



VYTAUTAS MAGNUS UNIVERSITY EDUCATION ACADEMY

12th CONFERENCE OF BALTIC SOCIETY OF SPORT SCIENCES

**„SPORT SCIENCE FOR SPORTS PRACTICE,
TEACHER TRAINING AND HEALTH
PROMOTION”**

ABSTRACTS

April 25–26, 2019,
Vilnius, Lithuania

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Vilnius LT-03113, Lithuania

Technical edition and computer composition of text:

Žaneta Šalnaitė

Donatas Gražulis

The bibliographic information about the publication is available in the National Bibliographic Data Bank (NBDB) of the Martynas Mažvydas National Library of Lithuania

ISBN 978-609-467-384-9 (Online)

<https://doi.org/10.7220/9786094673849>

DEAR FRIENDS,

On behalf of the Baltic Society of Sport Sciences (BSSS), Vytautas Magnus University Education Academy, Lithuanian National Olympic Committee and Lithuanian Olympic Academy we have the honour to invite you to take part in the work of the 12th Baltic States Sport Science Conference „Sport Science for Sports Practice and Teacher's Training and health promotion” in Vilnius, Lithuania. Vilnius hosts the BSSS conference for the third time.

Vyatautas Magnus University Education Academy has the honour to assume the main responsibility for the organization the Conference.

The annual event brings together the teaching staff, research fellows and doctoral students from the institutions of university-level education in the Baltic States and several other countries. Sport scientists from 25 countries already acknowledged their intention to present their study in the Conference this year: from, Germany, UK, Norway, Finland, Italy, Croatia, Spain, Austria, Slovakia, Poland, Greece, Iceland, Turkey, Israel, Brazil, Portugal, China, Chile and others. Traditionally, the Conference offers the opportunity for colleagues to learn about the research results yielded by others and to launch or renew cooperation projects. The format of the conference hopefully encourages academic discussions and interaction between the participants and renowned scientists who have been invited to deliver keynote speeches. The Conference traditionally includes competition for the award of young scientists, who get the chance to exchange ideas and establish contacts for developing their research projects.

The Conference is held in the Best Western Hotel Conference Centre that has excellent facilities for a successful scientific meeting. The Conference venue is located in the city centre, allowing easy access to several hotels, shops and restaurants. We are looking forward to seeing you in Vilnius, Lithuania.

Prof. Dr. Rūtenis Paulauskas
Chairman of the Conference Scientific Committee

BALTIC SPORT SCIENCE SOCIETY

BALTIC SPORT SCIENCE SOCIETY (BSSS) is a non-profit organization founded in Vilnius (the Republic of Lithuania) during the Second Baltic State Sport Science Conference (April 23–25, 2009) with the objectives:

- a) to promote study and development of sport sciences in the Baltic States (the Republic of Estonia, Republic of Latvia, Republic of Lithuania);
- b) to enhance the quality of doctoral studies (PhD) in the Baltic States;
- c) to organize scientific meetings and courses in the field of sport sciences;
- d) to cooperate with national and international organizations in sport sciences and related fields.

The leading organizations of the BSSS are:

- Faculty of Exercise and Sport Science, University of Tartu, Tartu, Estonia;
- Latvian Academy of Sport Education, Riga, Latvia;
- Lithuanian Sports University Kaunas, Lithuania;
- Vytautas Magnus University Education Academy, Vilnius, Lithuania.

Associated members are:

- J. Pilsudski University of Physical Education, Warsaw, Faculty of Physical Education and Sport, Biala Podlaska, Poland;
- Belarusian State University of Physical Culture, Republic of Belarus, Minsk.

The membership of BSSS includes individual members from the Baltic States (the Republic of Estonia, Republic of Latvia, and Republic of Lithuania) who have a PhD degree in sport or related sciences. Master's and doctoral (PhD) students are on the status of junior members. Membership is open for scholars and doctoral students from other countries as well.

The presidents of the BSSS:

- 2009–2012 Prof. T. Jürimäe (University of Tartu, Estonia);
- 2012–2015 Prof. A. Skurvydas (Lithuanian Sports University);
- 2015–2018 Prof. J. Grants (Latvian Academy of Sport Education);
- 2018– Prof. J. Jürimäe (University of Tartu, Estonia).

