion (RPE) at the end of step 3 in Bruce protocol. **Results:** Statistical analysis of data has been shown that there is a significant difference [ $F(2, 25) = 13.349$ ,  $p = 0.000$ ] in aerobic power between groups at the  $p < .05$ . Post hoc comparisons using the benfroni test indicated that the mean of aerobic power was significantly different between all three groups. Statistical analysis also has been shown there is a significant difference [ $F(2, 25) = 7.243$ ,  $p = 0.003$ ] in rate of perceived exertion between groups at the  $p < .05$ . Post hoc comparisons using the benfroni test indicated that the mean of RPE was significantly different between CLT and NIWK and also between CLT and IWK groups. **Discussion:** This study has been shown that aerobic power and RPE was improved by both normal and BFR interval method. We also found that there is not significantly difference in NIWK and IWK group. These findings were consistent with the previous researches (Abe et al., 2010; González-Alonso & Calbet, 2003). This results may be explained by reducing intensity of exercise by subjects during exercise with BFR in cause of pain in their legs during exercise. The result of current study suggest that low-intensity, interval training with BFR improves aerobic capacity and RPE concurrently in young men. **References:** Abe, T., Fujita, S., Nakajima, T., Sakamaki, M., Ozaki, H., Ogasawara, R., . . . Yasuda, T. (2010). Effects of low-intensity cycle training with restricted leg blood flow on thigh muscle volume and VO<sub>2</sub>max in young men. *J Sports Sci Med*, 9(3), 452-458. González-Alonso, J., & Calbet, J. A. (2003). Reductions in systemic and skeletal muscle blood flow and oxygen delivery limit maximal aerobic capacity in humans. *Circulation*, 107(6), 824-830.

## **DON'T GO WITH THE FLOW- OCCLUSION TRAINING FOR HEALTH AND PERFORMANCE BENEFITS.**

**Stojanovic, D.M.<sup>1,2</sup>, Mikic, M.<sup>1</sup>, Ostojic, M.S.<sup>1,2</sup>**

<sup>1</sup>University of Novi Sad (Novi Sad, Serbia), <sup>2</sup>Center for Health, Exercise and Sport Science (Belgrade, Serbia)

Introduction: Occlusion generally involves application of a tourniquet, inflatable cuff or elastic wraps over the proximal portion of the arm or leg to restrict blood flow into the muscle, and occlude blood flow out of the muscle. Occlusion keeps all the metabolic products of exertion in the area which may increase muscle cell swelling, intramuscular anabolic/anti-catabolic signalling and muscle fibre recruitment, all beneficial for muscular adaptation. It also seems to stimulate the production of heat shock proteins, aiding in cell repair, affect Nitric oxide synthase-1 (which helps control blood pressure, insulin secretion, blood vessel growth and helps catalyze nitric oxide from L-arginine) and reduces myostatin as well. Although occlusion in the absence of exercise may attenuate atrophy during periods of unloading, in combination with exercise (named occlusion training) it has consistently been observed to result in improvements in muscle size and function. Results: A growing body of evidence supports the use of moderate occlusion combined with low load resistance exercise or low-workload aerobic exercise to enhance hypertrophic/strength responses and morphological/endurance/strength gains in skeletal muscle, respectively. Discussion: Occlusion training seems particularly applicable to elderly and rehabilitation participants who exhibit compromised strength and/or joint stability, individuals who would be unable to facilitate increased muscle mass and strength by more traditional training. In addition, numerous investigations have reported that occlusion training enhanced performance in healthy and athletic participants across a range of athletic tasks, including maximum strength, countermovement jump, repeated sprint ability, agility and aerobic shuttle run test. Low-load exercise (20–40 % 1RM) in conjunction with short inter-set rest periods (30–60 s) and relatively high training volumes (50–80 repetitions per exercise) appear to ensure a sufficient physiological stimulus is achieved. Brief periods of high frequency (twice daily) occlusion training has been proved to produce substantial hypertrophic and strength responses, causing no prolonged decrements in muscle function, muscle swelling, muscle soreness and elevation in blood biomarkers of muscle damage. However, while likely beneficial for both clinical and athletic population, there is currently no firm consensus amongst scientists and practitioners regarding the best practice for implementing occlusion training. References: Loenneke JP, Abe T, Wilson JM, Ugrinowitsch C, Bemben MG (2012). Blood flow restriction: how does it work? *Front Physiol*, 3: 392. Kubota, A., Sakuraba, K., Koh, S., Ogura, Y., and Tamura, Y. (2011). Blood flow restriction by low compressive force prevents disuse muscular weakness. *J. Sci. Med. Sport*, 14, 95–99. Scott BR, Loenneke JP, Slattery KM, Dascombe BJ (2015). Exercise with blood flow restriction: an updated evidence-based approach for enhanced muscular development. *Sports Med*, 45(3):313-25.

## **SPORT AS A TRANSFORMATIONAL PROCESS: A MULTIDISPLINARY AND BIOLCULTURAL APPROACH**

**Varela-Silva, I.<sup>1</sup>**

<sup>1</sup>Centre for Global Health and Human Development | National Centre for Sport and Exercise Medicine, School of Sport Exercise and Health Sciences, Loughborough University, LE11 8NN, UK

Introduction: Sport, in all its expressions, plays a fundamental role worldwide. It has the potential to promote development, improve the health of the populations, facilitate social inclusion, and build stronger

and more resilient societies (United Nations, 2005; UE, 2016; USAID, 2016). All sport outputs happen within a human context defined and constrained by biology and culture. Sport is a transformational process that acts at the individual, community, and global levels (The Open University, 2016). Because of its inherent complexity, new insights into sport research ought to be conducted using multidisciplinary and biocultural perspectives (Stember, 1991; Dufour, 2006; Wiley and Cullin, 2016). Methods: A systematic review of the literature was conducted focusing on sport research, societal transformations, and health outcomes using Scopus, PubMed, Sport Discus, Science Direct, and Google Scholar databases. Results/ Preliminary discussion: Most of the research on sport tends to be gender-biased, western-oriented, and with racially ingrained misconceptions that erroneously claim differences in performance based on skin-colour or purported geographic origin. These biases influence sport and health research and, in the long run, will perniciously affect sport outcomes at individual, community, and global levels. References: Dufour, D. L. (2006) 'Biocultural approaches in human biology.', *American journal of human biology*, 18 (1) United States, pp. 1–9. doi: 10.1002/ajhb.20463. Stember, M. (1991) 'Advancing the social sciences through the interdisciplinary enterprise', *The Social Science Journal*, 28(1), pp. 1–14. doi: 10.1016/0362-3319(91)90040-B. The Open University, C. 2016 (2016) 'Transformation Processes', in *Understanding Operations Management*. The Open University, p. 72. UE (2016) Mapping of good practices relating to social inclusion of migrants through sport, European Commission. Luxembourg: European Union. United Nations (2005) *Sport as a Tool for Development and Peace: Towards Achieving the United Nations Millennium Development Goal*. USAID (2016) *The role of sports as a development tool*. Silver Spring, MD. Available at: [http://pdf.usaid.gov/pdf\\_docs/Pnade352.pdf](http://pdf.usaid.gov/pdf_docs/Pnade352.pdf) (Accessed: 12 December 2016). Wiley, A. S. and Cullin, J. M. (2016) 'What Do Anthropologists Mean When They Use the Term Biocultural?', *American Anthropologist*, 118(3), pp. 554–569. doi: 10.1111/aman.12608.

## **FEMALE TURKISH ATHLETES IN OLYMPIC GAMES, HISTORY OF SOCIO-CULTURAL CHALLENGE.**

**Turkmen, M.<sup>1</sup>**

<sup>1</sup>*Bartın University (Bartın, Turkey)*

**Introduction:** The purpose of this study was to explore the representation level of Turkish female athletes in Olympic Games, and discuss the socio-cultural reasons affecting this representation level. **Methods:** The type of this study is a review article and used explanatory research method through a wide range of literature review and analysis of statistical results. **Results:** Turkish female athletes started appearing in Olympic Games since 1936 Games in Berlin, and have recorded many important results in the games during last few decades. The first female Olympian who received the first medal in Olympics was Hulya Senyurt, a judoka, who won bronze medal in 1992 in Barcelona. The first gold female medalist was Nurcan Taylan, who won the medal in 2004 in Athens in weightlifting. The second gold medalist was Gamze Bulut as she won gold medal in Athletics in 2012 in London, but her medal was cancelled because of doping abuse. Another pioneer female athlete is Nur Tatar, who won 2 medals in last two Olympic Games, one silver and one bronze in Taekwondo. It has been a big challenge for Turkish women to show off on Olympic stage, still hundreds of female athletes had chance to compete in Olympic games in last 80 years. **Discussion:** Although there is a serious increase in the number of female athletes participating to Olympic Games, there are very few athletes who succeeded to take medals in these competitions. When compared to male athletes, the limited number of female athletes can be interpreted through cultural and religious values of Turkish nation which is a similar case in most of the Muslim communities (Pfister, 2010).

Koca and Asci (2015), stated that there were significant differences in gender role orientations between Turkish female elite athletes and non-athletes which also depicted that sport participation caused a positive perception of gender in Turkish society. This study concluded that there is a two way interaction between socio-religious values and women's participation to organized sports, as sometimes religious women are restricted with the sport bye-laws (e.g. women wearing headscarves are banned from competitive sports [Koca and Hacisoftaoglu, 2011]) and sometimes religious attitudes banned women from participating to sport activities (Inal HS, 2011). References: Inal HS (2011). Women's and Girls' Sport in Turkey, *Women in Sport & Physical Activity Journal*, 2:2. Koca C, Asci H (2015). Gender role orientation in female Turkish athletes and non-athletes. *Women in Sport & Physical Activity Journal* 14.1 (Spring 2005): 86-94. Koca C, Hacisoftaoglu I (2011). Sport Participation of Women and Girls in Modern Turkey. in *Muslim Women and Sport* (ed. Benn T, Pfister G, Jawad H). Pfister G (2010). *Outsiders: Muslim Women and Olympic Games – Barriers and Opportunities*, *The International Journal of the History of Sport*, 16(18): 2925-2957.

## **IMPROVING SPORT ORGANIZATION PRODUCTIVITY THROUGH AUTONOMOUS EMPLOYEES.**

**Schneider, R.C.<sup>1</sup>**

*<sup>1</sup>The College at Brockport, State University of New York (Brockport, New York, USA)*

**Introduction:** The primary purpose of this paper is to offer a managerial approach to employee motivation that supports a consolidated hierarchy of motivational needs in the sport organization workplace that culminates in the high level need of autonomy, for the ultimate purpose of improving collective employee productivity, leading to enhanced sport organization outcomes. **Methods:** Employee motivation can be broadly achieved through management's thorough understanding and application of the consolidation of Maslow's Hierarchy of Needs (1943) and Berryman, Fink and Fink's (1996) Needs that Motivate, which when consolidated includes the following hierarchical motivational needs: physiological, safety and security, affiliation, equity, achievement, esteem, power, autonomy, and self-actualization. A literature based approach to the application of the "consolidated needs that motivate" to employees including but not limited to a sport organization setting is used to arrive at a process to increase overall organizational productivity. **Results:** The following seven employee prerequisites serve as a guide for sport managers to help determine employees who are qualified to assume the responsibilities that are characteristic of the type of independence that is emblematic of an autonomous employee: (a) having met the levels of motivational needs leading up to autonomy, (b) interests and intentions aligned with the mission, (c) unequivocal upper organizational respect, (d) trusted to operate independently, (e) transparent and open with management, (f) unshakable self-esteem, and (g) holding a true sense of inner-peace. **Discussion:** Sport organization's pursuit of organizational goals can best be met by employees when employees are motivated to excel and more particularly, excel autonomously on behalf of the organization. A sport organization that consists of high rates of employees who are qualified to operate autonomously is poised to be a beneficiary of the enhanced organizational production that is likely to result from Sultan's (2012) finding that autonomy is highly positively correlated to workplace motivation. The sport manager's ability to facilitate workplace productivity of which Martin (2004) speaks can take place by creating a work environment that supports employees' unique potential to master each of the levels of the consolidated motivational needs pyramid created from combining unique hierarchical needs from Maslow's Hierarchy of Needs (1943) and Berryman, Fink and Fink's (1996) Needs that Motivate. Ultimate ascension to and the meeting of the need for autonomy in the workplace can support the maximization of workplace productivity. **References:** None.

## Oral Presentations

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### Adapted Physical Activity

#### **THE EFFECT OF THERAPEUTIC RIDING ACTIVITIES ON THE MOTOR PERFORMANCE OF CHILDREN DIAGNOSED WITH CEREBRAL PALSY: A PILOT STUDY.**

**Akpinar, S.<sup>1</sup>, Ozcan, K.<sup>1</sup>, Ozyurt, G.<sup>2</sup>**

*<sup>1</sup>Nevşehir Hacı Bektaş Veli University (Nevşehir, Turkey), <sup>2</sup>Nevşehir City Hospital, (Nevşehir, Turkey)*

**Introduction:** One of the provided ways for the treatment of the inactivity for the disabled people is considered as Therapeutic Riding Activities. Equine assisted activities and therapies (EAAT) have emerged as a new method of treatment for children who are diagnosed different diseases, like autism and cerebral palsy (Bass et al., 2009; Kern et al., 2011). Cerebral palsy is a movement disorders that appear in early childhood. The symptoms can be different among people. Many studies mostly focused on social aspects of the therapeutic riding activities. Thus, the aim of the present pilot study was to find if therapeutic riding activities improve the motor performance of the arms in children diagnosed with cerebral palsy. **Method:** In this pilot study, 3 children (2 girls, 7 and 8 years old, and a boy 7 years old) participated ten-week therapeutic riding activities. Children with ASD in the experimental EAA group attended therapeutic horse riding sessions for 8 weeks. Each week consisted of an hour session. In each session, there were only two riders for the lessons. The content of the sessions were organized in a way that all activities met children's goals and objectives and also took their abilities into consideration. Those activities included both barn activities and riding sessions. In order to measure the children arms coordination patterns, a virtual reality environment setup was used. In this setup, children were asked to reach one of the three targets located in front of the body with either dominant or non-dominant hand. Two kinematic parameters were measured; accuracy and hand path deviation from linearity. The children were tested before and after the therapeutic riding activities. Parents signed the informed consent form to allow their children participate in this study. The consent form was in accordance with the Declaration of Helsinki as amended by the World Medical Association Declaration of Helsinki (World Medical Association, 2013) and was approved by the Ethics Committee of Nevşehir Hacı Bektaş Veli University. **Results:** The result displayed that children performed better especially with their left non-dominant arm at the post-test for both accuracy and hand path deviation from linearity. For the accuracy, left arm accuracy dropped from 1.6 cm to 1.2 cm. For the hand path deviation from linearity, left arm performance was dropped from 0.10 to 0.07. For both kinematic variables, right arm performance was not changed from pre- to post-tests. **Conclusion:** In conclusion, the current pilot study found the positive effect of therapeutic riding on children who are diagnosed with cerebral palsy. Thus, this kind of treatments should be provided to the children with this type of disease to improve their motor performance. This will be surely beneficial for them to improve their life quality. **References:** None.

## Anthropology

### PHYSICAL PERFORMANCE AND ANTHROPOMETRIC CHARACTERISTICS OF THE GERMAN NATIONAL RUGBY UNION 7S TEAM.

**Clijesen, R.<sup>1,2,3</sup>, Hohenauer, E.<sup>1,2,3</sup>, Rucker, AM.<sup>4</sup>, Kueng U.M.<sup>2</sup>, Stoop, R.<sup>1</sup>, Clarys, P.<sup>3</sup>**

<sup>1</sup>University of Applied Sciences and Arts of Southern Switzerland (Landquart, Switzerland), <sup>2</sup>University of Applied Sciences "Thim van der Laan" (Landquart, Switzerland), <sup>3</sup>Vrije Universiteit Brussel (Brussels, Belgium), <sup>4</sup>Doepfer Schulen (Regensburg, Germany)

Introduction: Rugby union is an internationally played contact team sport. The sport involves low-intensity aerobic exercises, combined with periods of intermittent, intensive anaerobic exercises (Brewer et al., 1995). Adequate follow-up of body composition and standardized physical fitness assessment of competitive rugby athletes is useful to guarantee optimal development of the player's position-specific physical performance profile and somatotype. The aim of this study was to describe the anthropometric and physical performance characteristics of the German rugby union 7s team. Methods: Seventeen male rugby players, classified as forwards (n=9; 24.2±2.1 years) and backs (n=8; 24.3±5.05 years) were assessed. Anthropometric measurements included: body height, weight, height to weight ratio (H/W), five skinfolds, biepicondylar humerus and femur breadth, upper arm- and calf girth, estimated lower body fat percentage and determination of the individual and mean somatotype. The physical performance tests included: sit & reach, handgrip strength, one minute sit-ups, one minute push-ups, vertical jump performance, peak power performance, bent arm hanging, 40-m sprint and the Yoyo intermittent endurance test. Results: The forward players were significantly taller (p=0.003), heavier (p=0.001) with a smaller H/W (p=0.009) compared to the backs. Humerus and femur bone breadths (p<0.05) and flexed upper arm and calf girths (p<0.05) were significantly different between the groups. Handgrip strength left (p=0.04), one minute sit-ups (p=0.03) and peak power output (p=0.015) were also significantly different between the groups. Discussion: The data indicate that German forward and back players have a similar somatotype and performance level. Several studies have shown that forward players tend to be taller and heavier compared to back players at elite and sub-elite levels (Crewther et al., 2012; Jarvis et al., 2009). A higher body mass of forward players could be advantageous in that their playing position is much more body contact intensive, and requires a significant amount of tackling. The nominative data of this study may assist other coaches to detect weak links in rugby specific athletic performance. References: Brewer J, Davis J, (1995). Sports Med, 20(3), 129-35. Crewther BT, Kilduff LP, Cook CJ, (2012). J Sports Med Phys Fitness, 52(1), 27-32. Jarvis S, Sullivan LO, Davies B, Wiltshire H, Baker JS, (2009). Res Sport Med, 17(4), 217-30

### MORPHOLOGICAL DEVELOPMENT OF CHILDREN IN EARLY ADOLESCENC.

**Elezi, A.<sup>1</sup>, Kastrati, A.<sup>1</sup>, Bytyqi, Xh.<sup>2</sup>, Elezi, G.<sup>3</sup>**

<sup>1</sup>University of Pristina "Hasan Prishtina" (Pristina.Kosovo), <sup>2</sup>Municipal Assembly (Rahovec, Kosovo), <sup>3</sup>American Hospital (Prisina.Kosovo)

Introduction: Considering all human development phases, the adolescence phase presents the fastest development phase in anthropological aspect. Adolescence is the age when the child faces with rapid physical differentiation, creates self-personality and style, creates his own social circle, becomes emotive,

falls in love, etc. Methods: The sample of this research is consisted from 240 students of masculine genre of Middle-High School “Selami Hallaqi” on Gjilan municipality, Kosovo. The students were divided in four groups. First group consisted of 60 students of 12 years of age, second group consisted of 60 students of 13 years of age, third group consisted of 60 students of 14 years of age and the fifth group consisted of 60 students of 15 years of age. These anthropometrical parameters were applied: Body height, arms wideness, length of leg, body weight, chest perimeter, arm perimeter, wrist diameter, elbow diameter, knee diameter, back under skin fat tissue, arm under skin fat tissue and stomach under skin fat tissue. For results processing, it has been applied the analysis of univariate and multivariate of variables. Results: In the beginning, the parameters of basic statistics and the delivery ones, were interpreted, and later the outcome results of analysis of univariate and multivariate of variables. Basic statistical parameters of anthropometrical variables especially those of body volume, show that, at the age of 12 and 14 years old there is a significant asymmetry on fat tissue and the body volume. Analysis of univariate and multivariate of variables, showed that the outcome differences on all anthropometrical variables between the groups are statistically valid  $p < 0.01$ . Discussion: The outcome differences between groups divided upon age on morphological development, show that the early adolescence age presents the fastest phase of physical development. The physical development can be understood as morphological and physiological complex formation and its mutual connection with factors of biotic and social environment of a person. All the processes that characterize physical development are correlatively conditioned with various actions of endogenous and exogenous factors (Kurelic et.al, 1975). It has been confirmed that under over nutrition conditions the puberty phase begins earlier, whereas concerning the malnutrition the puberty phase is delayed. (Misigoj-Durakovic.2008). References: Kurelic, N., Momirovic, K., Stojanovic, M., Sturm, J., Radojevic, Dj., Vickic-Stalec, N. (1975). Structural development and morphological and motor dimensions of youth. Belgrade. Institution for researches of Physical Education Faculty. Misigoj-Durakovic, M. (2008). Kin-anthropometry. Kinesiology faculty in Zagreb. Kosinac, Z. (1999). Morphological–motorical and functional development of child of prior school ages. Math and natural sciences faculty in Split, Croatia.

## **RELATION BETWEEN SUBCUTANEOUS FAT AND FUNDAMENTAL MOTOR SKILLS IN PRE-SCHOOL CHILDREN AGE 3- TO 6 YEARS.**

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Introduction: It is quite well known that excessive body fat in children is interpreted as a marker of inhibited physical activity and motor performance. This study aimed to establish whether severe impairment of fundamental motor skills (defined as performance under 5th centile of norms) were significantly more frequently identified in preschoolers' age 3-6 years with sum of four skinfolds higher than 85th centile of norms. Methods: Research sample consisted of 496 (females = 241, males = 255) preschoolers selected from specific district of Prague, Czech Republic. Subcutaneous fat was estimated from the sum of four skinfolds (triceps, subscapula, suprailliac and calf). MABC-2 was used for the assessment fundamental motor skills. Results: Sum of four skinfold and BMI >85th centile of Czech norms was found in 35,8% children, 61,7% within 15th – 85th centile, and 2,5% of children <15th centile of norms. Results revealed that children whose sum of skinfolds and BMI were higher than 85th centile of norms or lower than 15th centile had double the frequency of severe motor problems. Interestingly on the other hand we found no significant differences in the frequency of high above average performances >90th centile in MABC-2



between fat 8.4% and non-fat children 10,7%. Discussion: The finding of a higher frequency of motor difficulties in overfat pre-school children is in agreement with finding of Okely et al. (2004). In their research over-weight and obese pre-school children aged four and six years had double the frequency of the lowest mark on artificially established 5 point FMS scale in comparison to their non-overweight peers. However, beside that our results interestingly showed that not only a high amount of adipose tissue but also a very low amount of tissue may represent a predisposition for poor FMS performance. Further, in conformity with previous studies (e.g. D'Hondt et al., 2009; Morano et al., 2011) we found that overfat preschoolers generally scored significantly worse in FMS performance in comparison to proportionate fat peers. However, in this research differences in the total score and standard score between proportionate fat children and overfat children significantly differ only statistically  $p < 0.05$ . When the effect size (practical significance) was checked, no significant differences were revealed  $r = 0.11$  between the two groups. This finding is in contrast with the results from previous researches because the degree of difference in FMS performance between sub-samples classified according to the centile rank of BMI was much larger. For instance, the results in Logan et al. (2011) showed that children with BMI >85th centile had MABC-2 average centile score TTS PCT = 38.7 and children with BMI in the range between 25th – 85th centile TTS PCT = 60.7. It means the difference was 22 centile points. We therefore suggest that amount of body fat is not a clear predictor for the degree of fundamental motor skills. Reference: None.

## MORPHOLOGICAL CHARACTERISTICS OF TOP TURKISH JUNIOR FEMALE TENNIS PLAYERS.

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Introduction: The purposes of this study were to determine the anthropometric, body composition, and somatotype characteristics of elite Turkish junior female tennis players, and to compare their values with the normative reference group. Methods: Subjects were top national female junior tennis players ( $n = 12$ , age =  $15.9 \pm 1.1$  years) who participated in winter Fed Cup development camp in 2016. A total of 16 anthropometric variables (height, weight, eight skinfolds, four girths, and two breadths) were measured. BMI, body fat percentage (Siri, 1956), muscle mass percentage (Poortmans et al., 2005), sum of skinfolds (three, six, and eight), and somatotype components (Carter and Heath, 1990) were calculated accordingly. Results: The mean height and weight values of subjects were found as  $169.5 \pm 5.8$  and  $64.1 \pm 9.1$  respectively. The average scores for body composition parameters were as such;  $22.3 \pm 3.3$  for BMI,  $28.0 \pm 3.6$  for body fat (%),  $44.3 \pm 13.6$  for sum of three skinfolds,  $105.7 \pm 28.7$  for sum of six skinfolds,  $133.8 \pm 36.7$  for sum of eight skinfolds,  $38.9 \pm 2.1$  for muscle mass (%). The mean somatotype profile of the subjects was determined as meso-endomorphic (4.1 - 3.4 - 2.6). Discussion: Results were compared with the findings of the Sánchez-Muñoz et al. (2007) which investigated the morphological characteristics of best junior ( $n = 12$ , age =  $15.9 \pm 0.6$  years) female tennis players in the world. Comparison indicated that participants of the study are heavier (+ 2.1 kg) but shorter (- 0.5 cm) than their top ranked counterparts. They have higher values for BMI (+ 0.8 kg/m<sup>2</sup>), sum of six skinfolds (+ 3.5 mm), and sum of eight skinfolds (+ 9.5 mm). On the other hand, they have lower values for percentage of body fat (- 0.6), sum of three skinfolds (- 0.6 mm), and percentage of muscle mass (- 6.0). Results also revealed a discrepancy between the somatotype profiles. Dominant component of top ranked players was stated as mesomorph (3.7 – 4.6 – 2.9) by Sánchez-Muñoz et al. (2007) whereas participants of the current study were found as endomorph dominantly. In conclusion, this is the first study that analyzes the morphological features

of top Turkish junior female players. Results of the study mainly suggest and recommend strength and conditioning coaches of the top Turkish junior female players to dwell on increasing the percentage of muscle mass that may alter the body sizes of the players and consequently may boost their performances. References: Carter JEL, Heath BH. (1990). Somatotyping: development and applications. Cambridge, UK: Cambridge University Press. Poortmans JR, Boisseau N, Moraine JJ, Moreno-Reyes R, Goldman S. (2005). *Med Sci Sports Exerc*, 37(2), 316-322. Sánchez-Muñoz C, Sanz D, Zabala M. (2007). *Br J Sports Med*, 41(11), 793-799. Siri WE. (1956). The gross composition of the body. In: Lawrence JH, Tobias CA (Eds). *Advances in biological and medical physics*. New York, USA: Academic Press, Inc.

## Architecture and Urbanism

### NETWORK OF SPORTS FACILITIES IN TIVAT: POTENTIAL AND LIMITATIONS OF THE DEVELOPMENT OF THE SPORTS NETWORK.

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Introduction: Tivat is the youngest town on the Montenegrin coast. Its urban development began with the construction of the military arsenal (1889) during the Austro-Hungarian rule, around which a modern city began to develop. During the formation of its first urban structure, necessary surfaces and infrastructures for sport and recreation were developed. The first plans that were made (Hoffman's plan from 1936), recognized the importance of sports and recreational areas in the city, which are necessary for normal psycho-physical development of the population of Tivat. Method: Data analysis will be performed using the following scientific methods: method of analysis, comparison method, inductive-deductive method and the method of synthesis. Descriptive and normative methods were also used. Results: The potential for the development of sports activities in the town is great (linear conception along the coast, the morphology of the terrain - the convenience of flat terrain, climate, green areas, etc.). Undeveloped areas in the city account for nearly 76% of the land area of the municipality of Tivat, which makes it the Montenegrin city with the greatest potential for the development of sport and recreation. Discussion: The aim is to determine the existing network of sports facilities of various typologies (open and closed) in Tivat, whether such setting meets the needs of the population (permanent and temporary), and whether there are possibilities for transformation and expansion of the network of sports facilities. Typical seaside sports (water polo and swimming) are not sufficiently represented in sports infrastructure, and it is necessary to determine in what way it is possible to improve the network of indoor pools. References: None.

### ANALYSIS GYMS ASPECT ELIMINATING NOISE (SOUND BARRIERS) CASE STUDY IN THE CASE OF PODGORICA.

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Introduction: The paper presents analysis of three gyms in terms of detection and elimination of noise on the territory of Podgorica. Cases of areal survey samples and the size of the noise generated during the

use of spatial content sale of games and sports give specific results which can be compared with positive indicators of addressing the problems in the area of Europe. Through three characteristic elements of typological gym there are given certain guidelines for improving the condition of using the hall. Methods: Three typical examples of the gyms covered the area as the city of Podgorica will analyze the impact noise that is created using the same. The method is used based on statistics, mathematical analytics, observation, research and analysis that are based on direct measurement of the gyms. Results: Based on the conducted research, which are methodologically complex because they include statistically and mathematical apparatus that will receive the results on the basis of which will be given proper guidance to solve the problem of sound barriers that occur in space. The comparative method will be done ranking in relation to European standards analyzed samples typology of buildings. Discussion: The problem of noise generated by its direct use is increasingly present in our practice. Here is an example of three independent research units gymnasium in Podgorica, which actually meets the need with regard to their economic and social status, but the question is what kind of guidelines necessary to improve the working conditions in them in terms of the noise generated by the area. Continuous development and advancement of technology the material is going to meet to resolve these problems. References: Sport- und freizeitanlagen p1/76, Bundesinstitut für sportwissenschaft. Pravilnik o zvočni zaščiti stavb (1999). Uradni list RS, št. 14/1999. SIST EN ISO 3382-2 Akustika - Merjenje parametrov prostorske akustike - 2. del: Odmevni čas v običajnih prostorih (2008). Ljubljana: Slovenski inštitut za standardizacijo. Geraint J., Rod S. and Ben V.; STADIA: A Design and Development Guide, Elsevier, 2007. London. G.S. Popović, Urban parameters for planning the network of physical education facilities in Montenegro, Sport Mont br.40-42/XII, Podgorica 2014. Direktiva 2003/10ES (2003). Uradni list L 42/03, L 165/07, L 311/08. Dosegljivo 1.9.2012 na <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003L0010:20081211:SL:PDF>. Gregor Jurek in sodelivci, Analiza šolskoga športnega prostora s smernicami za nadaljnje investicije, univerza v Ljubljani, fakultet za šport, September 2012.

## **PLANNING NETWORK OF SPORTS FACILITIES IN THE NORTHERN REGION OF MONTENEGRO. CASE STUDY: MUNICIPAL KOLASIN.**

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Introduction: The purpose of this paper is to identify the potential of certain municipal centers, that is, recognition of the sports and tourist proper infrastructure, which represent the greatest potential of this region. Method: The material of this paper has been systematized so that sports that “products” architecture are covered, as well as sports that are based on natural phenomena and which are performed in open spaces, through the planning parameters of network development of sports facilities. Results: Through analysis of existing sports and recreational network, this paper provides guidelines for restricting of construction in the wider area of the city, giving priority to sports and recreational use. Due to the character of mountainous and favorable climatic conditions of the Municipality of Kolasin, of great significance is harmonization of the existing network of sports facilities (summer and winter sports) and planning positions for new facilities, which significantly influence the urban development of the city. Discussion: Areas for sport and recreation are areas that are intended for the development of sports and recreational facilities by a planning document. Reviving sports life through the development of sports and recreational zones on the level of municipal Kolasin, the potential of sports tourism will be increased during the whole year. Rehabilitation of sports facilities, which are used to represent the headquarters of

professional sports clubs, is a step in the realization of raising of physical culture of the city. Therefore, sports tourism reaches international character and becomes a potential catalyst for an identity framework of the population. References: Ilić, S. (1998). *Sportski objekti (Sports Facilities)*. Beograd: Građevinska knjiga, IBI -CAU Partnership (2011). *Spatial urban plan of the Municipality of Kolasin*. Podgorica.

## Biomechanics

### BODY SEGMENT PARAMETERS DURING GS TURN IN RECREATIONAL SKIERS.

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Introduction: The purpose of this study was to analyze the kinematic parameters of the body of the respondents, without competitive experience in skiing, in order to determine the competitive efficiency. Hraski and Hraski (2009), state that for every skier main goal is to perform turns, from start to finish, with as much as possible efficiency because the slightest error in the technique of skiing can affect the loss of speed and therefore the result. Mujanovic et al., (2014) state that the technique of skiing is undoubtedly an important factor for rational performance of movement. Methods: The participants in this research were 23 male students. Examinees were divided into two groups. Measuring instruments were the five body segment parameters during the giant-slamom turn. Video required for kinematic analysis was recorded with two digital cameras (Joerg et al., 2007), with calibration frame that allows precise calibration of space in the analysis (Huremovic et al., 2009). In order to determine whether there are differences between the groups, we used t-test. Results: The results of the Mean in used variables showed that the differences were in favor of faster examinees. Results have shown that the examinees differ on a statistically significant level in three variables. Discussion: The analysis of the results in this research has shown that there is a relation between the measured body segment parameters and duration of the course run. Gurshman (2005) says that the inclination of body is a movement of the entire body forward and inward in the direction of the center of the future turn. Schnellmann (2015) says if hip angulation is done properly, body mass above the pelvis moves laterally, towards the outside of the turn, shifting more weight to the outside ski for maintaining an edge grip. This is also a good indicator of the technical efficiency of subjects during the performance of turns, which may in the future be the parameters for determining the effectiveness of a technique of skiing. References: Gurshman, G. (2005). *Inclination as Integral Part of Modern Giant Slalom Technique*, Retrieved 05/15, 2015, from <http://www.youcanski.com/en/coaching/inclination.htm>. Hraski, z., Hraski. M. (2009.) *Influences of the skiers' body geometry on the duration of the giant slalom turn*, Science and skiing IV, Meyer and Meyer Sport (UK) Ltd. Huremovic, T., Biberovic, A., Pojskic, H. (2009). *Predictive value of kinematic parameters on the results of the long jump with students*. Sport scientific and practical aspects, 6(2). Joerg, S., Ruediger, J., Peter, S., (2007). *Motion Analysis using Contemplas – for applications in ski school*, Retrieved 02/15, 2014, from [http://www.contemplas.com/div/icss\\_2007\\_poster\\_ski\\_school\\_carving.pdf](http://www.contemplas.com/div/icss_2007_poster_ski_school_carving.pdf). Mujanovic, E., Atikovic, A., Nozinovic Mujanovic, A., Nurkovic, N. (2014). *Predicting students' performance in giant slalom*. Centr Eur J Sport Sci Med., 7(3): 45–54. Schnellmann, R. (2015). *Glossary Angulation*, Retrieved 06/15, 2014, from <http://www.yourskicoach.com/glossary/SkiGlossary/Angulation.html>.

## Health and Fitness

### EFFECT OF AN 8 WEEK JUDO COURSE ON MUSCULAR ENDURANCE, TRUNK FLEXIBILITY, AND EXPLOSIVE STRENGTH OF MALE COLLEGE STUDENTS.

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Introduction: Judo is a worldwide sport played as a main competition in the Olympic Games and World Championship for different age categories (Emerson et al., 2011). The level of physical fitness, tactical skills and techniques required in judo is high (Emerson et al., 2005) as it is a high intensity short exercise done in periodic manner (Fabrice et al., 2003). There are very few studies that find the effects of judo exercises on judo non-athletes. The purpose of the research was to determine the impact of an 8 week judo course on the muscular endurance, trunk flexibility, and explosive strength of male college students of King Fahd University of Petroleum and Minerals (KFUPM). Methods: 20 students had complete data after the course. Pre and post measurements were obtained for standing long jump, sit ups, and sit and reach. The data were tested for normality using the Shapiro-Wilk Test. Pre and post data which were normal were compared with paired t-test, while non-normal data were compared with the Wilcoxon Signed Rank Test. Statistical significance was set at 0.05. Results: There were statistically significant differences in all parameters with the following results:  $168.1 \pm 26.3$  vs  $183.2 \pm 30.5$  cm for standing long jump ( $p = 0.002$ , 95% CI = [6.3, 23.8]),  $24 \pm 6$  vs  $28 \pm 4$  repetitions for sit ups ( $p = 0.001$ , 5% CI = [2, 7]),  $23 \pm 8$  vs  $28 \pm 7$  cm for sit and reach ( $p = 0.004$ , 95% CI = [1, 7]). Discussion and Conclusion: Increase in values of standing long jump, sit ups, and sit and reach show evidence that the explosive strength, muscular endurance, and trunk flexibility of the students improved, respectively. Şengül (2011) also reported improvements in explosive strength in children after giving they underwent a judo program. Even though the participants were not judo athletes, there is evidence that the course improved some aspects of their physical fitness. References: Fabrice D, Pierre J, Edith F (2003). British Journal of Sports Medicine, 37(3), 245. Şengül D (2011). Asian Social Science, 7(9), 212-219. Emerson F, Fabrício BD, Karin AM, Guilherme GA (2011). Sports Medicine, 41(2), 147-66. Emerson F, Monica YT, Marian K, Stanisław S (2005). Biology of Sport, 22(4), 315.

### MOTOR ABILITIES OF YOUNG GIRLS ENGAGED IN RHYTHMIC GYMNASTICS AND MODERN DANCE.

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Introduction: The physical demands imposed on rhythmic gymnasts and modern dancers by choreographers and performance schedules make their physical fitness just as important to them as skill development (Angioi, et al., 2009). The purpose of this study was to compare motor abilities of younger school age female children (7-9 and 9-11) who attended rhythmic gymnastics classes with those who attended classes of modern dance. Methods: The subsample of examinees practicing rhythmic gymnastics was composed of 30 girls aged 7-9, that is, 35 girls aged 9-11, whereas the subsample of examinees practicing modern dancing was composed of 36 girls aged 7-9, that is, 40 girls aged 9-11. 16 motor skills tests were obtained for the purpose of assessing coordination, agility, explosive strength of lower

limbs, flexibility and balance. For the purpose of determining quantitative differences between the two groups of examinees, particularly concerning both age groups, multivariate (MANOVA) and univariate (ANOVA) analysis of variance were applied. Results: The results of the research showed a significant difference in the majority of motor variables at the level of statistical significance of  $p=0.05$  between the two categories of examinees especially in the older age group (9-11), showcasing better results with the girls engaged in rhythmic gymnastics. Discussion: The authors explain the findings as due to specific requirements of girls' competition in rhythmic gymnastics, as well as their everyday training process which is considerably more demanding than that of modern dance performers, thus resulting in higher-quality motor abilities. Rhythmic gymnastics and dance activity effects are also visible in psyche as it affects intellectual abilities, functional abilities, improves health and helps form numerous social values, enhances artistic creativeness and has an application in sports training, recreation and physical education lectures (Ladesic & Mrgan, 2007; Uzunovic, 2008; Angioi et al., 2009). References: Angioi, M., Metsios, S., Twitchett, E., Koutedakis, Y. & Wyon, M. (2009). Association Between Selected Physical Fitness Parameters and Aesthetic Competence in Contemporary Dancers. *Journal of Dance Medicine & Science*, Volume 13, Number 4. pp. 115-123(9). Jovanovic, S., Tesanovic, G., & Bosnjak, G. (2010). Speed, agility and explosive strength as components of jazz ballet dancers' training process. *Proceedings of the 5th International Congress Youth sport 2010*. Ljubljana. P. 229-233. Ladesic, S. & Mrgan, J. (2007). Ples u realizaciji antropoloskih zadaca tjelesne i zdravstvene kulture. [Dance in the implementation of the anthropological task of physical education.] Paper presented at 16. ljetna skola kineziologa Hrvatske, Porec, Croatia, June 19–23, 2007. Uzunovic, S. (2008). The transformation of strength, speed and coordination under the influence of sport dancing (Transformacija snage, brzine i koordinacije pod uticajem modernog sportskog plesa). *Facta Universitatis*, 6, 135–146.

## Motor Learning

### DIFFERENCES IN SOME MOTOR ABILITIES OF GIRLS ENGAGED AND THOSE THAT ARE NOT ENGAGED WITH AESTHETIC ACTIVITIES.

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Introduction: The research was conducted in order to determine the differences in some motor abilities between girls engaged and not engaged with aesthetic activities. Aesthetic activities are an essential part of the program therefore their use in school practice particularly preferred about what talking the research of many authors (Miletic, 1999; Nozinovic, 2005). Methods: Sample of subjects consisted of 62 girls' younger primary school age. For the assessment of some motor abilities, were taken variables of coordination in rhythm and frequency of movement (Srhoj, 2001; Miletic, 2006). In order to determine whether there t-test. Results: By analyzing the results of the t-test, it has been noticed that the examinees differ on a statistically significant level and that the differences are in favor of girls engaged with aesthetic activities. Discussion: The results point to the conclusion that girls engaged in with aesthetic activities have significantly better developed coordination skills as well as the frequency of movement which enables them to easily and quickly overcome everyday motion activities. It also points to the fact that the program of aesthetic activities they attending results in a certain level of improvement in motor abilities, which is confirmed by research (Jelavic Mitrovic et al, 2006; Delia et al, 2005; Ladesic, 2007)

about the development of coordination and flexibility. Therefore, the task is to act on the aforementioned and similar motor abilities with targeted exercises especially with musical accompaniment. References: Delija, K., Jelenic, A., Breslauer, N. (2005). Analiza razlika izmedju skupina ispitanica ukljucenih u razlicite kinezioloske aktivnosti. Zbornik 14. ljetna skola kineziologa, Hrvatski kinezioloski savez, Zagreb. Jelavic Mitrovic, M., Miletic, A., Dundic, M. (2006). Utjecaj motorickih sposobnosti na izvodjenje plesnih koraka u nastavi tjelesne i zdravstvene kulture. Zbornik 15. ljetna skola kineziologa, Hrvatski kinezioloski savez, Zagreb. Ladesic, S., Mrgan, J. (2007). Ples u realizaciji antropoloskih zadaca tjelesne i zdravstvene kulture, strucni rad, 16. Ljetna skola kineziologa Republike Hrvatske. Miletic dj. (1999). Factors of successfulness with folk dances. 4th Annual Congress of the European College of Sport Science, Rome, Italy. Miletic, dj., Mladineo, M., Bozanic, A. (2006). Realizacija ritma pokretom u funkciji kvalitete rada u nastavi tjelesne i zdravstvene kulture, 15. ljetna skola kineziologa Republike Hrvatske, Rovinj. Nozinovic, A., Nozinovic, Z. (2005). Metrijske karakteristike testova za procjenu sposobnosti realizacije ritma u plesu s ciljem homogenizacije grupa, Fakultet za tjelesni odgoj i sport, Tuzla, "SPORT- naucni i prakticni aspekti", 2(1); 27-31. Srhoj, Lj., Miletic, dj. (2001). Povezanost nekih motorickih sposobnosti i uspjeha u ritmickoj gimnastici i plesu, Zbornik radova 10. Ljetne škole pedagoga fizicke kulture RH, str.143, Porec.

## MOTOR DEVELOPMENT OF CHILDREN IN EARLY ADOLESCENCE PHASE.

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Introduction: Most of motor abilities and habits are developed only during childhood period, and those especially can be developed and on them can be influenced in favor manner from school age 7-15 year of age. In this period the structure of motor space gets built based on factors genetic factors and physical activities that influence on embezzlement and perfection of new motor elements and child development. Methods: The sample of this research is consisted from 240 students of masculine genre of Middle-High School "Selami Hallaqi" on Gjilan municipality, Kosovo. The students were divided into four groups. First group consisted of 60 students of 12 years of age, second group consisted of 60 students of 13 years of age, third group consisted of 60 students of 14 years of age and the fifth group consisted of 60 students of 15 years of age. These motor parameters have been applied: Running 30 meters with high start; High jumping from the spot; Hand tapping; Flexibility and bending of body forward. For results processing it has been applied the analysis of univariate and multivariate of variables. Results: In the beginning the basic statistical and delivery parameters were interpreted and then the outcome results from the analysis of univariate and multivariate of variables. Basic statistical parameters of anthropometric variables especially those of the body volume show that the age of 12 years old we can see a significant asymmetry of variability of flexibility, the age of 14 on variable of speed and resourcefulness and the age of 15 on variable of hand speed. The analysis of univariate and multivariate of variables show that the outcome differences on all of the motor variables between groups are statistically valid  $p < 0.01$ . Discussion: The outcome differences between divided group upon age on motor development show that the early adolescent period presents the most important period and the only one of the development of motor abilities. The period of 7-14 years of age is considered the best age for improvement of natural relative indexes of muscle strength and the relation height-weight as an important factor that which conditions the good sport results (Petkovic.1999). In order to have influence on motor abilities in a higher

scale, it is necessary, that with the process of transformation we start on early ages by respecting sensitive periods for development of certain characteristics and abilities. (Markovic.1997). References: Kurelic, N., Momirovic, K., Stojanovic, M., Sturm, J., Rdojevic, Dj. & Viskic-Stales, N. (1975). Structural development and morphological and motor dimensions of youth. Belgrade. Institution for researches of Physical Education Faculty. Petkovic, D. (1999). Anthropologic bases of success in sport gymnastics. University of Nis. Mrakovic, M. (1997), Introducing on systematic kinesiology. Faculty of physical culture in Zagreb. Croatia.

## Olympism

### HISTORICAL DEVELOPMENT OF THE OLYMPIC MOVEMENT.

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Introduction: The Olympic Movement is the term that covers all areas related to phenomenon of Olympism. History of ancient and modern Olympic Games, ethics, Olympic education, social development, good governance of the International Olympic Committee, Olympic solidarity, sustainability, legacy, sporting regulations, peace through sport and funding are some of the areas covered by this concept. Methods: The primary method applied in this research is the historical method, with an emphasis that implies heuristic, empirical and theoretical study of the origin and development of the International Olympic Committee and its functioning within the Olympic Movement. Special importance in the course of the study had the primary sources - information and reports collected from the Web site of the International Olympic Committee and the International Olympic Academy. Results: The research results indicate that the management of the IOC as a sports organization that operates such a gesture aimed at achieving the goal to contribute building a more peaceful and better world by educating young through sports in accordance with the Olympic values. Discussion: From its foundation until today, the Olympic Movement had to monitor and respond to many political, economic, sociological, technological and other challenges and changes during 20th and 21st century, to adapt and change within them, so the Olympic Games could be successful in all its determinants (Skempler, 2007; Škaro, 2012). Successful work of the IOC for the realization of their projects related to world peace, education, youth, equal inclusion of women in every aspect of the movement, their establishment and the Commission for Sport for All, Sport and the environment are facts indicating that the IOC has a significant impact on the values of the Olympic movement (Arnold, 1996; Defrantz, 1997; Šiljak, 2013). Conclusion: The International Olympic Committee during its existence confronted with many challenges that had to be overcome in the best possible way. IOC improved the sport with the correct management and has grown into the organization that is at the head of the Olympic movement. Today, the Olympic movement, next to equal participation of all athletes, provides programs of Olympic Solidarity, Education and others. Boycotts of the Olympic Games, the ban on the participation of women and professionals in the Olympics have long been overcome problems. References: Arnold, P. (1996). Olympism, sport and education. *Quest*, 48 (1), 93-101. Defrantz, A. (1997). The changing role of women in the Olympic Games. *Olympic Review*, Vol. 26, No. 15 18-21. Skempler, G. (2007). *Sport and Society - History, Power and Culture*, Belgrade: Clio, 103. Šiljak, V. (2013). *Olympism*, Belgrade, Alfa University; 10. Škaro, D. (2012). *Management of the Olympic Games*, Zagreb: Mate doo, '96.



## Other

### DIFFERENCES IN THE BODY COMPOSITION OF STUDENTS ACTIVE AND INACTIVE IN PHYSICAL EXERCISES.

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Introduction: Human body is very complex, and apart from genetic factor, body composition is influenced by many other factors. Goal of this research was to demonstrate if there are differences in body composition of students who are active and the ones who are not active in physical activities (sports). Methods: Population/sample in this research were 288 male students of College AAB from three different campuses placed in three different cities through Kosova. For the assessment of body composition the measure instrument Tanita BC-601 was used to measure 9 variables and one variable of height which is entered into the measurement devices before measuring as well as some other data. For the assessment of life style, i.e. presence of physical activity (sports) in active or recreational sense we used questionnaire with 20 questions of different type to determine life style. Results: Based on statistical processing of the data we came to conclusion that there is a difference between students who are active and the ones that are not active in physical activities and these differences are visible in three variables: spending of calories (KCAL) - DCI, body vitality - BMR and visceral fat – AVF. Out of 288 respondents 220 were active in physical activities while 68 of respondents were not physically active. Discussion: It was determined that there is statistical significant between two tested groups in body composition and in presence or lack of physical activities. Results obtained in the variable of daily consumption of calories (DCI) demonstrate that students who are physically active have increased need for calories since they need calories for burning when doing physical activities. (Mialich, 2014) Most of the university students studied were classified as being of normal weight according to the BMI, but the high levels of body fat mass detected should not be overlooked. In addition, even though most of the sample was considered to be active, according to the IPAQ, it can be seen that practically half the students (49.5%) were irregularly active or sedentary. Students that are active physically demonstrate better body vitality (BMR) which in simple terms means that the ones who are physically active are metabolically younger. References: Bubanj S (2013). Physical Education and Sport Vol. 11, No 3, 2013, pp. 197 – 208. Ghane M, Aghayari A, Mazreno AB (2014). International Journal of Pediatrics, Vol.2, N.4-3, Serial No.12. Mak, KK., Cerin, E., McManus, A.M. et al. Eur J Pediatr (2016). 175: 31. doi:10.1007/s00431-015-2586-5. Mialich MS, Covolo N, Vettori JC, Jordao AA (2014). Junior Revista chilena de nutrición, vol.41 no.1. Sukanta Saha (2013). Annals of Biological Research, 4 (3):95-100. Vasiljevic I, Bjelica D, Popovic S, Gardasevic J (2015). Journal of Physical Education and Sport ® (JPES), 15(3), Art 63, pp. 426 – 428. Zaccagni L, Barbieri D, Russo EG (2014). Journal of Translational Medicine, 12:120

## Physical Education and Pedagogics

### PHYSICAL EDUCATION EXPERIMENTAL PROGRAM TO TEST THE EFFECT ON PERCEIVED COMPETENCE.

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Introduction: The first purpose of this study was to test multidisciplinary and holistic experimental program in physical education program effect on the soul need perceived competence. The second purpose of this study was to analyze the relationship between attitudes of perceived competence in the experimental group before and after the application of program, mostly due the theoretical reason that if perceived competence proves significant than we can use experimental program as a tool for the flow experience and intrinsic motivation. Methods: The data was collected from 74 students of the 8th grade of elementary schools randomly divided in two groups (experimental participated in experimental program: 53; control participated in regular program: 21) during the spring semester of 2015. The system of variables consists of 4 items, modelled by five-point Likert scale, of perceived competence scale items (Williams & Deci, 1996). The t-test analysis was applied to test perceived competence attitudes before and after the experimental program. Results: The experimental group attitudes of perceived competence after the experimental program were significantly more positive than before participation in it, while control group attitudes of perceived competence decreased after participation in the regular school program. Discussion: The current findings support the authors' hypothesis that the multidisciplinary and holistic experimental program in physical education program has significant effect on the soul need perceived competence which is closest predictor of flow experience (Deci & Ryan, 2000) that is needed on a daily life basis among youth (Csikszentmihalyi, 2014). These findings were consistent with the previous evidences (Benson & Scales, 2011). However, this study applied multi-disciplinary experimental program which was designed on growth-mind set practices (Yeager & Dweck, 2012) and sparks findings (Benson & Scales, 2011) – both connected to flow experience and intrinsic motivation – to suggest future comprehensive program that could be potentially used as a regular tool for achieving both, flow and intrinsic motivation. Anyway, these findings with certainty provide a base for future necessity of qualitative research of the program effects on the intrinsic motivation. References: Williams GC, Deci EL (1996). Internalization of biopsychosocial values by medical students. *J of Pers and Soc Psy*, 70, 767-779. Deci E, Ryan R (2000). The “what” and “why” of goal pursuits. *Psy Inq*, 11, 227-268. Benson PL, Scales PC (2011). Thriving and sparks. Yeager DS, Dweck CS (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Edu Psy*, 47, 302-314. Csikszentmihalyi M (2014). Applications of Flow in Human Development and Education: The Collected Works of Mihaly Csikszentmihalyi.