The main event of BSSS is an annual conference. Each spring the host organization arranges the Baltic State Sport Science Conference:

- The first Baltic Conference in Exercise and Sport Sciences – Tartu, May 7–10, 2008;
- The second Baltic Conference in Exercise and Sport Sciences – Vilnius, April 23–25, 2009;

- 2010 – Riga, Latvia;
- 2011 – Tartu, Estonia;
- 2012 – Kaunas, Lithuania;
- 2013 – Riga, Latvia;
- 2014 – Tartu, Estonia;
- 2015 – Vilnius, Lithuania;
- 2016 – Kaunas, Lithuania;
- 2017 – Riga, Latvia;
- 2018 – Tartu, Estonia.

The aims of the conferences are:

- to enhance the quality of sport sciences in the Baltic States;
- to organize a young scientist section during the conference in order to promote PhD studies;
- to invite leading scientists all over the world as key-note speakers.

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KEY-NOTE SPEAKERS' PRESENTATIONS

SPORTS WORKERS' WELFARE IN EUROPEAN MEN'S BASKETBALL: CONTEXT, EXPERIENCES, CONCERNS AND POSSIBILITIES

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Aim of the study: The study of labour and employment have been a longstanding interest of scholars, particularly sociologists, who have recently focused attention on the increasing precarity of work (i.e. employment which is uncertain, unpredictable, insecure, temporary and risky). In Europe, sports workers (employees of the professional sports industry) comprise a significant part of the labour force. Their careers are often characterised by short-term contracts, spells of unemployment, social and geographical transitions, movement to/ from lower leagues, and forced/unforced retirement. Thus, sports work is characterised by precarity. The aim of this study was to explore workers' experiences and interpretations of the precarity of their work in professional men's basketball in Europe. Methods: Data were generated from 15 semi-structured interviews with players, coaches and general managers (American, European and non-European) who were working in various leagues around Europe. Grounded in the interpretivist paradigm, this work pays attention to how the precarity of work and life of sports workers intersect at particular times and in particular contexts and the impact it has on workers' experiences and their welfare. Results and Conclusion: The data suggest that the surplus of high-quality sports workers and the often short-term nature of their careers creates a context of uncertainty and insecurity. Aware they are 'only as good as their last game', this 'disposable workforce' frantically tries to maximise employment opportunities within a limited (yet unknown) time frame. Longevity in the industry appears to be dependent upon workers' ability to display flexibility, adaptation and the capacity to cope with uncertainty. Whilst precarity has an impact on the nature of work, workplaces and individual work experiences, it also has implications on 'nonwork' life. Sports workers revealed that the precarity of their work had an impact on their physical, social, emotional and psychological well-being outside of sport. As such, this line of inquiry contributes to on-going discussions of organisational responsibilities regarding the employment conditions of sports workers and their welfare, well-being and 'duties of care' which are an increasing concern amongst policy makers and sport federations.

THE IMPORTANCE OF THE MAINTENANCE OF SKELETAL MUSCLE MASS FOR METABOLIC HEALTH

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The main role of muscle is to allow body movements via the generation of force, with the importance of this highlighted in conditions associated with muscle mass loss, such as sarcopenia. Additionally, skeletal muscle has a critical, but often overlooked, role in metabolism. For example skeletal muscle is the primary protein store in the body, and during starvation or conditions such as AIDS, can provide gluconeogenic precursors which are crucial for survival. On top of this, as muscle is the primary site for glucose disposal in the body it is therefore important in metabolic conditions such as diabetes. Extending this further, the importance of muscle in lifelong health is reflected by data demonstrating the association of muscle mass/function with mortality. This is highlighted by our recent work, published in the BMJ, where we demonstrated, in ~500,000 participants (40–69 years) from the UK Biobank, that each 5 kg lower grip strength was associated with increased risk as shown by hazard ratios (HR) of 1.11 (all-cause mortality), 1.14 (CVD events) and 1.06 (all-cancer events). Similarly we have demonstrated that the increased risk of all-cause and CVD mortality in people with type 2 diabetes (T2D) is attenuated in those with high grip strength (CVD mortality with low [HR 4.05] vs high [HR 1.46], both relative to people without T2D with low grip strength). Taking this evidence together this indicates that the maintenance of muscular strength is of clear importance for public health. Muscle strength is determined through a combination of multiple modifiable and non-modifiable factors. The primary modifiable factors is genetics with data indicating that hand grip strength is ~50% heritable [8]. On the non-modifiable side the primary factors important for the maintenance of muscle mass/strength are nutrition, particularly sufficient protein intake, and physical activity, particularly resistance exercise which is even effective in nonagenarians. Resistance exercise has been shown, in a wide variety of populations, to be efficacious in increasing muscle mass and function, increasing basal metabolic rate, reducing blood pressure, improving blood lipids and glycaemic control. Indeed, a meta-analysis in 2011 found that resistance exercise training can result in a 0.6% reduction in HbA1c.