### EFFECT OF A VOLLEYBALL COURSE ON HEALTH RELATED FITNESS COMPONENTS OF UNIVERSITY STUDENTS.

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Introduction: Physical educators need to evaluate the physical education (PE) curriculum they provide to their students. One way is through regular health-related fitness assessments. Physical education

programs have improved fitness levels of schoolchildren (Jarani et al., 2016; Siegrist et al., 2013). The aim of this study was to determine the effect of a volleyball course on the health-related fitness of male university students. Method: The students were non-PE majors from King Fahd University of Petroleum and Minerals. They registered for a volleyball course which was done twice a week for eight weeks (31 October-29 December 2016, 50 minutes per session). The parameters assessed were as follows: 1) body composition through body mass index (BMI), 2) muscular endurance through the 60s curl-up test, 3) flexibility through the sit and reach test, 4) leg explosive strength through standing long jump, and 5) cardiovascular endurance through a 1.6 km run. Pre and post measurements were taken and the data were analyzed using descriptive statistics and paired t-test with SPSS 16. P-values for statistical significance was set at  $<0.05$  while a Cohen- $d > 0.2$  was considered of practical significance. Results: Data from 145 students were analyzed (mean (SD) age = 20.8 (0.64) years). There was a statistically significant improvement from pre to post in all variables. The improvements in all variables except BMI were practically significant. Discussion: The data shows evidence that the volleyball course improved the health-related fitness variables of the students. This shows a course designed for non-PE majors may improve their fitness levels if well designed. References: Jarani J, Grøntved A, Muca F, et al. (2016). *J Sports Sci*, 34(1), 35-46. Siegrist M, Lammel C, Haller B, Christle J, Halle M (2013). *Scand J Med Sci Sports*, 23(3), 323-330.

## **DIFFERENCES BETWEEN STUDENTS OF TWO DIFFERENT STUDY PROGRAMS IN ASSESSMENT OF WATER SPORTS TEACHING STANDARD.**

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Introduction: Water sports is one of the regular subjects on the Faculty of Kinesiology of the University of Zagreb. Curriculum is realized through theoretical, theoretical-practical and practical teaching. Organization of field teaching consists of transportation to the teaching location, accommodation, food, material-technical conditions and professional staff. With the aim of improving the quality of teaching, from year 2001 anonymous questionnaire is conducted among students. Results of the questionnaire show high satisfaction rate of the teaching realized (Oreb and assoc. 2009), and differences in opinion towards sailing according to the sex (Oreb and assoc. 2010.) The aim of this research was to determine if there is a difference in assessment of pedagogical-material standard of Water sports teaching between students of „old“ study program (2001-2007) and students of Boulogne program (2010-2015). Methods: The research was conducted on 2400 examinees, students of the Faculty of Kinesiology on the University of Zagreb. Through the anonymous questionnaire students have assessed twelve variables on a five grade Likert type scale. Assessed variables: travel arrangements, accommodation, food, teachers, assistants, boats, climate, curricula of sailing, sailboard, rowing and kayaking. By means of arithmetic mean a difference was determined between assessment of students of Boulogne program and that of the students of „old“ program. Results: It is determined that there is a difference in assessment of students of „old“ study program and the students of Bologna study program. Arithmetic mean for „old“ study program is 4, 15, while for the Bologna study program it is 4, 46. Discussion: Students of the „old“ study program had Water sports class on their last, fourth year of study, in 8th semester, while in the Bologna study program Water sports are included in the third year of study, during the 6th semester. Students of Bologna study program have assessed overall realization of Water sports teaching by higher average mark than students of the „old“ program. The reason for this is improvement of the teaching quality, and more

serious approach of the Bologna program students due to the location of the class in the middle of study, not at the end of study, as was the case with the students of the „old“ program. References: Oreb, G., Kostanovic, D. i Prlenda, N. (2010). Razlike izmedju studenata i studentica u stavu prema jedrenju. *Proceedings* (2), 259-266. Oreb, G., Baresic, M., Oreb, I., Prlenda, N., Kostanic, D. (2009). Stavovi i interesi studenata i studentica Kinezioloskog fakulteta prema prakticnoj nastavi sportova na vodi. U M. Andrijasevic (ur.). *Upravljanje slobodnim vremenom sadrzajima sporta i rekreacije*. Zagreb: Faculty of Kinesiology of the University of Zagreb, 177 –184.

## SPORT PERCEPTION IN CHILDREN'S PICTURES.

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Introduction: Drawing is one of the most effective and important ways of communication. Experts indicate that it is possible to learn the child's cognitive, emotional and psychomotor development, thoughts and content through her drawings (Artut, 2006). Methods: The sample of the study consists of 75 children between ages of 11 and 14 (n=39 girls, n=36 boys) studying in Golcuk Regional Boarding Secondary School during 2016-2017 educational year. The universe of study consists of 90 children. At the beginning of the research, a brief interview was held in the classroom environment with the children about sports, the places where sports activities were done, sportsmen, and the children were informed about the study. In the research data drawing technique was used and students asked to write down behind the papers what they described in their paintings. The obtained data were grouped according to the drawings of the children and analyzed by descriptive analysis method. The data obtained from population divided in sex, percentage, number in the study evaluated by chi-squared test. Results: As a result of the research; children drew a picture of football, basketball volleyball and others (parachute jumping, car racing, ice-racing branches) and running. In the pictures, children illustrated themselves with friends, sportsmen, sports teams, children, adults, families and trainers/teachers. Children mostly used sports fields, outdoor, indoor, grass area/pitch, sun, clouds and sky as a model when they drew a picture. In pictures sunny cloud and sky, grass, forest, bird and butterfly, flowers used with sports field by children, and women painted more bird and butterfly than men. Main colors, intermediate colors, intermediate cold and intermediate warm colors were seen in pictures. Also, children used smiley faces, serious, unhappy face, violence anger and complex feeling in their pictures. Discussion: It was seen that the children used red, yellow, orange, green, blue, purple colors and the presence of joyful and smiling faces in children's drawings has supported understandings that children are happy. Burkitt and Newel (2005) found that happy children often choose yellow and orange colors in their pictures. Burkitt and et al. (2003) found that the children used the most preferred colors in the lovely and beautiful figures, used the least preferred colors in ugly, bad figures and they used moderate colors in figures if they are neutral. References: Artut, K. (2006). *Sanat Eğitimi Kuramları ve Yöntemleri* (5. Basım b.). Ankara: Anı Yayıncılık. Burkitt, E., & Newel, T. (2005). Effects of human figure type on children's use of colour to depict sadness and happiness. *International Journal of Art Therapy*, 10(1), 15-22. Burkitt, E., Barret, M., & Davis, A. (2005). Drawings of emotionally characterised figures by children from different educational backgrounds. *International Journal Of Art & Design Education*, 24(1), 71-83.

## Physiology

### DIFFERENT PHYSIOLOGICAL RESPONSES AFTER PARTIAL-BODY CRYOTHERAPY (-135°C) AND COLD-WATER IMMERSION (10°C).

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<sup>1</sup>University of Applied Sciences and Arts of Southern Switzerland (Landquart, Switzerland), <sup>2</sup>University of Applied Sciences "Thim van der Laan" (Landquart, Switzerland), <sup>3</sup>Vrije Universiteit Brussel (Brussels, Belgium), <sup>4</sup>University of Portsmouth, (Portsmouth, United Kingdom)

**Introduction:** Various external cooling modalities, including cold-water immersion (CWI) and partial-body cryotherapy (PBC), are well established in the fields of sports, medicine and physiotherapy. Although the use of these extreme cold applications are popular, only few studies have directly compared the different physiological effects of CWI and PBC. The aim of this study was to examine the physiological and subjective effects of CWI (10°C for 10 min) and PBC (-60°C for 30 seconds, -135°C for 2 min). **Methods:** Healthy male participants (n=19) volunteered in this study and received either a CWI (n=10) or a PBC (n=9) treatment. Baseline measurements included anthropometric measurements, assessment of muscle oxygen saturation of the right thigh (SmO<sub>2</sub>), skin microcirculation of the left thigh (laser speckle contrast imaging), local skin- and tympanic temperature, and thermal comfort and sensation. All outcomes were recorded for 60 min after the treatments. **Results:** SmO<sub>2</sub> was significantly (p<0.05) lower only after CWI (84±10%) compared to PBC (95±5%) up to 40 min. Directly after the treatment, a more exaggerated (p=0.001) hyperaemic response was observed following PBC (147±33%) compared to CWI (119±32%). Thigh skin microcirculation was lower (p<0.05) following CWI (74±19%) compared to PBC (98±12%) up to 30 min. The skin temperature of the lower extremities remained significantly (p<0.05) lower only in the CWI group up to 40 min (thigh) and 60 min (shin) but not in the PBC group. The participants in the CWI group felt significantly (p<0.05) colder compared to the participants in the WBC group. **Discussion:** These results indicate that exposure to PBC and CWI causes dissimilar physiological effects on all observed parameters. CWI showed the potential to significantly lower SmO<sub>2</sub>, skin- microcirculation and temperature vs. PBC. It is postulated that reduced cell metabolism leads to a decrease of the inflammatory tissue reaction (White, 2013). These findings are in line with previously published studies (Costello et al., 2014; Solinaik et al., 2015) and might help to further understand the different physiological mechanisms after these two methods to achieve specified therapeutical or medical goals. **References:** Costello JT, McNamara PM, O'Connell ML, Algar LA, Leahy MJ, Donnelly AE (2014). Arch Exerc Health Dis, 4, 243-250. White GE, Wells GD (2013). Extreme physiology & medicine, 2, 26. Solianik R, Skurvydas A, Pukenas K, Brazaitis M (2015). Cryobiology, 71, 112-118.

## Psychology

### THE PRECISE MECHANISM UNDERLYING THE ANXIETY-PERFORMANCE IMPAIRMENT IN A DART THROWING TASK.

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**Introduction:** With specific regard to the hypothesized effects of anxiety on performance, the theory of conscious processing (Masters, 1992) and the theory of ironic processes of mental control (Wegner,

1994) are largely indiscriminate. That is, both theories propose that anxiety impairs efficient functioning of processing thoughts, which leads individuals to focus on thoughts that will be detrimental to their performance. However, an important difference between the theories is that Wegner's (1994) theory predicts that performance when anxious will break down in a precise manner. The precision of that hypothesized performance breakdown in a dart-throwing task when anxious is the focus of the present research. Method: The sample comprised 67 individuals (44 men, 23 women; Mage = 23.05, SD = 4.16). Performance measured using a dart-throwing task employing a regulation dartboard and darts. Participants responded to poster adverts and had no previous darts experience ( $n = 23$ ) or had played darts fewer than 10 times ( $n = 44$ ). To measure physiological arousal, heart rate and heart rate variability recorded using a Polar RS800CX heart rate monitor. Additionally, Mental Readiness Form-3 (Krane, 1994) administered to measure cognitive anxiety. Results: When instructed not to miss in a specific direction on the dartboard, anxious performers did so a significantly greater number of times ( $t_{66} = 4.75, p < .001$ ). Importantly, there was no difference in non-ironic error (all  $t$ s  $< 1, p$ s  $> .5$ ), which provides a specific support for Wegner's theory in a performance setting. Especially, when anxious, participants performed not only more ironically but also performed more precisely in the to-be-avoided zone than when they were not anxious. Discussion: The primary purpose of the study was to examine the precision of ironic errors in a performance setting. As hypothesized, in the high-anxiety condition, compared to the low-anxiety condition, participants' ironic error hits were significantly farther from the target zone and significantly farther into the ironic error zone. In other words, when anxious, participants performed ironically, and more precisely ironically (Woodman et al., 2015). The present research demonstrates that ironic performance errors is a meaningful and robust potential concern for performers who are required to perform under pressure. The most parsimonious applied implication for performers who suffer from ironic effects of performance is to help them control their anxiety. References: Krane, V. (1994). *The Sport Psychologist*, 8, 189-202. Masters, R. S. W. (1992). Knowledge, knerves and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, 83, 343- 358. Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review*, 101, 34-52. Woodman, T., Barlow, M., & Gorgulu, R. (2015). *The Sport Psychologist*, 29, 213-223. Doi: <http://dx.doi.org/10.1123/tsp.2014-0114>.

## Rehabilitation

### LEVEL OF FUNCTIONAL MOVEMENT SCREEN OF ATHLETES IN DIFFERENT SPORT TYPE AND NON-ATHLETES.

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Introduction: The first objective of this study was to determine the Functional Movement System -FMS of athletes, as a basis to predict injuries in sports. Another purpose of the study was to compare the FMS results with the results of non-athletes, and to determine statistically significant differences between them. Methods: The study included 107 subjects aged  $20 \pm 6$  months, of which 37 football players, 32 basketball players and 38 non-athletes. FMS is used screening system of evaluation and assessment structure movement is used, tested from 7 basic movement patterns which require a balanced relationship between agility and balance. Results: The results showed that there were no statistically significant differences found between groups in any of analyzed FMS variables. Totals FMS result shows that the average results are between marks 15 to 17. Discussion: The results of the total FMS indicate that there

is no greater risk of injury to the locomotive apparatus, which is a reference value equal to or smaller cumulative score of 14 (Kiesel, Plisky, Butler, 2011). A total of eight subjects has a lower composite rating of 14, and only one examinee 11, which is an extremely low score and meets only in the elderly (Mitchell, Johnson, Vehrs, Feland, Hilton 2015). On a similar sample of other researchers (Sprague, Mokha, Gatens, 2014; Bawang, 2015; Schneiders, Davidsson, Hörman, Sullivan, 2011) confirms that the results of this study are moving in the expected values. References: Bawang, R.J.G. (2015). Corrective Exercises on the FMS scores of Athletes. Master's Thesis, Graduate School of Sport Coaching Science: Chinese Culture University. Kiesel, K., Plisky, P., & Butler, R. (2011). Functional movement test scores improve following a standardized off-season intervention program in professional football players. *Scandinavian Journal of Medicine & Science in Sports*, 21, 287-292. Mitchell, U., Johnson, W., Vehrs, P., Feland, B. & Hilton, S. (2015). Performance on the Functional Movement Screen in older active adults, *Journal of Sport and Health Science*, 1-7. Schneiders, A.G., Davidsson, A., Hörman, E., & Sullivan, S.J. (2011). Functional movement screen normative values in young, active population. *The International Journal of Sports Physical Therapy*, 6(2), 75-82. Sprague, P.A., Mokha, G.M., & Gatens, D.R. (2014). Changes in Functional Movement Screen Scores over a season in collegiate soccer and volleyball athletes. *Journal of Strength and Conditioning Research*, 28(11), 3155-3163.

## Sociology

### FACTORS DETERMINING RESOCIALIZATION OF CONVICTS AS THE MEMBERS OF JEOPARDIZED SOCIAL GROUPS AND THEIR SOCIAL INCLUSION.

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Introduction: Through the working process with convicts it is essential to find the nature of resocialization process development and recognize the organizational and personal factors that are significant for efficient management in the sphere of the treatment. That is why it is necessary to make an overview of the current institutional system in Republic of Serbia. Methods: The data was collected from randomly selected 250 convicts in Vojvodina. The system variables consists of 32 items, modeled by fifth-point Likert scale of attitudes and beliefs and six demographic items that were modified from Boskovic (2002) original items to fit each area, while doing the research we came across useful information regarding this topic. This research emphasizes on a critical perception of the subject, in order to give a more realistic comprehension of the current situation in Republic of Serbia and recognize its weaknesses. Based on gained experience, this research also enables us to build a framework for the best possible cooperation between penalty institutions and convict's social inclusion. Results: Resocialization is a complex, multidisciplinary and at the same time a deep process. Scientifically, this project has a satisfying level of innovation, while it has lighted up the path to new approach in labor management, having in mind such specific work environment as it is in prison. Also, it has enabled us to gain a deeper insight in the process of resocialization with its up-to-date treatments, such as working process, leisure time, cultural and educational program, special rights of prisoners, freedom of religion, as well as their impact on resocialization of the prisoners. Social value of this project is reflected in large amount of documented data that enables better understanding of the present situation in prisons across Vojvodina. Discussion: Scientifically, this project has a satisfying level of innovation, while it has lighted up the path to new approach in labor management, having in mind such specific work environment as it is in prison. Moreover, it has enabled us to gain a deeper

insight in the process of resocialization with its up-to-date treatments, such as working process, leisure time, cultural and educational program, special rights of prisoners, freedom of religion, as well as their impact on resocialization of the prisoners. Furthermore, the research would lead us to a clear image of the relation between independent variables (organizational and personal characteristics) and dependent variables. References: Boskovic M., Radoman B. (2002) Penology, University of Novi Sad, Faculty of Law, Novi Sad, pg. 28-40. djukanovic B., Bukelic J., Dimitrijevic I., Stojovic Z., Knezevic-Tasic J., Besic M. (2001), Illusion of reality-alcohol and drugs, Podgorica, pg. 5-7. Milosavljevic M. (1997), Social issues, social deviations and social work, Social thought, Belgrade.

## Sport Management

### UTILIZATION OF RESEARCH OUTPUTS IN ELITE SPORT IN CZECH REPUBLIC.

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Introduction: The purpose of this study was to analyse the situation regarding the existence of structural factors for access, dissemination and the extent to which research outputs are used by elite sport in Czech Republic. Suggesting the measures for improvement the study contributes to current studies on this topic (Martindale & Nash, 2013; Reade et al., 2008; Kilic & Ince, 2015, De Bosscher et al., 2015). Methods: The data was collected in national context, employing two instruments. For inventory of 8 critical success factors (SPLISS, pillar 9) the desk research and content analyses were applied. On line surveys among elite athletes (n=93) and elite coaches (n=20) were conducted during the winter of 2015/2016 using the relevant part of standardized SPLISS questionnaire. Results: Key weaknesses in relation to SPLISS Pillar 9 in Czech Republic are linked to non-existence of specialised units which would collect and analyse data and look at application of science in elite sport and lack of strategies for active dissemination, search for and use of scientific information related to training activities for the development of elite athletes. The applicability of scientific research, new technology developments and innovation as well as opportunities for their use is considered by coaches as average. Majority of elite athletes was not able to rate this at all. Discussion: The results from this study confirmed that the situation with regard to coordinated approach to the organisation and dissemination of research and scientific information into elite sport in Czech Republic is very similar of what it can be found in majority of studies related to the this topic (Kilic&Ince,2015). Therefore it suggests that for effective transfer of sport science outputs into elite sport the appropriate extent of institutionalization (Peters, 2000) and communication strategies between the academia and practice for removing the barriers in knowledge transfer must be in place. References: De Bosscher, V., Shibli, S., Westerbeek, H. & van Bottenburg, M. (2015). SUCCESSFUL ELITE SPORT POLICIES. An International comparison of the sports policy factors leading to international sporting success (SPLISS 2.0) in 15 nations. Aachen: Meyer & Meyer. Kilic, K. & Ince, M.L. (2015). Use of Sports Science Knowledge by Turkish Coaches. International Journal of Exercise Science 8(1):23-27. Martindale, R. & Nash, C. (2013). Sport science relevance and application: Perceptions of UK coaches. Journal of Sports Sciences, 31(8):807-19. Peters, B.G. (2000) Institutional Theory: Problems and Prospects 2000 by the Department of Political Science, Institute for Advanced Studies (HIS). Reade. I, Rodgers. W& Hall, N. (2008). Knowledge Transfer: How do High Performance Coaches Access the Knowledge of Sport Scientists? International Journal of Sports Science & Coaching 3(3):319-34.



## Sport Statistics and Analyses

### COMPETITION EFFICIENCY ANALYSIS OF CROATIAN JUNIOR WRESTLERS IN EUROPEAN CHAMPIONSHIP 2016.

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Introduction: Following excellent results last few years, our wrestlers have a constant in winning medals at junior and U23 European Championship. Croatian junior National team won a bronze medal at the European Championship 2016 year. Considering the potential of our wrestlers there is an obvious need of technical and tactical analysis so our junior and U23 wrestlers would be able to achieve even better results. Notation analysis (also called “Match Analysis”), which uses means to record critical events (movements, situations, interactions, techniques and tactics, even intervention of referees) in that performance can be quantified in a consistent and reliable manner (Lopez-Gonzalez, 2013). Notation analysis for this paper will determine score efficiency, technical (defensive and attacking) and tactical structure as well as competitive efficiency at the European junior wrestling Championship in 2016. Methods: Match analysis were conducted by LongoMatch 0.20.1. Seven matches of Croatian wrestlers were analyzed. Time parameters, score efficiency, technical efficiency and tactical structure were observed. Each field was analyzed from the aspect of attack and defense phase and successful/unsuccessful techniques. This paper shows descriptive parameters and competitor efficiency were calculated. Results: The results show a great number of positive score in a standing position in relation to parterre position. The parameters of competitive efficiency (0.49 points per minute) show better attacking efficiency (1,32 points per minute) in relation to defense efficiency (0,83 points per minute). Discussion: Comparing Croatian and Hungarian national team, attacking efficiency is better while defense efficiency is significantly lower. Croatian wrestlers achieve less score per minute in relation with elite wrestlers (Tünneman, 2013), but it is visible a significant progress in technical and tactical efficiency in relation with previous research (Slacanac at al., 2016) in the past three year. References: Lopez-Gonzalez, E.D. (2013). Wrestler’s performance analysis through notation techniques. *International journal of wrestling science*, 3:2, 68-89. Slacanac, K., Baic, M., Karnincic, H., Sunjerga, R., Penjak, A. (2016). Effects of technical efficiency parameters on placing of Croatian wrestling national team members in World championships 2013. *International scientific conference “Effects of physical activity application to anthropological status with children, youth and adults (book of abstracts).* Page: 147. Tünnemann, H., (2013). *Analysis of the World championships 2013 in Greco-Roman Wrestling.* Almada: Fédération Internationale des Luttes Associées.

## Sports Medicine

### USE OF ACUPUNCTURE IN SPORTS MEDICINE AMONG TOP CHINESE ATHLETES.

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Introduction: TCM – Traditional Chinese Medicine is official medical system in P.R. China. Most commonly method of TCM is acupuncture. Acupuncture usage in sports medicine in P.R. China is not limited only to hospital since 1960’s but competing athletes as well. During athletes career acupuncture is

performed for various reasons to all P.R. national and Olympic team members. Acupuncture is mostly used to treat both chronic and acute injuries and illnesses with traditions lasting centuries. Since 1980's many researches are conducted about acupuncture in sports medicine and is being evaluated for an influence on human performance. Objective: The aim of this study was to investigate the effect of acupuncture on P.R. China national and Olympic team members following their results, investigate musculoskeletal injuries, mental readiness and finally athletic performances after receiving acupuncture treatments. Methods: Published literature from year 2000 until 2015 was reviewed based on research literature from Journal of Traditional Chinese Medicine Sciences, Journal of Beijing University of TCM, Journal of Tianjin University of T.C.M. Asian sports medicine journal, PubMed and Medline research network. Published literature was reviewed based on inclusion criteria of acupuncture and sports medicine use among athletes in P.R. China. Totally 1000 articles were included in this study. Results: Acupuncture showed to be very effective in pain reduction, faster rehabilitation resulting in faster healing of injuries and mental readiness. Also it has shown that acupuncture treatment follow up exercises need precaution from team trainer or sports couch. Increases in exercise capacity and decreased heart rates were also seen with acupuncture treatment. Discussion: Acupuncture has been proven legal and safe, with few major side effects when administered correctly. After reviewing numerous studies pertaining to sports injuries Acupuncture seems to have a prevalent use in pain perception. Numerous trials concluded that acupuncture is capable of increasing range of motion. The effects of acupuncture on athletic performance pertaining to muscular strength saw significant results in strength increases. Many studies found significant increases in exercise capacity and performance along with a decreased heart rate. Increases in flexibility were only seen when acupuncture was combined with stretching protocols. References: Acupuncture and eastern healing therapies. Retrieved from The World of Sport and Science: <http://www.faqs.org/sports-science/A-Ba-and-timeline/Acupuncture-And-Eastern-Healing-Therapies.html>. Acupuncture/sports medicine. Journal of Beijing University of T.C.M. database 2000 – 2015. Retrieved from [http://en.cnki.com.cn/Journal\\_en/E-E056-JZYB-2016-03.htm](http://en.cnki.com.cn/Journal_en/E-E056-JZYB-2016-03.htm). Acupuncture/Sports medicine. Journal of Tianjin University of T.C.M. database 2000 – 2015 [http://en.cnki.com.cn/Journal\\_en/E-E056-TZYY.htm](http://en.cnki.com.cn/Journal_en/E-E056-TZYY.htm)

## **IMPACT OF PLYOMETRIC TRAINING ON ANAEROBIC POWER OF BASKETBALL PLAYERS TAKING EDUCATION AT PRIVATE HIGH SCHOOL.**

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Introduction: Aim of our research was to analyze whether plyometric training applied to basketball players have impact on anaerobic strength, anthropometric measurements of basketball players taking education at private university and playing basketball in school team. Methods: 16 male-student basketball players, aged 14-16 from different private schools in Denizli, voluntarily participated in research to investigate impact of plyometric trainings for eight weeks during summer vacation period between July-August 2016. Before training and tests a brief information was given to all participants. Wingate anaerobic test was used to determine anaerobic performance and capacity of subjects, and to measure quadriceps and hamstring strength isokinetic dynamometer was used (IsoMed®2000). Body compositions of participants were assessed with Tanita BC 418 MA device and their waists and hips were measured with measuring tape. Paired t-tests statistical analysis were used to analyze pre and post-performance variables of subjects. Results: The results of research showed a significant difference at 60°, and 180° Nm values measured with isokinetic dynamometer (PTNDQ, PTDQ, PTDH, PTNDH at 60°, and 180°)

in plyometric group, ( $p < 0.05$ ), but, there was no significant difference in control group ( $p < 0.05$ ). We did not find significant difference between pre-test and post-test values of research group and control group in body fat percentage, fat amount, BMI, body weight amount (kg), fat free weight (FFW), estimated muscle mass of participants calculated with Tanita BC 418 ma ( $p < 0.05$ ). Significant difference realized between pre-test and post-test by performing Wingate test (peak power, average power) in plyometric group ( $p < 0.05$ ), but in control group no significant difference was detected ( $p < 0.05$ ). Discussion: The results of this research showed that plyometric trainings have positive influence in basketball players' anaerobic strength. According to the comparisons of pre-test and post-test of Wingate test a significant difference was found by taking plyometric exercise noted by Akçınar (2014). Duda mentioned that significant increases were obtained in anaerobic power after plyometric training in volleyball and basketball players. Gür found that anaerobic power increased with the plyometric training applied to the research group consisted of young male footballers. Sagıroglu (2012) found that the values of the anaerobic power and capacity values of plyometric exercise groups showed statistically significant improvements. Akçınar Not seeing any significant difference in body fat percentage, fat amount, BMI, body weight amount (kg), fat free weight (FFW), estimated muscle mass appropriated to literature. Plyometric training must be executed in basketball training to achieve important targets in shorter time. Reference: None.

## Training and Testing

### **CORRELATION BETWEEN PHYSICAL DEVELOPMENT, FUNCTIONAL CAPACITY, AND PHYSICAL CAPACITY INDICATORS OF KAYAK ATHLETES RACING 1000 M DISTANCES.**

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Introduction: Athletic result of kayak athletes engaged in 1000 m distance races is determined by many different indicators. This study is aimed at exploring the correlation between physical development, functional capacity, and special capacity of skilled kayak athletes racing 1000 m distances. Methods: The analysis covers the data of 30 case studies of the Lithuanian national team of kayak athletes. There were 14 key indicators used, which vary as physical loads applied in kayak athletes training adapt. Pearson's correlation coefficient was applied to the search for correlation between the indicators. Results: The body weight of kayak athletes has a very strong relation with the muscle mass, a strong relation with the hand force and pulmonary ventilation at a critical intensity threshold. Muscle mass has a reliable relation with ventilatory anaerobic threshold power output and an inverse reliable relationship with hemoglobin concentration indicators. Heart rate after standard physical load has a strong inverse relationship with the pulse oximetry indicators at a critical intensity threshold. Relative VO<sub>2</sub> max indicators have a very strong relation with VO<sub>2</sub> anaerobic threshold indicators, while VO<sub>2</sub> relative indicators within the anaerobic threshold have a very strong relation with the power output. Discussion: Thus, research revealed that the muscle mass of kayak athletes (1000 m) has no reliable relation with the critical intensity threshold output of special work. Since 1000 m distance kayak race activities last for 3-4 min and during the course of this work the intensity approximates a critical intensity threshold. The preparation of such indicators could be programmed, the significance of individual characteristics and informativeness of research data could be assessed more properly following a thorough analysis, assessment of their contribution into

the qualification of kayak athletes, and clarification of correlation between them (Borges et al., 2015, Hamano et al., 2015, Balciunas, 2013). Thus, the data of our research affords ground for taking a new look into the training of kayak athletes specializing in 1000 m distance races and the upbringing of individual characteristics. References: Balciunas E (2013). Preparation of Lithuanian Elite Kayak rowers. Doctoral theses. Vilnius. Hamano S, Ochi E, Tsuchiya Y, Maramatsu E, Suzukawa K, Igawa S (2015) Relationship between performance test and body composition/physical strength characteristic in sprint canoe and kayak paddlers. Open Access J of Sport Med. 6. 191-199. Borges T, Dascombe B, Bullock N, Coutts A.J (2015) Physiological Characteristics of Well-Trained Junior Sprint Kayak Athletes. Int J of Sports Phys and Perform. 10(5). 593-599.

## LEVEL OF SPRINT ACCELERATION AMONG YOUNG SOCCER PLAYERS.

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Introduction: The aim of the study was to determine the level and differences of sprinting acceleration among elite soccer players in two youth age categories. Materials and Methods: The research group consisted of U19 and U17 category soccer players competing in the highest Czech leagues in respective age categories. Acceleration speed parameters were measured using the acceleration speed test at 5 and 10 meters from a stationary start position. Results: The results revealed a significant difference in acceleration speed for the 5 m test. The older players (U19) achieved better performance ( $1.084 \pm 0.014$  s) in comparison with the U17 category ( $\Delta v = 0.066$  s, 5.74%). This difference was significant ( $p < 0.05$ ). For the doubled distance (10 m), we detected a significant difference in acceleration speed in the monitored groups. Just as for the 5 m test, the older players (U19) achieved better performance ( $1.838 \pm 0.016$  s) compared with their younger counterparts from the U17 category. This difference was significant ( $p < 0.01$ ). Discussion: Compared with youth players from other studies (thus, from other countries and teams), it is necessary to realize that the differences in performances may be attributed to various factors such as different training methods, length of participation in the training process and categorization into higher age categories. Villanueva et al. (2011) states that compared with anthropometric characteristics, the biological maturity level of players is a very important determinant, which significantly impacts the test results. Therefore, we believe that it is an important factor to consider when evaluating and comparing results of individual age categories. Sporis, Jukic, Ostojic and Milanovic (2009) emphasize the importance of considering field positions of players that were examined in individual studies. Furthermore, the performance levels of players are important because several studies (Comfort, Bullock & Pearson 2012) identified differences between elite players and players at lower performance levels. The results may be beneficial for sport practice, especially for clinical staff, fitness coaches, soccer coaches and sports rehabilitation coaches. References: Comfort, P., Bullock, N., & Pearson, S. J. (2012). A comparison of maximal squat strength and 5-, 10-, and 20-meter sprint times, in athletes and recreationally trained men. *The Journal of Strength & Conditioning Research*, 26(4), 937-940. Mendez-Villanueva, A., Buchheit, M., Kuitunen, S., Douglas, A., Peltola, E., & Bourdon, P. (2011). Age-related differences in acceleration, maximum running speed, and repeated-sprint performance in young soccer players. *Journal of Sports Sciences*, 29(5), 477-484. Sporis, G., Jukic, I., Ostojic, S. M., & Milanovic, D. (2009). Fitness profiling in soccer: physical and physiologic characteristics of elite players. *The Journal of Strength & Conditioning Research*, 23(7), 1947-1953.

## KICK SKILLS IN YOUNG ELITE CZECH SOCCER TEAM.

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**Introduction:** The aim of this study was to classify kick skills in young elite Czech soccer team. Velocity and accuracy are the most crucial components of soccer kick and determine the successful shooting on the goal. Kicking technique is very important and it is necessary to realize that speed and accuracy of kick are influenced by several mechanisms and factors (Barfield, Kirkendall & Yu, 2002). Position of the supporting leg is very important because the supporting leg is considered to be responsible for body stabilization and it is assumed that it has a positive effect on kicking performance (Lees, Asai, Andresen, Nunome & Sterzing, 2010). **Material and method:** In this study, we monitored group of 20 professional soccer players of U19 category. Speed of kicking was verified using a Stalker ATS radar gun and the ball accuracy measured using 2D kinematic analysis. **Results:** The average velocity of the ball by the best instep kick trail was  $108.8 \pm 7.5$  km.h<sup>-1</sup>. The average distance between the ball and centre of the goal was  $62.6 \pm 28.3$  cm in the best trials. In case of the fastest kicks, we found a negative trend in the relationship between speed and accuracy  $r = -0.17$  ( $p > 0.05$ ). On the contrary, in trials with lowest speed there was a positive relationship between the variables  $r = 0.34$  ( $p > 0.05$ ). **Discussions and conclusions:** Results showed high stability of kicking speed regarding dominant leg. On the contrary, the parameter of kick accuracy revealed high variability. The research showed that the most accurate kicks were found at speeds between 90-102 km.h<sup>-1</sup>, which is approximately 80-90 % of maximal kicking speed. **References:** Andersen, T. B., & Dorge, H. C. (2011). The influence of speed of approach and accuracy constraint on the maximal speed of the ball in soccer kicking. *Scandinavian Journal of Medicine and Science in Sports*, 21(1), 79-84. Dicks, M. & Kingman, J. (2005). The effect of altered ball approach on kick kinematics and shot accuracy: A soccer case study. *Journal of Sport Sciences*, 23, 99-100. Kellis, E., & Katis, A. (2007). Biomechanical characteristics and determinants of instep soccer kick. *Journal of Sports Science & Medicine*, 6(2), 154-165. Lees, A., Asai, T., Andersen, T. B., Nunome, H., & Sterzing, T. (2010). The biomechanics of kicking in soccer: A review. *Journal of Sports Sciences*, 28(8), 805-817. Lees, A., & Nolan, L. (2002). Three-dimensional kinematic analysis of the instep kick under speed and accuracy conditions. In Spinks, W. (ed.), *Science and football IV*, London, Routledge. Muller, C., & Brandes, M. (2015). Effect of Kinesiotape Applications on Ball Velocity and Accuracy in Amateur Soccer and Handball. *Journal of Human Kinetics*, 49(1), 119-129. van den Tillaar, R., & Ulvik, A. (2014). Influence of Instruction on Velocity and Accuracy in Soccer Kicking of Experienced Soccer Players. *Journal of Motor Behavior*, 46(5), 287-291.

## EFFECTS OF REPETITION FAIL RESISTANCE TRAINING ON STRENGTH IN YOUNG MALE ADULTS.

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**Introduction:** There are some previous research that shown repetition fail resistance training has influence on maximal strength. Therefore, the purpose of this study was to examine affection of repetition fail resistance training on maximal strength in young male adults. **Methods:** Thirty four trained male participants ( $22.9 \pm 1.8$  years) completed 12 weeks training program with 4-week familiarization period

and 8-week resistance training to repetition fail with submaximal loads (80–95% of 1 repetition maximum, 1 RM). There were four training sessions per week. Four strength tests were used for assessment of maximal strength for 1RM: bench press and behind the neck shoulder press as absolute strength tests, and deep squat and pull-ups as relative strength tests. Results: T-test for paired samples was applied to determine differences between the initial and final measurements, and there was significant difference with  $p < 0.01$  in every of four variable, both absolute and relative strength tests. Graphical trend display indicates that curve has not identical accrual of results between different tests. Discussion: The results of this investigation showed that repetition fail resistance training is highly effective for trained male athletes in gaining and maximizing strength performance, although strength accrual is not the same in each variable, probably due to different window period length of strength accumulation for different muscle groups. References: Drinkwater, Eric J., Trent W. Lawton, Rod P. Lindsell, David B. Pyne, Patrick H. Hunt, and Michael J. McKenna. "Training leading to repetition failure enhances bench press strength gains in elite junior athletes." *Journal of Strength & Conditioning Research*, 2005. Looney, David P., et al. "Electromyographical and perceptual responses to different resistance intensities in a squat protocol: does performing sets to failure with light loads produce the same activity." *Journal of Strength & Conditioning Research*, 2016: 792-799. Sampson, J. A., and H. Groeller. "Is repetition failure critical for the development of muscle hypertrophy and strength." *Scandinavian Journal of Medicine and Science in Sports*, 2015. Schoendfeld, Brad J., Mark D. Peterson, Dan Ogborn, Bret Contreras, and Gul T. Sonmez. "Effects of low vs. high-load resistance training on muscle strength and hypertrophy in well trained men." *Journal of Strength & Conditioning Research*, 2015: 2954-2963. Willardson, Jeffrey M., Layne Norton, and Gabriel Wilson. "Training to failure and beyond in mainstream resistance exercise program." *Strength & Conditioning Journal*, 2010: 21-29.

## IS IT POSSIBLE TO MEASURE THE BALANCE IN FEMALE AIR PISTOL SHOOTING WITHOUT USING A WEAPON?

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**Introduction:** The coaching and scientist literature reports that the shooters with better static balance have an advantage when it comes to performance (Mon et al., 2014). Body and COP movements have been shown to be closely related to the pistol's movements (Pellegrini & Schena, 2015). Most of the shooting tests found in the literature aimed to measure the COP movements are performed by use of the shooters' real own pistol. However, it would be interesting to have an appropriate measurement tool, able to be carried out at any place. The study objective is to validate the use of a dumbbell to simulate pistol in female Olympic air pistol shooting. **Methods:** The protocol consisted of two static bipodal balance tests during competition: A) Shooting simulation whereby a 1.5 kg dumbbell was used and B) Actual shooting test with their own competition pistol. The COP movements on the X (anterior-posterior) and Y (medium-lateral) axes were recorded by use of a portable force platform. Both tests were repeated three times. The duration of each test was 15 seconds with a maximum resting period of 1.5 minutes. **Variables:** Maximum COP displacements on the X and Y axes, COP total area displacement, average and maximum COP velocities on the force platform plane, average and maximum COP velocities on the X and Y axes. Principal and secondary axes length of the ellipse. **Results:** The analysis of the Pearson product moment correlations for the variables referring to the movement of the COP revealed statistically significant correlations between both tests for all variables  $p < 0.01$ . Pearson values oscillated between

R=0.7-0.98. Discussion: Regarding the validity of the dumbbell shooting simulation test, the statistical analysis revealed Pearson correlation values between 0.7 y 0.98: moderate to strong (0.7-0.88) for the variables that correspond to COP movements amplitudes, and excellent (0.82-0.98) for the variables that correspond to COP movements velocities (Fleiss, 1986). This justifies the use of a dumbbell to simulate a pistol in female Olympic shooting, see also (Mon et al., 2014). Conclusion: The use of a standard, cheap and affordable object such as a dumbbell could be valid to simulate a pistol in female Olympic shooting; this allows COP movement measurements to be carried out anywhere (in places such as schools, for example) for females and young talent selection purposes too. References: Fleiss, J. L. (1986). *The design and analysis of clinical experiments*: Wiley Online Library. Mon, D., Zakyntinaki, M. S., Cordente, C. A., Monroy Antón, A., & López Jiménez, D. (2014). Validation of a Dumbbell Body Sway Test in Olympic Air Pistol Shooting. *PLoS ONE*, 9(4), e96106. Pellegrini, B., & Schena, F. (2005). Characterization of arm-gun movement during air pistol aiming phase. *J Sports Med Phys Fitness*, 45(4), 467-475.

## EFFECTS OF CREATINE SUPPLEMENTATION AND HEAVY RESISTANCE TRAINING ON MORPHOLOGICAL CHARACTERISTICS OF YOUNG ADULTS.

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Introduction: Creatine supplementation has become a common practice among professional, elite, collegiate, amateur, and recreational athletes with the expectation of enhancing exercise performance. The purpose of this study was to examine effects of creatine supplementation in combination with heavy resistance training on anthropometric parameters and body composition of young male adults. Methods: Fourteen male adults ( $22.5 \pm 0.8$  years), participated in this study and were randomly assigned to ingesting creatine-monohydrate (5g per day - after training) group CR (n=9) and control group K (n=5). The training program contained four training sessions per week and lasted 12 weeks. Anthropometrics and body composition were measured before and after the training program. For assessment of anthropometric parameters and body composition following variables was used: body weight, chest circumference, waist circumference, upper leg circumference, upper arm circumference, abdomen skin fold thickness and m.triceps brachii skin fold thickness for anthropometrics, and fat free mass, fat mass, total body water and muscle mass for body composition. Two-way analysis of variance with repeated measures was used to establish significant differences between subjects over time. Results: Both CR and K group involved improvements in body weight, chest circumference, waist circumference, upper arm circumference, m.triceps skin fold thickness and muscle mass ( $p < 0.05$ ), but no group or interaction effects were observed ( $p > 0.05$ ), with exception in muscle mass that is significantly improved in CR group compared with K group. There were no significant differences in upper leg circumference, abdominal skin fold thickness, fat free mass, fat mass, BMI, and total body water. Discussion: The main findings of present study indicates that creatine supplementation affects only muscle mass, but heavy resistance training had effects on anthropometric parameters for all subjects. References: Balsom, P.D., B. Ekblom, K. Soderlund, B. Skodin & E. Hultman. Creatine supplementation and dynamic high-intensity intermittent exercise. *Scandinavian Journal of Medicine & Science in Sports*. 8:247-251, 1998. Earnest, C. P., P. G. Snell, R. Rodriguez, A. L. Almada, and T. L. Mitchel. The effect of creatine monohydrate ingestion on anaerobic power indices, muscular strength and body composition. *Acta Physiol. Scand.* 153:207-209, 1995. Goldberg, P.G. and P.J. Bechtel. Effects of low dose creatine supplementation on strength, speed

and power events by male athletes. *Medicine and Science in Sport & Exercise*. 29:S251, 1997. Ostojic, S. Creatine Supplementation in Young Soccer Players. *International Journal of Sport Nutrition and Exercise Metabolism*. 14:95-103, 2004.

## EFFECTS OF CREATINE SUPPLEMENTATION ON MAXIMAL STRENGTH IN MALE ATHLETES.

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**Introduction:** Creatine monohydrate has become very popular supplement among professional, amateur and recreational athletes in gaining strength. Therefore, the purpose of this study was to examine influence of creatine monohydrate oral ingestion on maximal muscle strength in male athletes in 8-weeks period. **Methods:** Fourteen male participants ( $22.3 \pm 1.1$  yr) were randomly assigned to 2 groups: experimental group (CrM, N = 9), who consumed 20 g/day creatine (Cr) for 1 week and 5g/day Cr for 7 weeks, and control group (K, N = 5). CrM group used creatine monohydrate during 8 weeks of strength training (80 – 90% of 1 repetition maximum (1RM), 4 sets, 8-12 repetition, 4 days/week). Control group went only through strength training. Participants were measured in four strength tests for 1 RM: bench press, deep squat, pull-ups and behind the neck shoulder press before creatine consumption and strength training, and again after 8 weeks. **Results:** Because of significance difference in initial measurements, univariate analysis of covariance (ANCOVA) was used to analyze. There was significant difference between CrM and K group in strength in variable deep squat (F: 23.449;  $P < 0,01$ ), pull-up ( F: 20.118;  $P < 0,01$ ) and behind the neck shoulder press ( F: 8.440;  $P < 0,05$ ) after 8 weeks of training program. However, bench press did not reach significance between groups. **Discussion:** Although bench press did not differ significantly, there were great strength increase in all variables after experimental program in both groups. Therefore, creatine supplementation is highly beneficial in enhancing muscle strength performance during high load resistance training. **References:** Becque, Daniel M., John D. Lochmann, and Donald R. Melrose. "Effects of oral creatine supplementation on muscular strength and body composition." *Physical Fitness and Performance*, 2000. Kreider, Richard B. "Effects of creatine supplementation on performance and training adaptations." *Molecular and Cellular Biochemistry*, 2003: 89-94. Rawson, Eric S., and Jeff S. Volek. "Effect of creatine supplementation and resistance training on muscle strength and weightlifting performance." *Journal of Strength & Conditionig Research*, 2003. Syrotuik, Daniel G., Gordon J. Bell, Robert Burnham, Lorraine L. Sim, Robert A. Calvert, and Ian M. Maclean. "Absolute and relative strength performance following creatine monohydrate supplementation combined with periodized resistance training." *Journal of Strength & Conditionig Research*, 2000. Volek, Jeff S., et al. "The effects of creatine supplementation on muscular performance and body composition responses to short-term resistance training overreaching." *European Journal of Applied Physiology*, 2004: 628-637.



## MORPHOLOGICAL CHARACTERISTICS OF YOUNG DANCERS DEPENDING ON THE COMPETITIVE CATEGORY.

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**Introduction:** The group of female esthetic sports like artistic and rhythmic gymnastics, ballet and an artistic theatrical expression of dancing pose high specific demands upon the functional, energy, motor and psychological capacities of athletes; but also upon the size, body build and composition of the performers, particularly of elite level females (Misigoj-Durakovic, 2012). The aim of this paper was to define the specific morphological types of competitors on the basis of determining the differences in morphological characteristics of girls aged 7-15 years, engaged in modern dance, depending on the particular competitive category. **Methods:** The sample respondents consisted of 135 girls aged 7 to 15 years, divided in three competition categories (solo/duo, group and formation). For the realization of the objective of this study, a battery of eight anthropometric measures was applied, which, largely, estimate the voluminosity and mass of the body, as well as the subcutaneous adipose tissue of the respondents, as they can be influenced by the means of physical exercise to the fullest extent. **Results:** Based on multivariate analysis of variance (MANOVA) results, statistically significant differences (on the highest level of statistical inference, i.e.  $P=0.00$ ) between anthropometric variables' systems of the three groups were determined. The results of univariate analysis of variance (ANOVA) indicate that there are differences between respondents in majority of examined anthropometric variables on the level of statistical significance of  $p=0.05$ , especially in variables for evaluation of body voluminosity and subcutaneous adipose tissue. **Discussion:** The research results show that, in order to succeed in competitive categories with a small number of dancers performing (solo/duo as well as group), it is necessary to have, inter alia, specific morphological structure characterized by smaller volume of all body segments, especially smaller amount of subcutaneous adipose tissue. This clearly led the authors of this paper to the conclusion on which morphological type of girls is desirable for successful engagement in modern dance, depending on the competitive category the respondent is engaged in, as confirmed by the results of some other studies (Steinberg et al., 2008; Popovic et al., 2014). **References:** Misigoj-Durakovic, M. (2012). Anthropometry in premenarcheal female esthetic sports athletes and ballerinas, in Handbook of anthropometry, V. R. Preedy, Ed. New York: Springer, 1817-1836. Popovic, B., Madic, D., Spasic, A., Radanovic, D., stajer, V., Aleksic-Veljkovic, A. (2014). Morphological characteristics of younger school age girls different physical involvement. 1st International scientific conference „Research in Physical Education, sport and health“. Vol. 3, No. 2, pp. 99-104. Steinberg, N., Siev-Ner, I., Peleg, S., Dar, G., Masharawi, Y., Hershkoviz, I. (2008). Growth and development of female dancers aged 8-16 years. American Journal of Human Biology, 20 (3), 299-307.