ASSOCIATION BETWEEN UPPER AND LOWER EXTREMITY MUSCLE STRENGTH DEPENDENT ON HEALTH STATUS AND PHYSICAL ACTIVITY IN OLDER ADULTS

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Aim: To evaluate the association between handgrip strength (HGS) and lower extremity muscle strength in older populations differing in health status and physical activity. **Subjects and methods:** In the first study, data were retrieved from three cohorts (overall 561 individuals, 38% men, aged 60–90 yrs) encompassing healthy older individuals (European MyoAge cohort), geriatric outpatients, and older individuals post hip fracture (Yeung et al., *JAMDA*, 2018, 19: 703–709). In the second study, two groups (regularly exercising and inactive) of healthy older women (n=32, aged 65–80 yrs) participated (Rava et al., *JAPA*, 2017, 25: 58–64). HGS was measured using an isometric hand dynamometer. Knee extension strength (KES) and leg extension strength (LES) were measured using dynamometer chair. Body composition was assessed by dual-energy x-ray absorptiometry (healthy individuals), or by direct segmental multifrequency bioelectrical impedance analysis (geriatric outpatients and individuals post hip fracture). Gait performance was assessed by 6-minute walking test (healthy individuals), 4-m walking test (geriatric outpatients) and 10-m walking test (individuals post hip fracture). **Results:** In the first study, HGS and KES were lower in geriatric outpatients and older individuals post hip fracture compared with healthy older adults. A low correlation was found between HGS and KES in healthy older individuals ($r=0.35$ in men and $r=0.44$ in women, respectively, $p<0.05$), and moderate in geriatric outpatients ($r=0.54$ in men and women; $p<0.05$) and older individuals post hip fracture ($r=0.44$ in men and $r=0.57$ in women, respectively; $p<0.05$). In the second study, regularly exercising older women had higher ($p<0.05$) values of LES compared with inactive women, whereas HGS did not differ significantly in these groups. A moderate positive correlation was found between HGS and LES ($r=0.52$; $p<0.05$) in healthy older women. **Conclusions:** A low to moderate association between upper and lower extremity muscle strength was found as a function of health status at population level. The assessment of HGS and LES in older women with different physical activity level indicated that regular exercise training had a beneficial effect on maintaining muscle strength in lower limbs but not in upper limbs in older age. The measuring of

one muscle group strength seems unjustified as an indicator of overall limb muscle strength in older adults.

FACTORS AFFECTING RATES OF MOVEMENT IN DIFFERENT TYPES OF LOCOMOTION

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Movement in locomotion has been studied for a long time. Studies of humans and animals have brought us a good understanding of how do we perform in different types of locomotion. Humans do perform several types of locomotion not only in their every days life but also in sport. In cyclic activities, the average velocity of progression is defined by the product of the distance traveled per cycle of motion (stride length) and the average frequency at which the cycle of motion is being repeated (stride frequency). It makes a wide range of possible step length and step frequency combinations at any velocity. The step length and frequency are usually freely determined or self-selected by the person and are rarely fixed or pre-established. Researchers have tried to find out whats the optimal frequency of the cycle of motion. A lot of different factors do appear as findings for big groups of humans and individuals. Also, many of those factors are playing a big role through different types of locomotion. Despite great success in previous studies, we still struggle to find the best solutions for the practical application of our knowledge in the sport.

MOVING TOWARDS POSITIVE INTERPERSONAL RELATIONSHIPS IN YOUTH SPORTS: THE COACH, THE ATHLETE AND THE PARENT (C-A-P) CONCEPT

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The interpersonal relationships between the coach, the athlete and the parent in youth sport is a complex and dynamic phenomenon (Gleaves, Lang, 2017). The athletic triad can be more or less effective and often influences the young athlete's decision to participate in sport, to remain in the sport and to pursue a sporting career in the future. The evaluation of coach-athlete-parent (C-A-P) relationship becomes an important aspect in a youth sports setting.