## EFFECTS OF EXPERIMENTAL VOLLEYBALL RULES QUANTIFIED BY JUMPS, NUMBER OF HITS AND CONTACTS.

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**Introduction:** This study determined the influence of new rules tested at the first U23 Men's Volleyball World Championship (21-point set except in 5th set; 15 seconds between rallies: 10 seconds from finished

point to whistle for serve and 5 seconds to serve) on number and types of jumps and number of contacts and hits. Methods: The analysis comprised 25930 jumps, 15706 contacts and 10224 hits during 36 matches played by 144 males aged under 23 ( $M = 21.1 \pm 1.4$  years) at the U23 Men's World Championships in Uberlandia, Brazil, conducting two investigations: 1) Analysis of jumps for Jump Float Serve (JFS), Jump Spin Serve (JSS), attack, setting and block by In-game role and Level of set win (Walkover, Balanced, Tough); 2) Analysis of contacts (reception, setting, block, defense) and hits (serve, attack) by In-game role and Set outcome. Pearson's Chi-Square test was used to test individual subsamples. Significance between means established for specific elements in specific subsamples was tested using the T-test and One-Way ANOVA. Results: Investigation 1 - Jump frequency was: attack (33%), block (32%), set (16%), JFS (12%) and JSS (7%). Significant differences ( $p = 0.000$ ) were found between in-game role and jump type, as Middle blocker performed the most (34.7%), followed by Outside hitter (24.9%), Setter (24.6%) and Opposite (15.8%). Investigation 2 - Hit number and type showed significant differences between set Winner and Loser teams only for serves by Setter ( $p < 0.001$ ) and Middle blocker ( $p < 0.05$ ). Contact by set Winners and Losers showed significant differences for Opposite ( $p < 0.05$ ) and Middle blocker ( $p < 0.05$ ) in block and Libero in reception ( $p < 0.05$ ). Discussion: This age group competes successfully in the highest men's volleyball leagues internationally. Sheppard et al. (2007), Sheppard et al. (2009) and Vilamitjana et al. (2008) identified Middle blocker as the predominant performer of jumps in block and attack, agreeing with our study. Vilamitjana et al. (2008) reported the highest jump percentages in block (37.9%) and attack (21.7%), also agreeing with our study. The results showed major differences in jumps, hits and contacts between in-game roles: Middle blocker was the most frequent jumping position, followed by Outside hitter and Setter. Libero showed a new tendency of being Setter with a jump after the initial Setter defense action. References: Sheppard JM, Gabbett TJ, Stanganelli LR (2009). *J Strength Cond Res*, 23(6), 1858–1866. Sheppard JM, Gabbett T, Taylor K, Dorman J, Lebedew AJ, Borgeaud R (2007). *Int J Sports Physiol Perform*, 2(3), 292–304. Vilamitjana JJ, Soler D, Barrial JM, Del Grecco P, de Oca MM, Rodríguez F (2008). *Med Sci Sports Exerc*, 40(5), S383.

## MUSCLE POWER DURING STANDING AND SEATED TRUNK ROTATIONS WITH DIFFERENT WEIGHTS.

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Introduction: There is considerable debate on effectiveness of seated vs standing resistance exercises. Though seated exercises are more stable and safer, these seems to be less effective than standing resistance exercises. This is especially true for trunk rotations with an additional load. If the weight is heavy, the use of legs can help to execute the exercise more effectively while standing. This study aimed to test the hypothesis that differences in peak and mean values of power between standing and seated trunk rotations were more pronounced at higher than lower weights. Methods: Twenty seven fit men (age  $22.7 \pm 2.9$  y, height  $178.6 \pm 8.6$  cm, weight  $86.3 \pm 11.1$  kg) completed two trials of trunk rotations in both standing and seated positions with a bar weight of 5.5, 10.5, 15.5, and 20 kg placed on the shoulders. They were instructed to perform trunk rotations with maximal effort in the acceleration phase. The FiTRO Torso Premium was used to monitor basic biomechanical parameters throughout the movement. The system consists of an inertia measurement unit in a small box with an integrated USB interface and software. While inserted on the barbell axis, the sensor unit registers instant angular of rotation movement. Calculations of force and power are based on the Newton's second law of mechanics. Force produced to

accelerate and decelerate a rotation movement is obtained as a product of barbell mass and acceleration of its center of gravity (CoG). Angular acceleration is obtained by derivation of angular velocity. For the transformation of angular velocity and acceleration into their real values, a rotation radius (distance between rotation axis and barbell mass CoG) is used. Power is calculated as a product of force and velocity. Results: Peak power was significantly higher during standing than seated trunk rotations at weights of 20 kg ( $274.4 \pm 63.5$  vs.  $206.4 \pm 54.6$  W,  $p = .004$ ), 15.5 kg ( $371.2 \pm 93.9$  vs.  $313.5 \pm 72.3$  W,  $p = .007$ ), and 10.5 kg ( $336.9 \pm 77.8$  vs.  $286.3 \pm 66.0$  W,  $p = .009$ ) but not at lower weight of 5.5 kg ( $191.6 \pm 46.2$  vs.  $166.0 \pm 37.0$  W,  $p = .061$ ). Similarly, mean power in the acceleration phase of trunk rotations was significantly higher in standing than seated position at weights of 20 kg ( $143.2 \pm 32.1$  vs.  $101.9 \pm 23.7$  W,  $p = .008$ ), 15.5 kg ( $185.1 \pm 42.3$  vs.  $150.4 \pm 36.5$  W,  $p = .019$ ), and 10.5 kg ( $169.8 \pm 40.7$  vs.  $139.7 \pm 31.6$  W,  $p = .024$ ) but not at 5.5 kg ( $107.4 \pm 29.4$  vs.  $86.5 \pm 21.1$  W,  $p = .111$ ). Discussion: Muscle power is greater during standing as compared to seated trunk rotations, with more pronounced differences at higher weights. These findings indicate that standing trunk rotations are much more effective for power production than those performed in the seated position. Nevertheless, intervention studies are needed to prove this observation.

## Poster Presentations

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### Anthropology

#### **BODY HEIGHT AND ITS ESTIMATION UTILIZING ARM SPAN MEASUREMENTS OF BOTH GENDER ADOLESCENTS FROM CENTRAL REGION IN KOSOVO.**

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Introduction: Considering that Kosovo's population is part of the central area of population from the Dinaric Race, it was of special significance to complete a professional study and a realistic assessment of morphometric evaluation adolescents from the Central Region of Kosovo. The first purpose was to examine the Body Height in Kosovar adolescents from Central region as the authors did believe this is the place where the population can reach the full potential of the Kosovo plain (Arifi et al., in press), while the second purpose of this research was to examine the Body Height in both Kosovar genders and its relationship between arm span. Material & Method: The subject of this study was 193 students from high schools, in total there, included from Central region of Kosovo, Prishtina, 100 male and 93 females. Anthropometric measurements of Body Height and arm span have been conducted according to the protocol of the International Society for the Advancement of Kinanthropometry (Marfell-Jones, Olds, Stewart, & Carter, 2006). The data was analyzed by Statistical Package for Social Sciences (SPSS) for Windows 23.00. Results: The results obtained were analyzed through descriptive parameters: Means and standard deviation (SD), the ratio between Body Height and arm span have been analyzed through correlation coefficient according to Pearson with reliability level of 95%. The linear regression analysis was carried out to examine extent to which arm span can reliably predict of Body Height. At the end, these relationships were plotted as scatter diagram for both genders. Statistical significance was set at  $p < 0.05$ . Discussion: Throughout this work we can prove that the adolescents from Central region of Kosovo are very tall with an average of 180.62 centimeters for boys and 166.77 centimeters for girls. The results proved that the adolescents from Central region are tall on average, taller than male population in Macedonia with 178.10 centimeters and taller than female population in Macedonia with 164.58 centimeters (Popovic et al., 2016), and is very close to the data that was reached in the measurement of Serbian female 166.8 centimeters (Popovic et al., 2013), but not taller than male population. Therefore, the authors believe that these circumstances had a negative bearing on the secular trend in Kosovo, while it is expected that the secular changes influencing Body Height will ascend in following two decades, comparing it to developed countries where this trend has already completed such as Dutch (Schonbeck et al., 2013). References: Bjelica, D., Popovic, S., Kezunovic, M., Petkovic, J., Jurak, G., & Grasgruber, P. (2012). *A. N.*, 18(2), 69–83. Bujanja, M., Vujovic, D., Tanase, G. D., Hadzic, R., & Milasinovic, R. (2015). *Sport Mont*, 43,44,45/XII, 277-282. Datta Banik, S. (2011). *A.H.B.I.*, 38(6), 728-35. Gardasevic, J., Rasidagic, F., Krivokapic, D., Corluca, M., & Bjelica, D. (2017). *M. J.S.S.M.* 6(1). Popovic, S. (2017). *Montenegrin Journal of Sports Science and Medicine*, 6(1).

## EXAMINING THE ATTITUDES OF EMPLOYEES WORKING WITH DISABILITIES.

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<sup>1</sup>*Pamukkale University (Denizli, Turkey)*

**Introduction:** The purpose of this research is to investigate the effect of working with the disabled people in the same workplace on attitudes of individuals' about disabled people. Working rate level is very low in Turkey (%3), but it is different in Europe (%12). This may be due to the absence of appropriate conditions for the disability or the attitude of employers (Meager, 1999). In addition to this, another important factor is attitudes of workmates of disabled people. **Methods:** In order to determine the attitudes of the individuals towards the disabled, the Likert-style, 5-grade Attitudes Towards the People with Disabilities scale, developed in 2009 within the scope of the study titled "How to Perceive Society Disability" conducted by the Office of the Prime Ministry's Office of the Disabled, was used. Sample of the study selected in private sector in Denizli city, Turkey between 41.680 people. 380 (190 of them working with the disabled people; 190 are not) individuals selected by stratified sampling method homogeneity test conducted on data and it is shown that siaturbation of data is normal. And independent sample t test conducted on data for investigate the problem of study. **Results:** There is no statistically differences between attitudes towards disabled of people working with disabled people and who are not. In other words, working with disabled people has no effect on people attitudes towards disabled people. **Discussion:** According to Şahin and Güldenoğlu (2013), before working with the disabled people in the same workplace need to get information or education about their specialties'. Thus workplace friends' of disabled people will not have prejudices, worries or wrong information about them. In our study average point of the groups were nearly the same, it is shown that all group has enough information and positive attitudes about disabled people. It is known that disabled workers are not employed in their own fields. They should have employed on the field where they are educated (Mamatoglu, 2015). If so they may feel more beneficial and comfortable and their workmates may more respect. According to Berthoud, (2011) research, disability attitudes differ according to variables such as gender, age, marital status. **References:** Berthoud, R. (2011) Trends in the employment of disabled people in Britain. No. 2011-03. Institute for Social and Economic Research. Genç, Y. and Çat, G. (2013). Employment of Disabled People and Social Inclusion, Journal of Academic Review. 8 (1): 363-393. Mamatoglu, N. (2015, October). General view of disability employment in Turkey: policies proposed by the employer for increasing visually handicapped employment, alternative policy 3: 225-226. Meager, N, et al. (1999).Employment of Disabled People: assessing the extent of participation. Great Britain, Department for Education and Employment.

## Architecture and Urbanism

### PLANNING THE NETWORK OF SPORTS FACILITIES IN OLD ROYAL CAPITAL CETINJE.

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<sup>1</sup>*University of Zagreb, (Zagreb, Croatia), <sup>2</sup>University of Montenegro (Podgorica, Montenegro)*

**Introduction:** The main purpose of this research was to analyse and identify sports facilities, their utilization, their importance to the life of citizens, and their spatial distribution in relation to the rest of the city center. **Method:** The material of this paper has analytical approach in research (collecting archive

materials, graphic and photographic documentation, measurement in the field, etc.). Data analysis was performed using the following scientific methods: method of analysis, comparison method, inductive-deductive method, normative method and the method of synthesis. Results: This paper aims to show the network of sports facilities in the municipality of Cetinje through the analysis of urban parameters for the planning of sports and recreational zones in the city. The aim is to review the existing capacities of sports facilities and meet the needs of residents, as well as giving recommendations for further development of the network of sports facilities. Discussion: Sports facilities are important in shaping the city's identity because they are often recognized as the town landmarks, places of communication, social life and gatherings. Sports activities includes maintenance of existing and construction of new sports facilities as well as meeting the needs of citizens and users in the field of sports and physical culture. Given that sport plays an important role for the health of citizens, social integration, prestige, recognition and other values of general interest, it is very important to the spirit of sport, not just locally, but also beyond, maintain and open new perspective sports development. Old Royal Capital Cetinje is recognized as a city of sport, which has a relatively long sports tradition. It has a number of sporting facilities but their practical implementation is not satisfactory. References: Popović, G. S. (2014). Urban Parameters for Planning the Network of Physical Education Facilities in Montenegro. *Sport Mont*, 40-42/XII, 131-139. Ilić, S. (1998). *Sportski objekti (Sports Facilities)*. Beograd: Građevinska knjiga. Planet Cluster, Spain, MonteCEP dsd, Montenegro, CEP doo, Serbia (2014). *Spatial Urban Plan of Old Royal Capital Cetinje*

## Biomechanics

### ANALYSIS OF SOME MECHANICAL VARIABLES OF JUMPING SHOOT FOR BOTH SIDES AND THEIR RELATIONSHIP WITH THE KINETIC EXTENT FOR THE CENTER PLAYERS IN HANDBALL.

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Introduction: Jump shooting is considered one of the most common effectiveness types of shooting to reach to the goal of the opposite team with avoiding contact with the opponent, and mastering this type of shooting gives the attacker a chance to overcome the defenders, whereas the rising of the shooting player was high, there was a greater freedom to shoot and the increasing of the chance to score when perform the movement of forward-jump shooting for both sides (right and left). Method: The researchers has applied the descriptive method for its convenience to the research nature. Research sample was consisted of handball senior players in Nineveh province who participate in the premier league which were selected with intentional. Scientific observation was carried out by using two Sony digital cameras with frequency (420 f/s), which were placed (2.95 m) on both player sides (right and left) with a lens height of (1.10 m) to recognizing the mechanical variables of turn and jump shooting for handball players A yard stick of one meter was used and filmed in both positions (horizontal and vertical) to calculate alteration coefficient from the image to reality in order to obtain mechanical variables. Data were statistically handled treated through applying (SPSS) program to obtain (the arithmetic mean, standard deviation, the correlated and independent (t), percentage and coefficient variance) as well as equations correlated with biomechanics variables. Results: The number of mechanical variables that have achieved significance correlations with the kinetic extent of jumping forward shooting for center players of the rotation to the right side were (4) correlations Two are( negative) and three were ( positive). The number of mechanical variables that have achieved significance correlations with the kinetic

extent of jumping forward for center players of the rotation to the left side were ( 8) correlations four are ( negative) and four were (positive). References: Hay, J, G,: 1980, *The Biomechanics Of Sport Techniques*, prentice hall, INC, Englewood Cliffs. Meller, D, I: *Biomechanical characteristics of the final approach step hurdle and take-offs of elite American springboard divers*. *Journal of Human Movement studies* 10 (4), 1984. Williams, M, and Lissner, H, R: 1977, *Biomechanics of human motion*, Ed, 2, Philadelphia.

## Coaching

### MONITORING OF SOME PARAMETERS OF STRENGTH IN HANDBALL (WOMEN).

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**Introduction:** Modern team handball consists of intense, intermittent activities such as running, sprinting, jumping as well as regular in fights between players (i.e. holding, pushing etc.) (Thue Kvorning, 2006). Assessment of power and strength could be multidimensional. Strength, while having potentially multiple definitions, is probably best defined as “the maximum amount of force of a muscle or a muscle group can generate in a specific movement pattern at a specific velocity of movement (Knuttgen & Kraemer, 1987, as cited in Reiman & Manske, 2009) Handball is a sport branch, which requires high physical preparation and technical and tactical. Being contact sport scrolled with multiple players, it has huge power requirements, as well as a certain level of intelligence for selection of complex situations in the game. All of those require systematic and persistent work for the creation and development of young handball players. Handball Game consists of intensive game, swift (sprint), jump, decline, and ‘duels’ in accordance with the rules of the game, where permitted, catching, drawing, pushing, holding, the player’s opponent. The aim of this research was to monitoring some strength parameters. **Methods:** The sample consists of 14 handball players Handball Club Prishtina. Entities are female, aged 20 + - 2 years. The measurements were made during the training process. The first measurement was made in the first microcycle preparatory period, while the second measurement in last microcycle in phase of competition before, the third measurement made was made in last week when the competition end. With t-test were calculated differences between first, second, and third measurements. The level of significant is  $p < 0.05$ . **Results:** The results according to the T-test have shown that the static strength exercises applied have had no important impact to increase of strength. **Discussion:** In this study it is proved that under the three measures that were mentioned above, progressive transformation in terms of force is not achieved to the extent expected. The amount of training in the first period is less competition to achieve workforce development at the desired level. Dosage of cargo by individual and specific skills in the game is a problem in itself that must be greater attention. Even the programming of cargo should be done by adapting the anthropometric status and motor for each athlete individually. **References:** Roberto Simão , Juliano Spineti, Belmiro F. de Salles, Liliam F. Oliveira, Thiago Matta, Fabricio Miranda, Humberto Miranda and Pablo B. Costa (2010) *Journal of Sports Science and Medicine* 9, 1-7. Roland van den Tillaar, Mario Marques (2011) *Kinesiologia Slovenica*, 17, 2, 38. Knuttgen & Kraemer, 1987, as cited in Reiman & Manske, (2009). Thue Kvorning, (2006) *ELITEVIDEN*, 4. K.Flessas, M. Koumpoula, D. Tsopani, CH. Oikonomou, (2008) *Biology of Exercise*, 4.

## Economics

### APPLICATION OF EMOTIONAL BRANDING STRATEGY IN THE MODEL DEVELOPMENT OF SPORTS BRAND OF THE BOTTLED WATER MARKET.

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Introduction: The new economy has brought new meaning to the brand, which is characterized by a brand, but also has a human touch, turning into an emotional brand. Alternative branding strategies put emphasis on brand experience in terms of emotional, holistic and socially responsible. Bottled water has become the world's "liquid gold" in the last 40 years, because it is a natural product, which is made with minimal costs. The paper develops the idea to perform a kind of humanization and the introduction of a new emotional brand of bottled water on the market, which will bear the name "Aqua F.I.F.A" designed label of FIFA international organizations, as well as the roof of the organizers of the most important football events in the world and the label of the national team. This paper will analyze in detail the market opportunities and prospects of introducing a unique sports brand, the emotional aspect, with the use of effective marketing communication strategy. Method: The paper describes the importance of the concept of emotional branding in contemporary branding from theoretical and practical point of view, analyzing a large number of texts from books, textbooks and articles. Collection of relevant data was performed from written sources and personal testing. We used the methods of collecting and analyzing primary and secondary data, available in electronic and written sources. The contribution of the research is that it shows the importance of the application of emotional branding strategy in the development of a new model, unique sports brand in football. Results: In addition to the defined primary strategic goal, vision and mission of a single sports brand, the paper stated investment objectives, implemented pest analysis, shows the marketing mix of products and applied the concept of integrated marketing communication in the service of improving the position of the new, sports brand, which was introduced with the emotional aspect of branding. Discussion: The aim is to create a theoretical and practical insight into the specific character of the application of the concept of emotional branding in the model of development of a new sports brand in the market of bottled water. The specific objective is to draw attention to the emotional character that the brand achieved its differentiation at specific target groups (fans, the team, the wider audience). References: Mushrooms M., "Emotional branding – a new paradigm linking brands with people", Mass Media International, Belgrade, 2006. P. Kotler, „Marketing Management“, 12th Edition, Data Status, Beograd, of 2006. Rakita B., Mitrović I., „Brand Management“, Modern administration, Belgrade, 2007. Mr. Belch, Belch M., „Integrated Marketing Communications through Advertising and Promotion“, McGraw-Hill, New York, 2012.

## Health and Fitness

### IMPACT OF HOME FITNESS PROGRAM ON ANTHROPOLOGICAL CHARACTERISTICS OF PHYSICALLY ACTIVE AND PHYSICALLY INACTIVE PERSONS.

**Furjan-Mandic, G.**<sup>1</sup>, **Bilbija, B.**<sup>1</sup>, **Radas, J.**<sup>1</sup>, **Ivkovic, G.**<sup>2</sup>

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Introduction: The results of previous studies have shown that regular, properly planned and programmed



physical exercise has a positive impact on high blood pressure (Faggard and Tipton, 1994), blood fat levels (Berg et al., 1994) and the elevated body mass index (Mišigoj Duraković, 2000).

## **DIFFERENCE IN STRENGTH BETWEEN WOMEN WHO PRACTICE PILATES AND WOMEN WHO PRACTICE AEROBICS.**

**Radas, J.<sup>1</sup>, Sesar, V.<sup>1</sup>, Furjan-Mandic, G.<sup>1</sup>**

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**Introduction:** In the fitness centers various kinds of recreational forms of exercise are carried out. The most common forms of group exercise are aerobics and pilates, and the reason for this is that these are simple activities that allow women to freely involve themselves in this way of exercising without previously acquired experience. Exercises for development of power are present in both forms of exercise, but in a different way. In aerobics they are executed in a more dynamic work and in pilates more through the static work. The end result of both forms of exercise is that the strength exercises strengthen and balance the body, reduce stress, increase endurance and that one feels better and more competent to deal with daily challenges. The basic objective of this research is to determine whether there are differences in the strength between the women engaged in pilates and women engaged in aerobics. **Methods:** The sample included in this study consisted of two groups of exercisers from the fitness center in Zagreb. One group engaged in pilates, other in aerobics and both groups consisted of 28 women. The age of the exercisers were from 20 to 50 years and a period of practicing a particular activity was between 1 to 4 years. What they all have in common is that they regularly exercise three times a week for 60 minutes. The sample of variables consists of the following tests to evaluate the relative repetitive and static forces: the test for assessing the strength of arms and shoulders (push-ups), the test for assessing the strength of the abdomen (“hundreds”), the test for assessing leg strength (endurance in squat - crouched position against the wall). Descriptive analysis of the data is used to calculate basic descriptive parameters and a T-test for independent samples of the differences in strength between the two groups. **Results:** Difference in strength of arms and shoulders (pushups), between groups, is statistically significant ( $t=-2.16$ ,  $p < 0.05$ ). Data indicate that subjects engaged in aerobic exercise have greater strength in the upper body. Differences between groups in results achieved in tests assessing strength of middle and lower body, are not sufficiently significant ( $p > 0.05$ ) to be considered for further interpretation. **Discussion:** The results showed that there are some differences in the two programs. The test of push-ups has given the data that shows significant statistical differences, while in the tests “hundreds” and squat endurance there are no statistically significant differences, although there are some differences. In all tests the subjects engaged in aerobics had better results than women who practiced pilates. From this we could conclude that the program of aerobics is a lot better for the development of this type of strength, but since this is not a representative sample, it cannot be a claim valid for general population. But we can assume that it would be a better program for the development of power and other motor and functional abilities. This is another study that shows certain differences in the program of aerobics and pilates. **References:** Dizdar, D. (2006) Quantitative methods. Zagreb: Faculty of Kinesiology, University of Zagreb. Dizdar, D., Pedisic, Z. (2010) Manual for quantitative methods. Zagreb: Faculty of Kinesiology, University of Zagreb. Furjan-Mandic, G. (2007) Methodology of aerobics. Zagreb: Faculty of Kinesiology, University of Zagreb. Milanovic, D. (2010). Theory and methodology of training. Zagreb: Faculty of Kinesiology, University of Zagreb. Papo, In. (2009) The impact aerobics to increase repetitive strength in women (thesis). Zagreb: Faculty of Kinesiology, University of Zagreb. Petroveckii R. (2006) The impact of

advanced pilates exercises on some dimensions of motor skills: flexibility, balance, repetitive power and static power (thesis). Zagreb: Faculty of Kinespiology, University of Zagreb. Siler, B. (2003) Pilates body. Zagreb: National and University Library.

## Other

### CONNECTION BETWEEN MORPHOLOGICAL CHARACTERISTICS AND THE ADOPTION PROCESS OF SKIING TECHNIQUES.

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Introduction: Skiing belongs to the activities that take place in the special conditions of the external environment, and a success in the Alpine disciplines primarily depends on the level of adopted specific motor skills, as well as the adopted level of motor and functional abilities (Franko, 2007). Methods: Testing was conducted on a sample of 35 respondents, who are second year students of the Faculty of Sport and Physical Education in Niksic, between the ages of 19-21 years old. All the students regularly attend the course Fundamentals of skiing. Variables of the predictor system were represented by 9 morphological measures: body weight, body height, body mass index, basal metabolic rhythm, body fat percentage, the amount of fat in kg, low fat tissue, the total amount of water in the body. Variables of the criteria system were represented by 4 situational motor task: aslope descent, wedges cruising primary winding path parallel wriggling, basic wriggling. Multiple regression analysis was used to determine the influence of variables of the predictor system on variables of the criterion system. Results: Based on the achieved results of the regression analysis it is possible to conclude that the system of 9 morphological variables has achieved a statistically significant effect on the execution efficiency of skiing techniques. The most dominant variable is the body weight. Respondents with higher body weight have better results in hair downhill ski elements, basic and parallel to wriggle wriggle. For downhill ski technique cuts the greatest significance have two variables of anthropometric characteristics and those are body weight and basal metabolic rhythm. Discussion: Based on the results achieved in this research conducted on a sample of 35 students who passed through 9 tests of morphological characteristics of the predictor system, in order to determine their influence individually on each of the 4 motor tests for assessment of situational motor abilities, we can conclude that there is a statistically significant effect of predictor variables on criterion variables. Also, body weight has a significant influence in the adoption process of certain elements of skiing techniques. References: Franko, I. (2007). Faktori uspjesnosti izvedbe skijaskih elemenata. Magistarski rad, Zagreb: Kinezioloski fakultet.