This international study aimed to link C-A-P into a continuous coach–athlete–parent educational and psychological process and to develop a reliable and valid questionnaire for measuring Coach-Athlete-Parent interpersonal relationships (C-A-P) in a youth sports setting. The keynote speech will include three stages of the presentation. In the first phase, the theoretical background of the athletic triad in maintaining and enhancing the positive interrelationships will be discussed. In the second phase, the high-standart international research in developing the C-A-P questionnaire process will be presented. Third, the video analysis of the C-A-P questionnaire development process will be performed and analyzed during the lecture. The C-A-P scale was developed by postdoctoral fellow Aušra Lisinskienė (Vytautas Magnus University, Lithuania) and her supervisor Marc Lochbaum (Texas Tech University, U.S.A., Vytautas Magnus University, Lithuania). The postdoctoral project grant funding was provided by 2014–2020 Operational programme for the European Union Funds Investments in Lithuania.

ORAL PRESENTATIONS OF YOUNG SCIENTIST

THE EFFECT OF DIFFERENT BACKSTROKE TECHNIQUES ON CHILDREN'S HEART RATE VARIABILITY ON THE INITIAL STAGE OF SWIMMING LEARNING: CASE STUDY

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Six-beat kick (i.e., six kicks per arm cycle) backstroke swimming model is considered to be the most rational. The use of rational technique as the general coordination of movements can be estimated from the point of adaptation of organism regulatory systems in the process of teaching swimming and possibility to impact on heart rate variability (HRV). The aim of study was to analyze the effect of different backstroke techniques on children's heart rate variability on the initial stage of swimming learning. Subjects: two 7-year-old children with rational and two 7-year-old children with irrational backstroke technique. At baseline and after a swimming lesson HRV in time and frequency domains parameters were assessed. Lessons consisted of warm up including 8x25m of different backstroke exercises and 8x25m backstroke swimming. After each 25m swimming the interval was used to correct swimming techniques. Results: After the lesson the rational backstroke technique increased in all measures: in frequency domains the values of high frequency band (HF), low frequency band (LF), total power (TP), also in time domains the percentage of differences between adjacent normal R-R intervals more than 50 ms (pNN50), square root of the mean of the sum of the squared differences between adjacent normal R-R intervals (RMSSD) and standard deviation of all NN intervals (SDNN) were increased. And the irrational backstroke technique decreased parameters of pNN50%, RMSSD, SDNN, TP, HF, LF after lessons. Conclusion. Adaptation reaction of organism regulatory systems for children, possessing rational system of backstroke swimming is expressed by means of adaptation with autonomic reaction to turn on, decreasing HRV. On the contrary, the increase in HRV when irrational technique is used features intensification of disregulation processes as a result of exhaustion, however, the use of rational backstroke swimming technique impacts on HRV time and frequency domains on the initial stage of swimming learning.

ASSESSMENT OF CONDITION OF RATIONAL NUTRITION OF ATHLETES IN KAZAKHSTAN

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The organization of a rational nutrition of sportsmen means presence of the certain mode including distribution of receptions of food during the day, a multiplicity of a food that should be strictly co-ordinated with a mode of training process. The athlete's need for energy and nutrients differs significantly depending on the sport and the amount of exercise. Important is the optimal distribution of food consumed during the day, as athletes advised to adhere to optimal nutrition, eat 3–4 times a day. However, studies show that these requirements do not always keep up.

The aim of the study is to evaluate the nutrition features of Kazakhstan athletes.

Methodology. Research diet regime of 60 athletes of Kazakhstan. Among them were 15 volleyball players playing in the national championship, 15 judokas, and members of the Kazakhstan national team, 15 judoists, members of the club team and 15 triathletes, members of the national team. To assess the state of rational nutrition, the questionnaire survey method was used. The surveyed answered questions:

- how many times do you eat per day;
- how many times do you have a snack between meals;
- how often do you eat at the same time.

The results of the study showed that only two times eat 11.7% of the subjects studied on the day, mostly triathletes – 27% of them. Three times a day 54% of volleyball players, 73% of triathletes, 100% of judoists and 80% of judoists of the club team eat.

Four and more times, 33% of volleyball players eat. Between meals once a snack 20.25% of the study, half – 37.75%, three times – 18.75%, four and more – 10%, 16.75% of the study snack.

At the same time every day, eat 51.5% of the study, 3–5 days per week – 24.75%, 1–2 days per week – 18,50% and 5% of the study indicated that they do not have continuous use of time food.

Conclusions. Comparison of the distribution of the studied on the number of main meal only 11.5% of the study feed four or more times a day, and only 51.5% of the study every day adhere to the regime of permanent food.

The nutrition regime of Kazakhstan athletes is not optimal, not enough of the

athletes under study eat 4 or more times a day. Not enough, only once a snack 22.7%, instead of having a snack – 11.7% of respondents.