### STROKE CHARACTERISTICS AND SWIMMING TECHNIQUE CONTRIBUTION TO THE SWIMMING RESULT.

**Dimitric, G.<sup>1</sup>, Smajic, M.<sup>1</sup>, Protic-Gava, B.<sup>1</sup>, Scepanovic, T.<sup>1</sup>, Bogdanovski, M.<sup>1</sup>, Jaksic, M.<sup>1</sup>**

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Introduction: The purpose of this study was to find out if some stroke characteristics and swimming technique effects on swimming speed on 100m distance for female students. Students are very specific

sample and swimming success depends on much more influences than in swimmers. Female students attend 30 lessons swimming course, starting from different degree of swimming skills. A lot of papers shows that active drag is affected by swimming technique (Kolmogorov et al., 1997). Active drag decreases swimming speed. Appropriate swimming techniques have a strong influence on performance at every swimming level. Long strokes provide good body position and good swimming results on 100m crawl. Swimming with longer stroke can produce greater propulsive force, and in that way enable greater swimming speed, better performance (Dimitric, cokorilo & Bogdanovski, 2016). But long strokes doesn't allow great stroke rate, so it is necessary to find best ratio among stroke rate and stroke length. Method: Study group consisted of 32 female students of Faculty of Sport and Physical Education in Novi Sad. Students swim out 100m crawl, starting from starting block and swim as fast as they can. While they was swimming, swimming time was measured, counted stroke rate, and swimming coaches evaluated swimming technique. After swimming, swimming speed on 100m crawl (V100) was calculated and that was criterion - dependent variable for this study, predictors were: stroke length (SL), stroke rate (SR), summary of strokes (SumZav) and swimming technique mark (OT).Swimming technique in this study was described as: good streamline position, effect strokes, good kicks, head position and right breathing and good arm and legs coordination. Data were analyzed using SPSS PC (version 19) program for Windows. Data were analyzed using descriptive statistics of minimum, maximum, mean and standard deviation. Regression analysis was used to estimate the effects of some stroke characteristics and swimming technique on results in 100m crawl swimming for female students. Statistical significance was set at  $p < 0.00$ . Results: Regression analysis showed that stroke length (SL), stroke rate (SR), summary of strokes (SumZav) correlated with swimming speed on 100m crawl (V100). Discussion: Study results confirms importance of right stroke length and stroke rate while female students' swimming 100m crawl. References: Kolmogorov, S. V., Romyantseva, O. A., Gordon, B. J., & Cappaert, J. M. (1997). Hydrodynamic characteristics of competitive swimmers of different genders and performance levels. *Journal of Applied Biomechanics*, 13, 88-97. Dimitric, G, cokorilo, N. & Bogdanovski, M. (2016). Relations between anthropometric characteristics and motor abilities of 14 – 15u female swimmers on 50m result for each technique. *Sport Mont* 14 (2016) 3: 37–40

## Philosophy and Ethics

### THE ETHICS OF JOURNALISTS IN SPORTS EVENTS.

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Introduction: The objective of this study represents the sports journalism, while the main goal will be directional to explaining the ethics of journalists in sports events. The main task of this study are primarily to discuss journalistic activities in sports events, the ethical dilemmas that journalists encounter, whether they work in the service of public and general interest and how their reporting effect of other stakeholders in the sport. Method: For making this study, the authors used descriptive method. The authors also consulted with the relevant literature and the experience of previous research in this field. The authors used as well the analytical and parallel methods that have proved to be the most productive in these types of research. Results: Sport promotes determination and creating a better and more productive society, while ethics as the science of morals has a duty to inform us about the basic components of morality and point to the true value. Specialized study of different fields of professional ethics is very fruitful, but we

should not forget that all professions are part of a wider society and their intended codes should coincide with broader ethical social norms. The most pressing ethical problems faced by journalists are: fairness and objectivity, journalists who appear in a false light, economic pressure, conflict of interest, anonymous sources, and so on. This study presents a general overview of the journalistic ethics in sports events and the impact of journalistic ethics to other actors in the sport and could be of interest to other researchers and further research in this area. Discussion: Journalists are usually criticized for sensationalist journalism, in which anonymous sources supplying journalists' allegedly confidential information. Just these issues again prompted interest in journalistic ethics, and is better informed, critical and mistrustful audience began to question much of the press writes. The accumulated mistrust of the media, ethical scandals which gives considerable publicity made that journalists become overly cautious and in newspapers and broadcasts omitted important information. References: Boxill, J. (2002). *Ethics and Sport*. Blackwell: Oxford. DeSensi, J. & Rosenberg, D. (2011). *Ethics and Morality in Sport Management*. *Sport, Ethics, and Philosophy*, Vol. 5 (No. 4), 457-459. Kokovic, D. (2004). *Sport i mediji*. Fakultet za uslužni biznis: Novi Sad. Milasinovic, R. (2015). *Etika aktera u sportskim događajima*, unpublished master thesis. Novi Sad: Univerzitet u Novom Sadu, Asocijacija centara za interdisciplinarne i multidisciplinarne studije i istraživanja.

## Physical Education and Pedagogics

### HANDBALL AS ONE-YEAR OPTIONAL ACTIVITY OF THE FINAL GRADE STUDENTS IN ELEMENTARY SCHOOLS.

Ljubojevic, M.<sup>1</sup>, Muratovic, A.<sup>1</sup>, Gardasevic, J.<sup>1</sup>, Milasinovic, R.<sup>1</sup>, Bojanic, D.<sup>1</sup>

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Introduction: The expansion of scientific and technological discoveries, accelerated globalization, and computerization seek substantial and permanent transformation of education (Hardman, 2008). Efficiency of the physical education can be improved with real, professional, and economic planning and monitoring of education effects, as well as with an increase in weekly number of classes (Ljubojevic, 2014). Method: The study was conducted for one school year on the sample of total 44 students, divided into two groups. Control group (22 students) consisted of students who attended only physical education classes. Experimental group (22 students) consisted of students who, in addition to physical education classes, attended additional two classes of handball during a week. Motor space was monitored through 8 variables of Eurofit battery tests, as follows: flamingo, hand tapping, seated forward bend (modified functional reach test), long jump, lay – sit for 30“, pull-up endurance, and pin running on 10x5m. Results: After the conducted study, results showed that the students from control group had better results in 6 out of total 8 motor tests. In test “pull-up endurance” and “pin running”, no significantly better results were observed. The students of experimental group achieved better results in 7 out of total 8 tests. The improvement was not observed only in the test “seated forward bend”, which monitors flexibility as an ability. Discussion: Analysis of the results confirmed that optional physical activity has certain impact on development of motor skills (Ljubojevic, 2011; Sedic, 2010). Furthermore, handball as optional activity can positively influence motor skills development, especially due to extended variety of motor movements that characterize this sport. References: Hardman, K. (2007). *Physical education in school: A global perspective*, *Kinesiology*, 40(1), 5-28. Ljubojevic, M. (2011). *Efekti nastavnog predmeta – sport za sportiste na motoricke sposobnosti učenika VIII razreda*, *Sport Mont*, (9), 31,32,33, 75-80. ISSN:

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## DIFFERENCES IN GENDER-RELATED MOTOR ABILITIES OF YOUNGER SCHOOL CHILDREN.

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**Introduction:** The development of motor abilities can be realized through the teaching process of physical exercises which should be planned and implemented reasonably and in an organized manner. For this reason, it should be planned, implemented and controlled (Findak, 1999). However, the current management of motor space of younger school children is not solved in a quality manner due to its complexity (Ismail & Gruder, 1971). The aim of this research was to determine whether there is any statistically significant difference in motor abilities of boys and girls of younger school age. **Method:** The sample included 76 examinees with 37 males and 39 females. All were 5th and 6th graders of primary school. The evaluation of motor abilities was based on 5 tests. Multivariate analysis of variance was applied for determination of differences within the whole system of motor tests, whereas univariate analysis of variance was used for determining differences in each motor test. **Results:** According to the findings, statistically significant differences in motor abilities between boys and girls at the studied age can be noticed in the test 20 m running from flying start, which is in favor of boys and in the test sit and reach, in favor of girls, while the differences in other tests are not statistically significant. **Discussion:** The relations between motor and cognitive abilities in boys and girls are positive and significant (Planinsec, 2002, according to Bala et. al., 2005). Considering the evaluation of motor abilities, boys have statistically much better results in the speed of alternative movements and explosive strength, whereas girls have achieved much better results in the test for flexibility (Cvetkovic et. al., 2007). It has also been concluded that 5th and 6th graders have statistically better results in the space of coordination and explosive strength, whereas girls are much better in the field of flexibility and suppleness (Badric, 2011). **Reference:** Badric, M. (2011). *Razlike u motorickim sposobnostima izmedju učenika i učenica 5. i 6. razreda*. Hrvatski casopis za odgoj i obrazovanje, 13, 82-107. Bala, G., Sabo, E., Popovic, B.(2005). „Odnos izmedju motorickih sposobnosti predškolske dece i njihove spremnosti za poalazak u uskolu”. (Relationship between motor abilities and school readiness in prechool children). *Kinesiologija Slovenica*, 11, (1), 5-12. Cvetkovic, M., Obradovic, J. i Krneta, z. (2007). *Trend razvoja motorickih sposobnosti dece nizeg skolskog uzrasta*. U G. Bala (ur.), *Zbornik radova Antropoloski status i fizicka aktivnost dece, omladine i odraslih (55-64)*. Novi Sad: Fakultet sporta i fizockog vaspitanja. Findak, V.(1999). *Planiranje, programirenje, provodjenje i kontrola procesa vezbanja*. U: *Zbornik radova 2. Medjumarodne znanstvene konferencije “Kineziologija za 21. Stoljece“* Dubrovnik 1999, (109-113). Zagreb: Fakultet za fizicku kulturu. Ismail, A.H., Gruber, J.J. (1971). *Integrated development - Motor aptitude and ntellectual performance*. Columbus: Charles E. Merrill Books.

## Physiology

### PERCEPTUAL SPACE OF VISUAL ENVIRONMENT FOR SPORT AND LEISURE.

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Introduction: Psychophysical study concerned to functionality and affective quality of various natural and man-made landscapes (Russell & Lanius, 1984; Gifford, 2016). The aim of project was to improve the conditions for sports and leisure. Methods: In this study took part students from Moscow colleges and universities with different preferences of visual environment. Slides with images of natural and urban landscapes, as well as the terms denoting the functional characteristics of the environment and different emotions were presented to subjects. They were asked to estimate differences between all possible pairs of stimuli, using 9-points scale. For the data processing were used methods of multidimensional scaling (Borg & Groenen, 2005). Individual and for all subjects common psychological spaces were calculated by SPSS. Images of landscapes and terms were presented in the spaces as points. The distances between points reflect the degree of their subjective differences. Results: The study defined criteria for the differentiation of landscapes, as well as associated with them functional characteristics and terms denoting various emotions. Clarified the criteria by which subjects identified landscapes as suitable for work, leisure, sport, tourism, etc. It has been shown the lack of significant cultural differences in perception by students' of the environment for everyday activities. For example, for the Russian students, national colour of environment was not associated with home or work environment. According to their point of view, the visual environment with national colour is special. For the most part, it is places for tourism, something worth seeing but for temporary stay. The opposite of landscapes with national colour is the environment for sports activities. Discussion: The issue of behavior and emotional state control by means of visual environment is one of the most important in the Environmental Psychology. We have accumulated some experience in probabilistic forecasting of certain types of behavior and emotional responses as a result of exposure to different types of visual environment. However, also remains open the issue of these links permanency and whether these connections should be strengthened or weakened. A solution probably could be found in context of B.F. Skinner and I.P. Pavlovian theories (Shettleworth, 2010). References: Borg I, Groenen P (2005). *Modern Multidimensional Scaling: Theory and Applications*. 2nd Ed. New York: Springer-Verlag. Gifford R (Ed.) (2016). *Research Methods for Environmental Psychology*. New York: Wiley. Shettleworth S (2010) *Cognition, Evolution and Behavior* (2nd Ed), New York: Oxford. Russell JA & Lanius UF (1984) Adaptation level and the affective appraisal of environments. *J of Environmental Psychology*. 4. 119-135.

### THE EFFECT OF USING EMOTIONS REGULATION STRATEGIES IN DEVELOPING EMOTIONAL INTELLIGENCE OF PUPILS OF THE OLYMPIC CHAMPION SCHOOL PROJECT IN NINEVEH PROVINCE.

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<sup>1</sup>*University of Mosul (Mosul, Iraq)*

Introduction: Revealing the degree of Emotional Intelligence of pupils of The Olympic Champion School Project in Nineveh Province Preparing a program to develop the Emotional Intelligence by using Emotions

Regulation Strategies of pupils of The Olympic Champion School Project in Nineveh Province. Method: The Researchers followed the empirical design known as Equivalent Groups Design which has the pre and post accurate tests. The sample of study is a group of the pupils of The Olympic Champion School Project in Nineveh Province whose number is (40) pupils of the age of 13–18 year who practice the games of track and fields, wrestling, and boxing. During the haphazard test the sample of study has been divided according to the toss system into two equal groups, ten pupils in each one, the first group is empirical on which the Emotion arrangement Strategies programmer has been adopted whereas the second is on criteria on which the programmer has not been adopted. The criterion was translocated after doing some changes according to the views of some experts and those specialists in psychology, education, and sport psychology. The criterion consisted of (60) expressions distributed among six axes (individual efficiency, social efficiency, adaptation, dealing with pressures, positive change, and natural temper). The program of Emotion arrangement Strategies has been used on the empirical group for (7) week, two sessions weekly. Results: The player (pupils) of The Olympic Champion School Project in Nineveh Province has an acceptable (enough) degree of Emotional Intelligence. There is an effect of the psychological training program by using Emotions regulation Strategies in Emotional Intelligence Developing of the players (pupils) of The Olympic Champion School Project in Nineveh Province Prepared by the researcher. Discussion: It is necessary to get use of the methods and activities of the psychological training program in emotion Intelligence Developing by using emotions regulation Strategies and it is also necessary to concern the psychological part in the steps followed in checking gifted sport pupils in sports school, one of the Strategies in emotion Intelligence tests. There is an opportunity to get use of the psychological training program (emotions regulation Strategies) in offering new horizons for researcher to prepare new studies on another samples of the players in another area to know more of effect of the program used, one of these horizons is the Olympic Champion School Project in Nineveh Province in Iraq. References: Bar-On, R., & Parker, J. D. (2000). *The Emotional Quotient Inventory: Youth version (EQ-i) YV: Technical Manual*, Toronto, Canada: Multi- health systems- Inc. Cracker, L. & Algiam, J. (1986). *Introduction to Classical and Modern Test Theory*. New York: (BS) College Publishing. Deci, E. (1980). *The psychology of self-determination*. Lexington, MA: DD Heath.

## **DIFFERENCES OF PSYCHOLOGICAL CHARACTERISTICS BY PLAYING POSITIONS IN ELITE HUNGARIAN JUNIOR HANDBALL PLAYERS.**

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Introduction: Contemporary literature shows the evidence that athletes should be prepared not only physically but also psychically for the high performance (Révész, 2008; Barrerios et al., 2011; Lénárt, 2012). The efficiency of competitions often depends from the sportsman's psychological preparedness, which is influenced by their personality characteristics (Williams & Kranek, 2001; Gyömbér & Kovács, 2012). Methods: 14-18 years old male and female Hungarian handball players from first class were examined (n=164) in the present study. For gathering data on psychological profile and to investigate different aspects of personality and behavior patterns, the Big Five instrument was used (Capara et al, 1993), measuring Five personality traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness (Cronbach's alpha =.952). Profile characteristics were computed based on the standard t-value ranges (Capara et al. 1993), where 1=very low, 2=low, 3=middle, 4=high, 5=very high. Besides exploring the psychological profile, differences by handball playing positions (goalkeeper, back, playmaker,

pivot, winger) were also taken into account. Statistical analyses were carried out by using IBM SPSS 22.0 software. Results: By gender, Conscientiousness ( $\chi^2=8.52$   $p<.05$ ) and Openness ( $\chi^2=13.64$   $p<.05$ ) tended to be significantly lower among males than females. By age Agreeableness ( $\chi^2=37.60$   $p<.05$ ) and Openness ( $\chi^2=44.46$   $p<.05$ ) were detected with significant differences. The younger the players were, the higher friendliness and openness characterized them. Playing posts showed only tendentious differences on Agreeableness ( $\chi^2=14.24$   $p\leq.05$ ) and Neuroticism ( $\chi^2=15.18$   $p\leq.05$ ) scales. Discussion: The study showed the female players were more responsible and informed than males, so they are more likely to perform their work as planned. The younger players are more friendliness and openness than the older players, therefore we can state that being in a team and the friendships within the team are very important for the younger players. Playing positions did not show significant differences on the scales of Big Five Questionnaire, but we could notice a tendency on Agreeableness and Neuroticism scales, where the goalkeepers reached the highest values. Future research is needed with extended samples to get deeper insights about the nature of the importance of playing positions and their interrelation with psychological profiles. . We would like to give a hand the coaches and the experts in the selection of playing positions. References: Barreiros, A. N., Da Silva, J. M., S. P. Darte, D. T., Da Fonseca, A. M. (2011). *Motriz Revista de Educaco Fisica*, 17. 128-137. Gyömbér, N., Kovács, K. (2012) *Noran Libro Publisher, Budapest*. Révész, L. (2008). PhD thesis, Budapest. Williams, J. M., Krane, V. (2001). *Mayfield Publishing Company, Mountain View, California*, 162-178.

## SUBJECTIVE METRICS OF A HUMAN HAND.

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Introduction: The study of the mental representation by a man of his hand was conducted with the aim of improving the athletes training methods, for the developing of fine motor skills of hands in children and people with stroke, for improving of manipulator in prosthetic arm, etc. Methods: By the methods of psychophysical scaling in subjects were measured the subjective feelings of distances between different points on the skin surface of the back side of the hand (Experiment 1) and the back of the hand and the palm of the hand (Experiment 2). The study involved healthy subjects without pathology of hands. The subjects were asked to estimate the distance between all possible pairs of points applied to the skin of the hand by marker. The subjects have not seen the location of the points in the hand. Matrix with the results of measurements were processed by methods of multidimensional statistics (Borg & Groenen, 2005) and presented as the N-dimensional spaces. Results: The surface of the back side of the hand is perceived by the subjects as a two-dimensional space. The subjects described the location (coordinates) of points using two scales: “thumb - wrist” (the first basis vector of the receptive space) and “thumb – pinky” (the second basis vector of the receptive space). In the case where points were plotted on the back side of the hand and the palm, the distances between all pairs of points were perceived as in three-dimensional space. The subjects described the location of points using three scales: “fingers - wrist” (the first basis vector), “thumb – pinky” (the second basis vector), “thickness of the hands” (the third basis vector). The degree of coincidence of the calculated subjective distances between points with the distances between the points on the hand has a very high values, although somewhat reduced between separate, remote points. We also studied individual differences of data obtained from various subjects. Discussion: The study of subjective metrics of a hand in healthy subjects, in lack of exercise on hand and in comfortable weather conditions, is the necessary step of studying the subjective metrics of the hand



in various forms of pathology, after physical exercises and the extreme weather impacts (McBride & Cooper Cutting, 2015). The N-dimensional spaces, which reflect of subjects' mental representation about the metric of hand surface, favor the development of more sophisticated training techniques on athletes in those sports, where the accuracy of manual action is extremely significant. References: Borg I, Groenen P (2005). Modern multidimensional scaling: Theory and applications. 2nd ed. New York: Springer-Verlag. McBride DM, Cooper Cutting JC (2015). Cognitive Psychology: Theory, Process, and Methodology. SAGE Publications.

## THE RELATIONSHIP BETWEEN PERCEIVED FREEDOM IN LEISURE AND LEISURE SATISFACTION OF SPORT SCIENCES STUDENTS.

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Introduction: The aim of this study was to examine the relationship between perceived freedom in leisure (PFL) and leisure satisfaction (LS) and to determine whether perceived freedom in leisure predicts leisure satisfaction of sport sciences students. In addition, the study aimed to investigate whether students' PFL and LS vary according to gender, form of participation in leisure activities (active/passive, individual/group), and leisure activities area (indoor/outdoor). Material and Methods: The research was a quantitative study which was utilized correlational and comparative methods. The population consisted of 1241 girls and 1951 boys with total of 3192 (age=21.87±2.269) sport sciences students who were selected randomly from different universities in Turkey. To evaluate PFL of students "Perceived Freedom in Leisure Scale" developed by Witt and Ellis (1985) adopted in Turkish by Yerlisu Lapa ve Ağyar (2011) and LS of students "Leisure Satisfaction Scale" developed by Beard Raghep (1980) adopted by in Turkish by Gökçe ve Orhan (2011). Additionally "Personal Information Form" was utilized in order to collect demographic information and leisure participation data of the students. Descriptive statistical methods, Pearson Correlation Analysis, Linear Regression Analysis, Factorial ANOVA, one way MANOVA, Multivariate (3x2) MANOVA Analysis test techniques were used for evaluation. Results: The results indicated that there were positive and middle level significant correlations in total score and sub-scale scores between PFL and LS. In addition, it was determined that PFL is meaningful predictor of LS which explains %42 of variation. It was also found that female's score is significantly higher than male's score in both dependent variables and sub-scales (except from some sub-scale such as knowledge and skill, and physiological) according to gender. LS of the students that are active in leisure activities is higher than the passive participants regardless of individual or group participation to activities. Main effect of participation in indoor/outdoor field leisure activities and effect of interaction with other independent variables is not significant in LS, either. The score of the students participated actively in leisure activities is higher than passively ones without participation individual or group and activities area (indoor/outdoor) in excitement and entertainment sub-scale of PFL according to trio interaction of independent variables. In binary interactions, it is determined that the students who are participating in leisure activities with group and in outdoor fields have the highest score in excitement and entertainment sub-scale of PFL and also the students who are passively participating in leisure activities is higher than passively ones without participation as individual or group in knowledge and skill sub-scale of PFL. References: None.

## Sociology

### IMPACT OF THE IDENTIFICATION WITH THE SUCCESSES OF THE HANDBALL TEAM OF MONTENEGRO.

**Bojanic, D.<sup>1</sup>, Radojicic, D.<sup>1</sup>, Muratovic, A.<sup>1</sup>, Vasiljevic, I.<sup>1</sup>, Ljubojevic, M.<sup>1</sup>, Lacic, O.<sup>2</sup>**

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Introduction: The sport system in the world is experiencing continuous deep qualitative and quantitative change, which stems from the recent social, political, and technological conditions of society development. Sport and national identity are strongly linked throughout the history of the mankind, as the most of the athletes have always, whether as individuals or as a part of the national sport teams, represented a certain group of people gathered around the same goal or the same idea (Popovic & Bjelica, 2013; Popovic, Vasiljevic & Bjelica, 2013; Popovic & Bjelica, 2014). Consequently, they along with fans, represent the members of a certain nation, bounded by the national pride jointly cherished (Bogdanov, 2011). Method: Questionnaires were distributed so that they cover all regions of the Montenegro, the capital of Podgorica, Niksic as the central region of Montenegro, Bar and Kotor as the representatives of the southern part of country, and Mojkovac and Bijelo Polje as the northern region representatives. The survey was conducted on a sample of 669 respondents, who at the time of the survey were adults and had a residence in the territory of Montenegro. Empirical data were analyzed using Statistical Package for Social Sciences (SPSS 20.0). Results and discussion: The analysis of the results determined that total 233 subjects identified themselves with the handball national team of Montenegro, or total 34.8%. Handball is considered to be a national sport in Montenegro based on the success of women's handball team and the handball club Buducnost Podgorica, so no wonder that a third of respondents identified themselves with the handball team. It is, therefore, reasonable to conclude that the achievements of national sports teams can strengthen the sense of community and belonging among individuals of a certain nation, mostly because these situations encourage a sense of belonging among the people (Popovic & Bjelica, 2013). References: Bogdanov, D. (2011). Influence of National Sport Team Identity on National Identity. Unpublished Doctoral Dissertation. Tallahassee, FL: The Florida State University. Malacko, J. & Radjo, I. (2004). Tehnologija sporta i sportskog treninga. Sarajevo: Fakultet za sport i tjelesni odgoj. Popovic, S., & Bjelica, D. (2013). Odnos sporta i nacionalnog identiteta u Crnoj Gori. Sport Mont, (37,38,39) /XI, 60-66. Popovic, S., Bjelica, D. & Vasiljevic, I. (2013). Attitudes of sports fans in Montenegro toward national identity among the type of settlement where they live. In Book of Abstract of the International Scientific Conference "Effects of physical activity application to anthropological status with children, youth and adults" (175), Belgrade: Faculty of Sport and Physical Education. Popovic, S., & Bjelica, D. (2014). Do Significant Achievements of National Football Team Can Strengthen National Identity in Montenegro? Montenegrin Journal of Sports Science and Medicine, 3(1), 31-33.