EFFECT OF POSITIVE THOUGHTS ON CORTISOL AND IMMUNOGLOBULIN A INDICATORS (PILOT RESEARCH)

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Nowadays people promote good health and well-being through various physical activities. However, often the desired result is not achieved regardless of the training method used. To change this, it is necessary to understand the way of interaction of bioenergy and biochemical principles in human body as well as awareness in processes that activate or limit body movements. Emotions are chemical feedback of thoughts that reflects information about the content of a particular thought. Essential are emotional states – long-term concentration in the emotions of one group, which directly affects the well-being of the physical body. Recent research in quantum physics and epigenetics shows that the quality of human life, including physical body health, is directly derived from the content of the individual's thoughts. Mind Determines Human Biology!

The aim of the study is to prove the effect of thoughts as the main activator on biochemical processes in the body by evaluating changes in cortisol and immunoglobulin A indicators in the blood. Subjects: 6 men and women aged 35–45. Methods: 1. Partly structured interview 2. Laboratory tests 3. Finding experiment 4. Mathematical statistics Results: After 4 days, the cortisol level in the blood decreased by 18.35% and the immunoglobulin A increased by 66%. The results provide new opportunities for improving physical and mental health by significantly expanding the body's self-regulatory processes. Conclusions: 1. People with high stress levels have high levels of cortisol and low levels of immunoglobulin A in the blood. 2. The stressors identified are negative thoughts of a potentially negative event in the future. 3. Human biochemical processes in the body are affected by both negative and positive thoughts. 4. By deliberately replacing negative thoughts with positive ones, biochemical indicators in the body improve.

MONITORING INTERNAL AND EXTERNAL GAME LOADS AND WELL-BEING IN TWO CONSECUTIVE WEEKLY GAMES DURING THE IN-SEASON PHASE IN BASKETBALL

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Aim of the study. To investigate internal and external game loads and well-being differences between two consecutive weekly games during the in-season phase in basketball. Subject and methods. Seven players competing in second-tier Lithuanian championship [Nacionalinė krepšinio lyga (NKL)] were selected for this study (mean \pm SD, age: 20.8 ± 1.6 years, height: 195.0 ± 5.4 cm., body mass: 88.3 ± 4.2 kg., training experience: 11.6 ± 3.7 years). Each subject played 6 games [two games per week scheduled on consecutive days (Friday and Saturday)] across 3 weeks of the in-season phase, in which their game loads were monitored. Players' external load was evaluated using PlayerLoad (PL) and PL per minute (PLmin) via microsensors, while internal game load was evaluated throughout percentage of maximum heart rate (%HRmax), summated heart rate zones (SHRZ) method, training load calculated from session rating of perceived exertion (TL-sRPE). Well-being was measured using five-point Likert scale assessing fatigue, sleep quality, general muscle soreness, stress levels and mood. Comparison between games played on Day1 and Day2 (i.e. Friday and Saturday games, respectively) were assessed for each dependent variable via linear mixed model. Results. Results revealed a statistically significant lower PLmin, total well-being and greater perception of fatigue ($p < 0.05$) in Day2 compared to Day1. No statistically significant differences were found for all the other investigated parameters ($p > 0.05$). Conclusion. A congested match schedule with two games played in two consecutive days elicited higher fatigue and lower well-being status in Day2, negatively impacting the game intensity (PLmin). These findings suggest basketball coaches to properly manage the players' game loads by optimizing team rotation and to optimize between-games recovery strategies.

QUANTIFICATION OF EXTERNAL AND INTERNAL MATCH LOADS IN ELITE FEMALE TEAM HANDBALL

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Purpose: To assess concurrently the external and internal match loads in elite female team handball players and to verify the differences in match loads between matches characterized by different durations. Methods: Eight elite female court handball players (mean±SD; age 23.0±2.1 years; stature 173.5±4.9 cm; body mass 67.8±6.8 kg) belonging to the same elite female handball team were investigated. Individualized internal and external match loads were monitored during seven 1st Division Lithuanian Women's Handball League [Lietuvos Moterų Rankinio Lyga (LMRL)] and seven Women's Baltic Handball League (WBHL) during the 2017/18 season. The LMRL and WBHL matches were characterized by different duration (two 30-min halves and two 20-min halves for LMRL and WBHL, respectively). The investigated external load measures were total PlayerLoad (PL), PL per minute (PL.min⁻¹), while internal load measures were match load calculated from session rating of perceived exertion (S-RPE) and percentage of maximum heart rate (%HRmax). Results: The main outcomes revealed a PL.min⁻¹ of ~9 AU and ~84% of HRmax per match. Moreover, statistically higher total PL ($p<0.001$; ES= Moderate) and match load calculated from S-RPE ($p<0.05$; ES= Small to Moderate) were found in LMRL compared to WBHL. Conversely, no statistically significant differences were found for PL.min⁻¹ and %HRmax between the two leagues. Conclusions: The main results indicate that elite female handball matches requires high physical and physiological demands. Additionally, a higher match time corresponded to dissimilar responses in external and internal match loads suggesting coaches to monitoring match loads with different strategies.