### ROLE OF SPORT PRACTICED BY PHYSICALLY DISABLED INDIVIDUALS IN PROCESS OF IDENTITY (RE)CONSTRUCTION.

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Introduction: Purpose of the research is to analyze the processual character of transformations that take place within identity of a disabled person practicing sport, as well as to determine psycho-social

mechanisms that this process is responsible for. Both aspects of the research will be reconstructed based on personal experiences of disabled individuals involved in sport activity. Methods: Conclusions from the research are based on qualitative data collected via the technique of unstructured interviews, carried out in the environment of disabled athletes (in total there were 50 interviews with persons practicing athletics, characterized with various types and degrees of disability). Analysis and interpretation of the research material was performed in accordance with procedures of the grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Results: On the basis of the completed analyses it was first of all possible to reconstruct the significance of sport practicing by the disabled for reconstruction of their identity. Second of all, the research allowed to recognize the most significant psycho-social mechanisms that are responsible for this process. Discussion: It was crucial in the research project to draw attention to the aspect of perceiving self by a disabled individual in terms of interpersonal relationships with other disabled, and to interpret the surrounding reality “dominated” by disabled members of the society, imposing particular norms and criteria. The research results confirm the hypothesis that sport practicing by disabled individuals impacts the manner, which they perceive themselves and construct their identity in. This finding complies with previous research (Shephard, 1991; Nigel & Smith, 2009). While the performed research show the situation of disabled individuals practicing sport in the context of specific social, political and economic circumstances in Poland (Niedbalski, 2015). Therefore, they may pose a base for future comparisons of specificity of sport practiced by the disabled, which may represent various countries and nationalities. References: Glaser B, Strauss A (1967). The discovery of grounded theory. Strategies for qualitative research. London, New Delhi, Sage Publications. Niedbalski J (2015). Polish Sociological Review, 4(192), 531-550. Nigel T, Smith A (2009). Disability, Sport and Society. London: Routledge. Shephard RJ (1991). Scandinavian Journal of Rehabilitation Medicine, 23, 51-59. Strauss A, Corbin J (1990). Basics of Qualitative Research. London, New Delhi, Sage.

## **IMPACT OF THE IDENTIFICATION WITH THE SUCCESSES OF THE FOOTBALL TEAM OF MONTENEGRO.**

**Vasiljevic, I.<sup>1</sup>, Bjelica, D.<sup>1</sup>, Gardasevic, J.<sup>1</sup>, Milasinovic, R.<sup>1</sup>, Vukotic, Dj.<sup>1</sup>, Bojanic, D.<sup>1</sup>**

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Introduction: Sport has a very good position when it comes to the development of national pride, but mostly because there are strong evidence in the scientific literature that the success of national sport team and also organization of major sport events such as world and continental competitions can increase self-esteem and national pride. (Dauncey, & Hare, 1999; Gavin, 2007; Karkatsoulis, Michalopoulos, & Moustakatou, 2005 ). Methods: The survey was conducted in 2013 and the questionnaires were distributed in three cities which were located in different regions of Montenegro, primarily in Bar and Kotor, which are located in the southern region, then in Podgorica as the capital, Niksic, which is located in Central region, as well as in Bijelo Polje and Mojkovac which are located in the northern region. A total of 700 questionnaires were collected, but the 31 questionnaire was excluded from the analysis because they were not properly filled out, so that the study included a total of 699 respondents. Empirical data were analyzed using Statistical Package for the Social Science (SPSS 20.0). Results: By the analysis of the results received was showed that 290 respondents or 43.3% have identified with the national football team of Montenegro. Discussion: Previous study (Bogdanov, 2011) showed that in Serbia 44% identifies themselves to the national football team, so we can conclude that there is a high percentage of identification with football teams. Montenegro has not yet participant to the “big competitions” that is

European and world championships, but this fact does not diminish epithet which represents football as the most important secondary thing in the world, so in Montenegro nearly half of despondence identify themselves with the football team. References: Bogdanov, D. (2011). Influence of National Sport Team Identity on National Identity. Unpublished Doctoral Dissertation. Tallahassee, FL: The Florida State University. Dauncey, H., & Hare, G. (1999). France and the 1998 World Cup: The national impact of a world sporting event. London: Frank Caas. Gavin, M. H. (2007). Narrating tragedy: from Kennedy to Katrina, from sports to national identities. Unpublished Doctoral Dissertation. College Park, MD: University of Maryland. Karkatsoulis, P., Michalopoulos, N., & Moustakatou, V. (2005). The national identity as a motivational factor for better performance in the public sector: The case of the volunteers of the Athens 2004 Olympic Games. *International Journal of Productivity and Performance Management*, 54(7), 579–594.

## Sport Management

### STRUCTURAL CARATERISTICS OF SPORT ORGANIZTIONS IN KOSOVO.

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Introduction: Sport in the Constitution of the Republic of Kosovo is defined as a special category of social interest and is funded from the budget of the Republic of Kosovo. For this reason, it is imperative to start with planning and systematic investments in establishing legal infrastructure and structure of sport organizations would be one of the main priorities of the development sports in Kosovo, as another purpose of this paper will be the autonomy of sports and its political neutrality according to international standards, constitutes another priority of the structural organization of organizations or Sports Federations in Kosovo. Material and method: Subject of this study will be 35 Sports Federations, 867 sports clubs, 67583 male athletes and 13458 females. Based on the data of Kosovo Statistical Agency, current condition for sports organizations, clubs, associations, Sports federations as well as sport activities and we will present through the tables underway that will give us a real data for the current condition of the total number of Sports federations, participants in sport activities, sport infrastructure. Results: Above mentioned methodology will contribute in obtaining concrete information from stakeholders in the field of sport, as required in order to answer the questions of the study which we have compiled, in particular to have good overview of what are concrete needs in the sports sector in Kosovo. Results will be processed with statistical SPSS 20.00. Discussion: Through this work we will be able to identify all deficiencies and advantages of sports organizations in our country. (Skoric et al., 2011). The new system of sport in Kosovo must be oriented towards the athletes and citizens that are dealing with physical activities. This will be the period when priorities will be the education of personnel in the field of sport and a chance to use a potential financing, familiarizing with the EU standards in the field of politics and sport (Kiriemadis, Th. & Theakou, E. 2007), putting of biographical (records) and categorization of sports, athletes, sports experts, sport facilities, physical education teachers, etc. The period of the establishment of the new system of the sport within the structure of sports organizations should be consistent with the needs and requirements of Kosovo society and in compliance with EU criteria and higher sports institutions, such as FIFA, UEFA, FIBA, IAAF, EHF etc. References: Borgers J, Thibaut E, Vandermeersch H, Vanreusel B, Vos S, & Scheerder J. (2013) Vol.50(1)45-63. Kovac, M., Starc, G., & Doupona Topic, M. (2005). Michael P Sam (2003) Vol.20, (189-213). Skoric, S. & Bartoluci, M. (2011); I.P.K pp (119/125). Kiriemadis, Th. & Theakou, E. (2007); SMIJ, Vol.3 nr.2, 27-37.

## CONTEMPORARY SPORTS PRODUCT AND MAKING A BRAND IN MONTENEGRO.

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Introduction: The objective of this study represents the sports branding, while the main goal will be directional to explaining the contemporary sports product and making a brand. The main tasks of this study are, the first discussing the sports branding nowadays and newly created sports products as well as drawing attention to the specific nature of the branding of sports products as a separate field of branding in general. Method: During making of this study, the authors used descriptive method with consulting of competent literature. The previous authors' experience in this field was also so useful. Moreover, the author used the analytic method and parallel method that is the most productive if you make some inferences about some appearance. Results: From the reason sport branding did not develop separately, it is the fact that it represents an integral part of the overall branding procedure; however, sport branding has some specialty in relation to other areas, mostly due to the reason, sport industry has much more unpredictable nature than most of other industries. This study made general retrospection of common characteristics and differences among sports branding and branding in general that might be relevant for many researchers in this area. Discussion: Sports branding is developing rapidly around the world (Bjelica & Popović, 2015), the dominant example of this development is most evident in the "sports industry" in the United States (Popović, 2011). However, the sport branding is not at the expectable level in Montenegro (Bjelica & Popović, 2015), and working on recognizing Montenegrin contemporary sports product and making a brand must be more prominent nowadays. Hence, some further knowledge regarding the contemporary sports product and making a brand collected in this study might improve the contemporary situation in Montenegro and help the current and potential marketers to invest in sport industry in Montenegro. References: Popović S (2011). Reklamiranje u sportu kao efektivno sredstvo savremene poslovne komunikacije (Unpublished doctoral dissertation), University of Novi Sad, Novi Sad. Bjelica D, Popović S (2015). Sport Mont, 43,44,45/XIII, 35-41.

## NETWORKING AND INTERNATIONALIZATION OF THE FACULTY FOR SPORT AND PHYSICAL EDUCATION FROM NIKSIC WITH OTHER FACULTIES, UNIVERSITIES AND RELATED INSTITUTIONS.

**Krivokapic, D.<sup>1</sup>, Bubanja, M.<sup>1</sup>, Tanase, G.D.<sup>1</sup>**

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Introduction: The Faculty for Sports and Physical Education from Niksic is among the firsts in the region which recognized the need for networking and international cooperation, so for the short time period cooperation was made with all universities in the region, as well as with many universities and departments for science and sport in Europe: (Ukraine, Bulgaria, Hungary, Romania, Germany, France, Turkey, England, Portugal, Albania, Czech Republic, Greece, etc). Methods: Institutions of contemporary education and sports institutions follow trend of connecting, merging and networking with compatible institutions from other countries, especially EU member states. EU members have elaborated and clearly defined rules and standards for functioning, and which should be followed in the states that are not members. The best way for following and mastering EU standards is cooperation with EU member states, projects, networking, strategic partnerships, cooperation agreements, etc. Results: Special accent was

put on broadening local, regional and international cooperation, which was set as a priority. Since the Faculty opening, 25 agreements have been signed with faculties from the states of the region and Europe some of which are EU members. Also, cooperation was made in the field of students exchange with these institutions. Through training of qualitative staff, the new trends will improve physical education and will be indirectly passed onto sport organizations in Montenegro. Management of the Faculty for Sport and Physical Education, set its priority to broaden international cooperation, follow development trends set by EU member states and implement them in the teaching process of the Faculty for Sport and Physical Education in Niksic and thereby the University of Montenegro as well. Discussion: Montenegro, as the country which fulfills, with expected dynamics, the chapters for EU membership, has successfully closed the chapter regarding education. That way, it has clarified that it is open for all kinds of international cooperation, for participation in the projects to help development of educational system in Montenegro, neighbor countries, region, EU countries that it will soon belong to in accordance with joining dynamics. References: Agencija za mobilnost i programe EU. Dostupno na: <[www.mobilnost.hr](http://www.mobilnost.hr)> Preuzeto: 05.12.2016. godine. Greenley, G. (1989). Strategic Managment. New York: Prentice Hall, 132-135. Razvoj koncepta cjeloživotnog učenja na UCG. Dostupno na: <<http://www.ucg.ac.me/userfiles/Predlog%20Strategije%20CZU%20za%20UCG.pdf>> Preuzeto:04.12.2016.godine. Torrington, D., Hall, L.I., Tajlor, S. (2014). Menadžment ljudskih resursa. Beograd: Data status, 79-81.

## **CHANGING PUBLICATION PATTERNS IN THE MULTYDISCIPLINARY FIELD OF SPORTS SCIENCES (2003–2016) IN MONTENEGRO.**

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Introduction: An analysis of the changing publication patterns in the Sports Sciences in the period from 2003 to 2016 is presented on the basis of the available peer reviewed journals in Montenegro. Method: Data collection took place as part of the MSA funding system for Sports Sciences research. Results and Discussion: The development of the Montenegrin peer reviewed journals is described and an overview of its contents presented. In terms of coverage of available publications by the relevant databases such as Web of Science, Scopus etc. it has been observed that the quality decreased the quantity. Hence, the overall growth rate in recognizing the available publications by the relevant databases, decreased the rate in number of publications e.g. the Sport Mont Journal decreased the number of publications between 300 and 1000%, while Montenegrin journal of sports Science and Medicine kept the same number since its establishment. It is also very important to highlight that a steady increase in the number of publications in English is observed and it is the fact there is no articles published in the peer reviewed journals in the area of Sports Sciences in Montenegro in publishing in Montenegrin and other languages. However, no overall shift away from book publishing in English is observed and most of books are published on Montenegrin or other similar languages. Reference: Engels T, Ossenblok T, Spruyt E (2012). *Scientometrics*, 93(2), 373–390.

## Sport Statistics and Analyses

### DIFFERENCES IN GAME – RELATED STATISTICS FOR NLB LEAGUE TEAMS.

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**Introduction:** The study aims were to examine which game-related statistics can serve to discriminate between winning and losing teams and to determine the differences in game-related statistics for both NLB League and EuroLeague teams when they win and lose in two competition. **Methods:** The data includes 185 games in NLB League during season 2008/2009, and games that three teams from NLB played in Euroleague in two seasons (2007/2008 and 2008/2009) – 96 games. All games from NLB are divided by final score difference: 12 or less points (balanced) and more than 12 points difference (unbalanced games). A discriminant analysis was used to identify the performance indicators which best discriminate winning and losing in NLB and difference when teams from NLB winning and losing in NLB and in EuroLeague. **Results:** The results of the discriminated analysis showed that winning teams differ from losing teams in assists (SC=0.417), defensive rebounds (SC=0.399) and in successful 2-point (SC=0.355) and 3-point field goals (SC=0.325). In balanced games winning differ from losing teams in defensive rebounds (SC=0.388), successful 2-point field goals (SC=0.343) and blocks committed (SC=0.303). In unbalanced games difference was in assists (SC=0.434), defensive rebounds (SC=0.304) and successful 3-point field goals (SC=0.353). When teams played in NLB difference between win and lost was in assists (SC=0.395), successful 2-point field goal attempts (SC=0.371) and defensive rebounds (SC=0.326). When played in EuroLeague difference was in unsuccessful 2-point field goal attempts (SC=0.414) and blocks received (SC=0.318). **Discussion:** Results were consistent with previous studies (Trinic et al., 2002; García et al., 2013; Gómez et al., 2008) and pointed out the importance of team preparation for defense that force offense to take bad shoots and protection of the area under the basket. Team play in offense indicated by number of assists provides open shots from good positions (García et al., 2013; Gómez et al., 2008). Defensive rebounds were only game statistic that differ winning and losing teams in all performed analysis. When teams played in EuroLeague difference in unsuccessful 2-point field goal attempts and blocks received is probably due to higher quality of opponent players and teams. Win-loss record (W=37; L=59) shows that the teams from NLB had lower level of player and team qualities compared to the other teams from EuroLeague. Data obtained in this study may be useful for coaches in preparing their team and analyze opponents during preparations for competitions. **References:** García J, Ibáñez SJ, De Santos RM, Leite N, Sampaio J (2013). *J of Human Kinetics*, 36, 161-168. Gómez MA, Lorenzo A, Sampaio J, Ibáñez SJ, Ortega, E (2008). *Coll Antropol*, 32(2), 315-319. Trinic S, Dizdar D, Luksic E (2002). *Coll Antropol*, 26(2), 521-531.

## Sport Tourism

### POSSIBILITY FOR DEVELOPMENT OF SPORT TOURISAM IN HERCEG NOVI.

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<sup>1</sup>*Alfa BK University (Belgrade, Serbia)*

**Introduction:** In contemporary society, it is essential to approach sport and tourism from the scientific angle, because of valid understanding of the problems that sports and tourism have in the country/city.

The aim of the research is a theoretical and practical contribution for establishing the future direction of development of sports tourism in Herceg Novi as a destination of wider interest for Montenegro. Methods: The study was based on applying fundamental scientific method - the method of analysis, causal-descriptive, comparative statistical method alone. It was done with the additional help of a specially formed questionnaire that served to methodically collect data from responsible holders of the strategy and policies of sports tourism. Results: The results of this study provide an answer to the question of how the conditions of the global environment and significant problems through which Montenegro can reduce the negative impacts in the area of sports tourism in the case of the city of Herceg Novi. Or, how to choose the most suitable approach in the management of sports tourism and execute appropriate organization of training of athletes. Discussion: Promotion of local tourism at the level of cities and municipalities, carried out by local tourism organizations (LTO). With the exception of commercial tourist agencies relating to the holiday (recreational swimming), there is no promotion of other, serious, organized sports facilities. Construction of the sports and tourist complex "Sutorinsko polje" could maximize sports tourism in Herceg Novi and it's potential (Babic, 2009). However, if the state of Montenegro and the town of Herceg Novi apply experiences from developed sports-tourist destinations Palma de Mallorca in Spain, Antalya in Turkey or Ayia Napa in Cyprus, they could get the investment at almost half the price. Conclusion: Sports - entertainment facilities, increase revenues destination, make it more attractive'm interesting for visitors. However, the management of the Ministry of Sustainable Development and Tourism has not developed a strategy based marketing appearances of Montenegro, Herceg Novi nor in promoting the development of sports tourism. Herceg Novi Riviera is an ideal environment for the development of sports tourism. The significance of this research is reflected in the possible contribution of the future development of sports tourism in Herceg Novi. Reference: Al Jazeera Balkan Net (2016). [www.balkans.aljazeera.net](http://www.balkans.aljazeera.net). Posted on 11. January 2015, retrieved 23.02. 2016. Babic S. (2009). Urban design Tamaris Hotel - Herceg Novi: Sia, 29th Local Tourist Organization of Herceg Novi (<http://vvv.hercegnovi.travel/>), taken 25.06.2015.

## Sports Medicine

### FREQUENCY OF FLAT AND HOLLOWED FOOT AMONG THE STUDENTS OF THE FACULTY OF NATURAL SCIENCE AND EDUCATION IN MOSTAR.

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Introduction: Flat feet (pes planus) refer to a change in foot shape in which the foot does not have a normal arch when standing. Deviations in the normal structure of the medial longitudinal arch produce unbalanced, functionally unstable conditions of the foot such as pes cavus or pes planus. Specific evaluation criteria for both pes cavus and pes planus are discussed, in addition to the adverse effects these two disorders have on weight bearing, force dissipation, and normal gait (Franco, 2016). The main objective of this study was to determine possible foot deformities students of the Faculty of Educational Sciences in Mostar. Students belonging to study physical education program. Methods: The research was conducted at the Faculty of Educational Sciences in Mostar, on the sample of 84 subjects. The variables sample consisted of total two feet deformities, as follows: flat foot (pes planus) and hollow foot (pes excavatus), divided into three degrees according to the severity of the deformity, ranging from the lightest to the most serious, including the feet without deformity. To determine the foot status, orthopedic



method is applied, where the plantar side of the foot is observed. The apparatus PODOSCOPE LUX 02990 is used. Results: Results are presented in table, in percentages and numerical representation of deformity assessment of flat and hollow foot. According to the results acquired, it is evident that, out of total 84 subjects, a number of 41 students (49%) are without any deformity. Numerical and percentage representation of flat foot deformity is as follows: 7 students (8.3%) - I degree; 10 students (11.9%) - II degree; 1 student (1.2%) - III degree. Numerical and percentage representation of hollow foot deformity is as follows: 11 students (13%) - I degree; 6 students (7.1%) - II degree; 8 students (9.5%) - III degree. Discussion: Till date majority of studies on prevalence of flat foot are conducted on Children below 10 years, but minimal literature is available with studies on 18-25 years age group (Bhoir et al., 2014). In children of school age, it have been observed that the percentage of representation of the foot is 59% (Jen-Huei et al., 2010). Also, research that is conducted in athletes indicates the presence of violated the arch of the foot even 60.71% of total respondents (Janicijevic et al., 2015). In this paper presented results indicate that even 51% shows the frequency of deformities of the feet flat and hollowed, although they are students of the department-physical culture. References: Franco, A.H. (2016). Pes Cavus and Pes Planus: Analyses and Treatment. *Physical Therapy*, 67, (5), 688-694. Bhoir, T., Anap, D.B., Diwate, A. (2014). *Indian Journal of Basic and Applied Medical Research*, 3, (4), 272-278. Jen-Huei, C. (2010). *Eur Journal Of Pediatrics*, 169(4), 447-452. Janicijevic, D., Mijajlovic, M., Ilic, D., Ilic. B. (2015). Foot status among young school age girls, 414-417.

## Training and Testing

### METEBOLIC ENERGY POTENTIAL IN YOUNG SOCCER PLAYERS COMPARED TO PLAYER POSITION.

**Andrasic, S.<sup>1</sup>, Cvetkovic, M.<sup>2</sup>, Gusic, M.<sup>2</sup>, Molnar, S.<sup>2</sup>, Cokorilo, N.<sup>2</sup>, Orlic, D.<sup>2</sup>, Stajer, V.<sup>2</sup>**

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Introduction: The aim of this study was to determine differences in metabolic energy potential of young soccer players compared to specific demands of players' positions. Blood serum samples were taken at three intervals for blood lactate concentration measurements, with aim to determine differences in capability of producing high workload during high blood lactate concentration ([La-]b) increase, as well as time of [La-]b removal speed based on specific playing position. Methods: This study was conducted on sixty young soccer players (14-16 years old) divided into 5 groups based on team playing position: 6 goalkeepers, 12 central defenders, 13 forwards, 14 central defending and attacking midfielders and 15 full-back defenders. [La-] b was measured by using finger-stick capillary blood analyzer at 3 stages of Cooper test: participants were analyzed before activity, 1 minute after activity and 10 minutes after activity (recovery period). In this paper basic descriptive statistics of all values as mean (AM), standard deviation (SD), minimum and maximum values, confidence interval of the coefficient of variation (CV), measures of Skewness and Kurtosis and value of Kolmogorov-Smirnov test were presented. For determining differences MANOVA, ANOVA, discriminative analysis and Roy's test were used. Results: Based on values of CV it was found that groups were significantly heterogeneous. Results MANOVA has shown ( $p=.122$ ) that there were no significant group differences. However, discriminative analysis shows presence of significant differences ( $p=.033$ ) confirmed by results of ANOVA values for [La-] b variable measured 1 minute after activity. Discussion: Differences in level of [La-] b 1 minute and 10 minutes after high-intensive activity showed that midfielders and forwards had the highest results.

Typical characteristics for these positions, compared to other positions in soccer, is higher amount of distance crossed as well as changes of dynamics of running speed and velocity. Results has shown that these positions had better ability to eliminate blood lactate and showing better physiology capability for repeating sprints and higher level of speed-sprinting endurance. Presented values may give coaches directions in training programming as well as understanding importance of different interval training using based on specific demands of player positions. References: Burgess, D. J., Naughton, G. & Norton, K. I. (2006). Profile of movement demands of national football players in Australia. *Journal of Science and Medicine in Sport*, 9, 334-341. Jeffreys, I. (2008). Movement training for Field Sports: Soccer. *Strength and Conditioning Journal*, Vol. 30, No.4. Reilly, T. (1997). Energetics of high-intensity exercise (soccer) with particular reference to fatigue. *Journal of Sport Sciences*, 15, 257-263. Bencke, J., Kjaer, M. & Bangsbo, J. (2006). Muscle and Blood Metabolites during a Soccer game: Implications for sprint performance. *Medicine & Science in Sports & Exercise*.

## **RELATIONS BETWEEN DIFFERENT MUSCLE FORCE CHARACTERISTICS AND SWIMMING PERFORMANCE IN HIGHLY TRAINED FEMALE SPRINT SWIMMERS.**

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*<sup>1</sup>University of Novi Sad (Novi Sad, Serbia), <sup>2</sup>Serbian Swimming Federation, <sup>3</sup>Faculty of sport and tourism (Novi Sad, Serbia), <sup>4</sup>Montenegrin Water Polo and Swimming Federation*

Introduction: The aim of this study was twofold. The first aim was examine the influence of different muscle force characteristics on female sprint swimming results quality. The second aim was to create multiregressional model which could use as a tool for swimming coaches with the purpose to female sprint swimming performance control and improvement. Methods: Sixteen highly trained female competitive swimmers all members of Serbian National Youth and Senior Swimming Team performed one trial of 30 seconds maximum effort in front crawl tethered swimming. Afterward, subject completed 100 m freestyle event. The system of variables consists of two groups, predictor system consists of 10 different muscle force characteristics variables and criterion system consists of 1 variable which represent swimming result quality on 100m freestyle expressed through FINA points. Means, standard deviations, minimum and maximum values were calculated for each variable. Pearson's correlation was used to quantify the association between the variables used in the research. The model of dependency in the observed variables was defined using the multiple regression analysis (backward method). Results: The swimming result quality on 100m freestyle expressed through FINA points significantly correlated with variables which represent explosive muscle force characteristics and variables which represent quantity of manifested force in time function. Regression equation for 100m freestyle result quality prediction was defined with variables which represent explosive muscle force characteristics and variables which represent quantity of manifested force also. Discussion: The results of this study provide encouraging support for the efficiency of muscle force testing under tethered swimming conditions to predict the result quality on 100m freestyle which agrees with the results obtained in previous studies (Keskinen et al., 1989; Dopsaj et al., 2000; Mourouco et al., 2014; Amaro et al., 2014). Equation of 100m freestyle quality prediction is defined by variables that measured the development of specific explosiveness which is in accordance with the results of previous studies (Dopsaj et al., 2000, Beretic et al., 2013) as well as the variables that represented quantity of manifested force in time function which is in accordance with previous study (Amaro et al., 2014). Thus by inserting variable values in obtained equation coaches can calculate the time required by particular female sprint swimmer to cover 100m freestyle race at the high

probability level and high prediction accuracy. References: Amaro N, Marinho D, Batalha, N, Marques, M, Morouco P (2014) *J Human Kinetics*, 41, 155-162. Beretic I, Djurovic M. Okicic, T, Dopsaj M (2013). *J Sport Sci and Med*, 12 (4), 639-645. Dopsaj M, Matkovic I, Zdravkovic I (2000). *Facta Universitatis*, 1(7), 15-22. Keskinen K, Tilli L, Komi P (1989) *Scand J of Sports Sci*, 11(2), 87-92. Mouroco P, Marinho D, Keskinen K, Badillo J, Marques M (2014). *J Strength and Cond Res*, 10, 15-19.

## **RELATIONSHIPS BETWEEN DIVERSE TESTS OF JUMPING ABILITY OF YOUNG BASKETBALL PLAYERS.**

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**Introduction:** Basketball is characterized by diverse manifestation of jumping comprising from different movement patterns (unilateral, bilateral) or types of muscle contraction (concentric, slow and fast stretch shortening cycle – SSC). Despite this fact, testing of jumping abilities in basketball is mostly narrowly focused to some basic tests like counter-movement jump (Alemdaroglu 2012). Studies failed to show whether diverse manifestation of jumping abilities of basketball players are of independent qualities. The primary aim of this study was to determine interrelationships between various jumping tests of young basketball players. **Methods:** The 31 young basketball (mean age: 17.1 years) players members of second division teams participated in this study. The variables analyzed were six jumping ability tests of which three were slow SSC actions (counter movement jump - CMJ, broad jump - BJ, standing triple jump - STJ), and three were tests of fast SSC actions performed bilaterally (drop jump from 40 cm height - DJ40) or unilaterally (dominant leg jump preceded by run up - DLJ and non-dominant leg preceded by run up - NLJ). **Results and discussion:** The tests used in this study were normally distributed and had appropriate inter-item reliability. Linear correlation analyses showed that tests shared between 16.8% and 76% of the common variance. NLJ was single out as the lowest correlated test among all analyzed variables that we prescribed to its higher coordination complexity, previously addressed for non-dominant limb actions (Tretriluxana, Gordon et al. 2008). The DJ40 was higher related to DLJ than to CMJ which suggesting that type of muscle contraction (fast vs. slow SSC) more than movement pattern specificity (bilateral vs. unilateral ) might be important for understanding diagnostic and training foci of jumping action. **In conclusion,** testing of young basketball players should have involved specific attitude in testing and training of unilateral and fast SSC jumping actions with special attention devoted to non-dominant limb. **References:** Alemdaroglu, U. (2012). *J Hum Kinet*, 31: 149-158. Tretriluxana, J., J. Gordon, et al. (2008). *Exp Brain Res*, 188(2): 305-315.

## **THE STRENGTH OF KICKING THE BALL AFTER PREPARATION PERIOD WITH U15 FOOTBALL PLAYERS.**

**Gardasevic, J.<sup>1</sup>, Bjelica, D.<sup>1</sup>, Vasiljevic, I.<sup>1</sup>**

<sup>1</sup>*University of Montenegro (Niksic, Montenegro)*

**Introduction:** The main aim of the research was to identify a level of quantitative changes of the strength of kicking the ball with fifteen years old football players under the influence of the programmed football training of a six weeks preparation period. **Methods:** According to the time orientation this was

a longitudinal study with the aim to define a quantitative changes of the strength of kicking the ball under the influence of the programmed football training with football players U15, which involved a summer preparation period of forty-two days. The training programme covered forty-four training units (Gardasevic et al., 2016a; Gardasevic et al., 2016b). The research was made on a sample of 120 football players U15. To estimate the strength of kicking the ball three tests have been used the strength of kicking the ball with foot-ball on the ground, the strength of kicking the ball with foot-ball in the air, the strength of kicking the ball with head. For determining differences in the variables at the beginning and at the end of training program we used discriminant parametric procedure t-test for big paired samples. Results: Based on the numerical values of the t-test it can be concluded that there are statistically significant differences in all three variables to estimate the strength of kicking the ball. This confirmed the hypothesis that the expected significant positive quantitative changes influenced by the proposed model of training in preparation period with fifteen years old football players. Discussion: In this research the authors were guided by the fact that this kind of training program in preparation period, where dominates the situational model training is very effective in terms of raising the strength of kicking the ball level with fifteen years old. The obtained results can be directed towards innovation plans and programs in the preparation period, and the adaptation of the same needs of the respective population (Gardasevic et al., 2015; Gardasevic & Bjelica, 2014). References: Gardasevic, J., Bjelica, D., Milasinovic, R., & Vasiljevic, I. (2016a). The Effects of the Training in the Preparation Period on the Repetitive Strength Transformation with Cadet Level Football Players. *Sport Mont*, 14(2), 31-33. Gardasevic, J., Bjelica, D., & Vasiljevic, I. (2016b). Six-Week Preparation Period and its Effects on Transformation Movement Speed with Football Players Under 16. *Sport Mont*, 14(1), 13-16. Gardasevic, J., Bjelica, D., & Popovic S. (2015). Efekti programiranog rada tokom pripremnog perioda na transformaciju agilnosti kod fudbalera kadetskog uzrasta. *Sport Mont*, 43,44,45/XIII, 355-360. Gardasevic, J., & Bjelica, D. (2014). Efekti rada u pripremnom periodu na brzinu vodjenja lopte petnaestogodisnjih fudbalera. *Sport Mont*, 40,41,42/XII, 160-166.

## **ESTIMATION OF MORPHO-FUNCTIONAL CHANGES AS A RESULT OF SPECIFIC TRAINING PROGRAM IN DIFFERENT COMPETITION LEVELS OF SOCCER PLAYERS.**

**Gusic, M.<sup>1</sup>, Krulanovic, R.<sup>2</sup>, Andrasic, S.<sup>3</sup>, Cvetkovic, M.<sup>1</sup>, Molnar, S.<sup>1</sup>, Smajic, M.<sup>1</sup>, Popovic, B.<sup>1</sup>, Ujsasi, D.<sup>1</sup>**

<sup>1</sup>University of Novi Sad (Novi Sad, Serbia), <sup>2</sup>High School of Traffic (Novi Sad, Serbia), <sup>3</sup>University of Novi Sad (Subotica, Serbia)

Introduction: Modern soccer demands a high level of functional capabilities, technical-tactical efficiency, so called morpho-functional universality from player, in order to successfully act in different game situations. Design of modern soccer game with all energetic segments included, gives a new dimension to conditioning programs that becomes the most important basics of high team result accomplishment. The aim of this study was to compare the efficacy of specially constructed training protocol on morpho-functional properties of soccer players in different competition levels. Methods: A group of sixty-six healthy soccer players (age  $26.8 \pm 2.3$  years, BMI  $23.7 \pm 4.9$  kg/m<sup>2</sup>) volunteered for this study, and were divided into two sub-groups in relation to competition levels (33 top level first league players and 33 national second level league players). Subjects were included in special (preparatory) conditioning program for 6 weeks, followed by initial and final testing. 8 anthropometric measures were measured, body composition (BT-905) and 3 tests for functional characteristic assessment: Yo-Yo Intermittent Endurance

Test, Conconi Test and RAST (TeamPolarSystem and NEWTEST). All descriptive parameters were presented as mean  $\pm$  SD. Data have been analyzed by using multivariate analysis of variance (MANOVA, MANCOVA) and analysis of variance (ANOVA, ANCOVA). Results: There has been significant difference in anthropometric variables between initial and final testing in both groups. Parameter Body Weight ( $p=0.021$ ) and Body Fat % ( $p=0.016$ ) decreased significantly in all athletes, but more apparent in the higher rank group. Also, significant difference in functional properties between initial and final testing has been noted in both groups. Improvement was obvious in variables for assessment of anaerobic capacity (peak power PP ( $p=0.006$ ), average power ( $p=0.001$ ), minimal power ( $p=0.002$ ), fatigue index ( $p=0.006$ ) on Rast-test). The lowest increase was for parameter VO<sub>2</sub>max mlO<sub>2</sub>/kg/min. No difference has been registered for following parameters: heart frequency at rest beat/min, maximal heart frequency beat/min and anaerobic threshold. Discussion: Modern top competition sport is unimaginable without systematic and thorough studying based on science, which can be applied on soccer as one of the most popular sports. On different competition levels, success is mostly dependent on a level of players and team competence, and the process of their specialization involves the transition through different preparatory protocols. References: Bangsbo J. (1994). The physiology of soccer – with special reference to intense intermittent exercise. *Acta Phy Scand*, 15, 1–156. Bangsbo J, Mohr M, Krstrup P. (2006). Physical and metabolic demands of training and match-play in the elite football player. *J Sports Sci*, 24, 665–74. Hof J. (2005). Training and testing physical capacities for elite soccer players. *J Sports Sci*, 23, 573–82. Wilmore JN, Costill DL. (1994). *Physiology of sport and exercise*. Champaign IL: Human Kinetics

## PHYSIOLOGICAL PROFILE OF SENIOR FEMALE SOCCER PLAYERS.

**Idrizovic, K.<sup>1</sup>**

<sup>1</sup>*University of Montenegro (Niksic, Montenegro)*

**Introduction:** The purpose of this investigation was to describe the physiological profile of elite, senior Montenegrin female soccer players. **Methods:** The participants for this study were 26 female soccer players who were members of Women's National football team of Montenegro. The subjects were the following: 4 goalkeepers, 6 defenders, 10 midfield players and 6 forwards, aged 18-25 years with an average playing experience of  $9.16 \pm 1.87$  years. The players were tested at the beginning of the 2012/13 competition season. Physical abilities tests was conducted by performing 9 motor function tests: standing long jump, countermovement jump, 10 m sprint, 20 m "flying" sprint, 30 m sprint, zigzag, zigzag with ball, 300 yards and Yo-Yo intermittent recovery test (level 1). All tests were performed on an outdoor grass pitch, and electronic timing gates were used to record completion times. **Results:** Physiological profile of Montenegrin female soccer players identified in this research point to a high level of its specificity concerning differences among players in relation to the quality of their motor abilities. **Discussion:** General relation between physical potential of Montenegrin players with those from other countries shows that when it comes to potential of high genetic predisposition they are at the same level as all other female soccer players. However, in the area of aerobic qualities, which point to a quality of specific realization and which are dependent on a quality training of this kind, they are lagging behind the players from other areas. Team profile of Montenegrin soccer players, on the basis of all the applied tests, except for YYIRTL1 and CMJ, shows they are at a similar (slightly lower or slightly higher) level with the results achieved by female soccer players in previous researches. Values of results in tests YYIRTL1 and CMJ, especially YYIRTL1, deviate from these standards and point to significant deviation from the results reported so far which, taking in consideration views of the authors, who have studied the

topic, would mean a lower level of physical match performance for Montenegrin female soccer players. References: Andersson H (2010). The physiological impact of soccer on elite female players and the effects of active recovery training (Unpublished doctoral dissertation), Örebro Studies in Sport Sciences, Örebro University. Garcia J, Quintana-Domeque C (2007). *Econ Human Biol*, 5(2), 340-349. Idrizovic K (2014). *Med sport*, 67(2), 273-287. Idrizovic K (2014). *Kond trening*, 12(1), 56-67. Mujika I, Santisteban J, Impellizzeri F, Castagna C (2009). *J Sport Sci*, 27, 107-114. Pineau JC, Delamarche P, Bozinovic S (2005). *C R Biol*, 328(9), 841-846. Tumilty D, Darby S (1992). *J Sport Sci*, 10, 144. Vecovi JD, Rumpf R, Brown TD, Marques MC (2011). *Scand J Med Sci Sport*, 21(5), 670-678.

## COMPARISON OF ANAEROBIC PERFORMANCES OF YOUNG SOCCER PLAYERS ACCORDING TO THEIR PLAYING POSITIONS.

**Kilic, O.<sup>1</sup>, Koklu, Y.<sup>1</sup>, Alemdaroglu, U.<sup>1</sup>**

<sup>1</sup>*University of Pamukkale (Denizli, Turkey)*

Introduction: Effective performance in soccer - a game which requires jumping, shooting, challenges, turns, dribbles, sprints, controlling the ball under pressure, running at different speeds, and sliding tackles - is dependent upon both aerobic and anaerobic metabolism (Açıkada et al., 1998; Stolen et al., 2005). It is very important to evaluate the anaerobic performance of soccer players. To our knowledge, there is little information available concerning the 60 s repeated jump test performances of young soccer players. The purpose of the present study was to compare 60 s repeated jump test performances of young soccer players according to their playing positions. Methods: Sixty (20 defenders, 20 midfielders, 20 forwards) young soccer players (average age  $16.7 \pm 0.7$  years; height  $173.8 \pm 6.5$  cm; body mass  $65.7 \pm 7.8$  kg) participated in this study voluntarily. For each player, anthropometric measurements (height and weight) were performed. Then, after 5 minutes standard warm-up, each player was performed 60 s repeated jump test on portable contact mat (Newtest Oy, Finland). Players were instructed to jump continuously with of maximum effort for the throughout 60 s of the test. Data were averaged across in 5 s intervals from the initial jump to the final 5 s of the test. Average power (AP, determined as the average power throughout the 60 s of testing), peak power (PP, determined as the highest value over a 5 s period of testing), minimum power (MP, determined as the lowest value over a 5 s period of testing) and fatigue index (FI, the lowest value over a 5-second period divided by the highest value over a 5-second period) values were calculated for each player. The differences in terms of playing position were evaluated by one-way ANOVA with Post Hoc Tukey test. Results: Significant differences were not found between playing positions in terms of AP (range from 31.2 to 52.1 W.kg<sup>-1</sup>), PP (range from 36.5 to 63.3 W.kg<sup>-1</sup>), MP (range from 19.1 to 42.8 W.kg<sup>-1</sup>) and FI (range from 12.7 to 52.3 %) ( $p > 0.05$ ). Discussion: As a conclusion, the present study results show that position roles have no differences anaerobic demands in young soccer players. Therefore, these results suggest that coaches should tailor fitness programs according to specific positions on the pitch in terms of anaerobic performance. References: Açıkada, C, Hazır, T, Aşçı, A, Turnagöl, H, and Özkara, A. (1998). Physical and physiological profiles of a second league division soccer team during preparation period. *Hacettepe J Sports Sci Technol* 1:3-14, 1998. Stølen, T, Chamari, K, Castagna, C, and Wisløff, U. (2005). Physiology of soccer. *Sports Med* 35: 501-536, 2005.

## COMPARISON OF MAXIMUM AEROBIC SPEED ASSESSED WITH DIFFERENT FIELD TEST PROTOCOLS IN YOUNG SOCCER PLAYERS.

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<sup>1</sup>*Pamukkale University (Denizli, Turkey)*

**Introduction:** One of the high intensity endurance training is maximum aerobic speed (MAS) training (Cappa et al., 2014). MAS the highest running speed that an athlete achieves during the incremental aerobic test (Baker, 2011). There are different test protocols to determine MAS. The aim of the present study was to compare maximum aerobic speed assessed with different field test protocols in young soccer players. **Methods:** Fifteen young soccer players (age 15.5±1.5 years; height 168.9.5±4.3 cm; body mass 58.1±7.1 kg; soccer training experience 4.9±1.7 years) voluntarily participated in this study. At the end of familiarization period, anthropometric measurements (height, and body mass) were taken for each player. Each player randomly performed seven different maximal test (Montreal Track test, MRT; Yo-Yo intermittent recovery test (level 1), YIRT; 20m shuttle run test, SRT; Incremental Running Test, IRT; 30-15 Intermittent Fitness Test, 30-15IFT ; 5 min run test, RT; Modify Shuttle Run Test, MSRT) sessions with at least two days intervals. A one-way repeated-measures analysis of variance was performed. A Bonferroni Post Hoc test was applied to make a pairwise comparison between MAS of different tests. **Results:** The 30-15IFT (17.6±0.9 km.h-1), IRT (17.1±0.8 km.h-1), MSRT (17.0 ± 0.8 km.h-1) and MRT (17.4±0.98 km.h-1) elicited significantly higher peak velocities compared to RT (14.9±1.0 km.h-1), YIRT (15.7±0.4 km.h-1) and SRT (14.7±0.3 km.h-1)(p<0.05). **Discussion:** These results suggest that coaches and sports scientists who want to achieve higher peak velocities in the field tests could use 30-15IFT, IRT, MSRT or MRT test protocols compare to RT, YIRT or SRT test protocols. **References:** Baker, D. (2011). Recent trends in high-intensity aerobic training for field sports. *Prof Str Cond*, 22: 3–8. Cappa, DF., Garcia, GC., Secchi, JD., Maddigan, ME. (2014). The relationship between an athlete's maximal aerobic speed determined in a laboratory and their final speed reached during a field test (UNCa Test). *Journal of sports medicine and physical fitness*, 54(4): 424-431.

## THE EFFECT OF STATIC STRETCHING IN AGILITY AND ISOKINETIC FORCE AT FOOTBALL PLAYERS.

**Sermaxhaj, S.<sup>1</sup>, Arifi, F.<sup>1</sup>, Bahtiri, A.<sup>2</sup>, Havolli, J.<sup>2</sup>**

<sup>1</sup>*University of Montenegro (Niksic, Montenegro)*, <sup>2</sup>*Universe College (Prishtina, Kosovo)*

**Introduction:** The conditional preparation is the base to execute all the elements techno-tactical and responsible to differentiate between the high and low levels of the football players (Popovic et al., 2013). Recuperation of organism is one of many important components to increase sport performance (Rey, Ezequiel et al., 2012). The aim of this research was to prove the impact of the static stretching in the exercises which are applied during the phase of recuperation (cool down) in the agility and isokinetic force of the young football players under the age of 17. **Methods** twenty four (24) young football players under the age of 17 have participated to the study, divided into two groups (control and experimental) during the period of August and November 2015. They exercised 3 times a week, in total doing 48 training sessions, under the plan and the programme of the football school of Ramiz Sadiku Club in Prishtina. With univariate analysis of variance (ANOVA) repeated measures were calculated differences between arithmetic means of control and experimental group before and after experimental programme

(static stretching). The level of significant is  $p < 0.05$ . Results: The results according to the univariate analysis of variance (ANOVA) have shown that the static stretching exercises applied at the end of the training session “cool down” have had no important impact in the agility and isokinetic force of the football players under the age of 17. Discussion: Although a great number of studies have focused on researches of training programs for improving of agility (Behm et al., 2011; Milanovic et al., 2013) and isokinetic strength of knee flexors and extensors (Brito et al., 2010; Lehnert et al., 2014), the static stretching is still one of the main discussions in sport and medicine. In this research, it has been proved that the static stretching exercises applied 3 times a week during the cool down period, in a duration of 16 weeks did not have any important statistical effect in the testing of the agility and isokinetic force at the football players U17. References: Behm DG, Chaouachi A, Lau PWC, Wong DP (2011). *J of Sports Sci and Med*, 10(2), 408. Brito J, Figueiredo P, Fernandes L, Seabra A, Soares J, Krstrup P, Rebelo A (2010). *Isokinetics and Exercise Science*, 18(4), 211–215. Lehnert M, Psotta R, Chvojka P, Croix M (2014). *Kinesiology* 46(1): 79-87. Milanovic Z, Sporis G, Trajkovic N, James N, Samija K (2013). *Jurnal of Sports Sciences and Medicine* 12, 97-103. Popovic S, Akpınar S, Jaksic D, Matic R, Bjelica D (2013). *International Journal of Morphology*, 31(2), 461-467. Rey E, Carlos LP, Luis C, Joaquin LB (2012). *Journal of Human Kinetics*, 31, 121-129.

## Traumatology

### DEGENERATIVE CHANGES IN THE JOINTS WITH FORMER ATHLETES.

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<sup>1</sup>*University of Montenegro (Niksic, Montenegro)*

Introduction: Degenerative changes in the joints with the long term sports activities, has as a consequence mainly local outright. The course of disease is progressive with a shorter or longer period of improvement. Methods: The paper analyzes the 75 active and former athletes, who were treated at the Orthopaedics and Traumatology Clinic Clinical Centre of Montenegro due osteoartrtic changes in the hip, knee and hock incurred several years after the end of a sports career, in most cases after an injury during a sports career. Results: In the case most of the people named direct or indirect violation of the regions to which they complained. The clinical picture was confirmed by X-ray diagnostics, formerly computed tomography (CT) or magnetic resonance (MR). Laboratory tests confirmed the disease was not created as a result of other systemic diseases. Discussion: Finally, it is concluded that daily physical activity during sports training and competition, especially in unsuitable conditions and a long sports career, which is occasionally complicated by easier and more difficult injuries, creates a convenience for the progress of secondary osteoarthritis. References: Oiestad BE, Engebretsen L, Storheim K, & Risberg MA. (2009). Knee osteoarthritis after anterior cruciate ligament injury: a systematic review. *Am J Sports Med*;37(7):1434–1443. Xiaojuan, L., & Stulberg, D. (2009). Knee Degeneration *J. Bone Joint Surg.*;91(Supp 1):50.



## Workshops

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### Workshop 1

#### **BUILDING A HEALTH ENHANCING PHYSICAL ACTIVITY SERVICE**

Clinical trials show the positive effectiveness of several exercise programs on health, but the transference to feasible public health community programs requires further competencies and techniques. The European Network for the Promotion of Health-Enhancing Physical Activity (HEPA Europe) is a network of the WHO Regional Office for Europe working for better health through physical activity among all people in the WHO European Region, by strengthening and supporting efforts to increase participation and improve the conditions for healthy lifestyles. One major purpose is to develop, support, and disseminate effective strategies and multi-sectoral approaches in the promotion of health-enhancing physical activity. This workshop is willing to disseminate strategies to promote the exchange and alliances between the different stakeholders (scientists, policymakers and professionals, young scientists and technicians) to cooperate and assess how to build and evaluate a practical services to community. The purpose is to present, interacting with attenders, a pragmatic model and examples to develop and evaluate an exercise-based public health program that attenders could apply in their professional or research tasks.

#### Agenda:

- a. Competencies of an international health promoter and general model to build the service
- b. Selecting and reaching the target population
- c. Building alliances
- d. Monitoring and evaluation for different stakeholders and marketing
- e. Using monitoring (fitness, health related quality of life) to implement better exercise protocols.



**Dr. Narcis Gusi** is Professor in Physical Activity and Health and head of the research group Physical Activity, Quality of Life and Health integrating members from university and health care system. He is PhD in physiology, MSc in health economics, Ms in sport psychology and Postgraduated in Applied Statistics. He is member of the Steering Committee of The European Network for the Promotion of Health-Enhancing Physical Activity (HEPA Europe) is a network of the WHO Regional Office for Europe, and member of Task Forces in EuroQol Foundation (Quality of Life and Health Economics) He has been temporal advisor of WHO in projects for socially disadvantaged and obesity. He participated in EU projects with Unit of Sports and DG Public Health for building capacities, inter-sectoral alliances and policies (PASEO, IMPALA, EUNAAPA, Senior Sport, Join In, PHAN), EuroQol Foundation projects (EQ-5D-Y, Population Studies, health economics valuation) and projects studying the effects of exercise on persons with diabetes neuropathy in health care setting. He has been scientific director of a Public Health Program linked to health care system named Exercise Looks After You attending more than 8000 elderly (diabetes, over-weighted and obesity, depression), 400 over-weighted children and disabled. He regularly publishes in peer-reviews journal with impact factor in public health, cost-effectiveness of programmes, obesity, aging, rheumatology, sport sciences and rehabilitation ( $h > 18$ ). At national level, he also leads epidemiological and applied projects in occupational health, caregivers of dementia and tele-health.

## Workshop 2

### MANAGING A COACHING STAFF OF SPECIALISTS

The question to be answered is why the job title of a head coach in the English Premier League is Manager and not head coach like in European basketball? How can Novak Djokovic have “two” head coaches or why do NBA teams have invented a job title like associate head coach? We will try to look into that topic looking into of sports with its specific needs but coming to a conclusion that European Basketball coaching staffs will need to transform to a bigger coaching staff of specialist and especially need to be trained in modern technological developments. In European Basketball we have a high intelligence on tactics but that needs to be enhanced with specialist knowledge and technological implementation of that expertise’s. With the discussion we will try to get an answer of what it needs for European Basketball to set up a system in which the head coach would also be referred to as a Manager of a coaching staff of specialist.



**Goran Sasic** has graduated from the coaching colleague in Belgrade and after that he specialized in scouting technologies and last but not least in Marketing and Communications. He works for Euroleague Basketball in the Basketball Operations department from 2010. During the first 5 seasons he administered the scouting server of Euroleague Basketball and logged many hundreds of games. He also organized the EBI Annual workshops head coaches, team captains and team scouts workshops. Since the year 2010 he is managing the EBI Master in Sports Management and Marketing. Before his time with Euroleague Basketball he worked as a coach, team manager and as a sports director.

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OSC offshore simulator at Maritime Faculty Kotor, Montenegro



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