STYLES OF SPECIAL ARTISTRY IN RHYTHMIC GYMNASTICS

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Rhythmic gymnastics is an Olympic sport and it should develop according to competitive sports tendencies in general. Rhythmic gymnastics etalon composition is characterized by technically impeccable, expressive, imaginative execution with virtuous apparatus work according to chosen music accompaniment's nuances and contrasts. Describing the expressiveness of rhythmic gymnast's performance, the term "special artistry" is used. Special artistry in rhythmic gymnastics means artistry of compositional content, artistry of rhythmic gymnast, shown by athlete during performance of competition composition and gymnast's artistic abilities, influencing aesthetical effect of composition performance. Incompatibility of various components of special artistry in rhythmic gymnastics to single style is preventing the creation of unified imaginative composition. The aim of the research is to define, classify and describe styles of special artistry in rhythmic gymnastics and to determine the correlation between gymnast's standing in competition; special artistry assessment calculated using special artistry evaluation work protocol and the special artistry style. During previous research the model of special artistry in rhythmic gymnastics and the work protocol for evaluation of special artistry in rhythmic gymnastics were created. Both were used in particular research preceding the following subjects:

1. To evaluate special artistry of the top rhythmic gymnast's during top level international competitions.
2. To define, classify and describe styles of special artistry in rhythmic gymnastics.
3. To determine the correlation between gymnast standing in competition; special artistry assessment and the special artistry style. To develop this research there were used following methods:
 1. Video-analysis.
 2. Analysis of scientific literature.
 3. Correlation method.

In total almost 500 videos of the top rhythmic gymnast's performances with different apparatuses during Europe championships, World Cups, World championships and Olympic Games were analysed. As a result 9 styles of special artistry in rhythmic gymnastics were defined, classified and described – 3 lyric, 3 heroic and 3 joyful styles. There is a substantial correlation

between gymnast's standing in competition; special artistry assessment and the special artistry style.

COMPARISON OF PARENTS' AND SWIMMING SPECIALISTS COMPETENCE COMPONENTS EVALUATION IN INFANT FLOATING

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Parents' competences in infant floating on the whole are often characterized by their insufficient knowledge, skills and practical abilities in maintaining correct and proper behavior in the aquatic environment. The purpose of our study is to compare parents' and swimming specialists' evaluation in competence level in infant floating. After the results of the study, it will be possible to see the views of both parties and to see the assessment of coherent or disagreeable competence component levels in infant floating. An assessment survey of the parents' competences level in infant floating was conducted from the beginning of September 2017 until the end of October and was organised at various branches of Riga Health Centre: RHC Kengarags, Imanta, Bolderaja and Ilguciema branch. 33 swimming experts and 112 parents' participated voluntarily in the survey. It was found that 3 questionnaires from swimming experts and 5 questionnaires from parents' were invalid as they did not follow the proper instructions. As a result 30 questionnaires from swimming experts and 107 questionnaires from parents' were finally processed and analysed. The content and statements put forward in the survey questionnaire regarding parents' competences level in infant floating were based on scientific concepts. In order to enable the objective assessment of Parents' responses to the questionnaire and process the statistics mathematically, each question has five variants of responses expressed on a five point scale.

Comparing the mode value of the assessment of infant floating opinion of specialists and the mode value of the self-assessment of parents, we can theoretically say that, at present, parents' self-assessment of their competence level in infant floating in several components (except three) is same with specialists opinion.

Comparing the mean results of the assessment of infant floating opinion of specialists and the mean results of the self-assessment of parents, we can theoretically say that, at present, parents' self-assessment of their competence level in infant floating in all basics components (except one) is higher than

specialists opinion. Having analysed the results obtained in more detail, we can see that the difference between specialists and parental assessment is statistically significant in several of the components we offer, which determine parenting competence level in infant floating.

EFFECTS OF FASTING AND CALORIC RESTRICTION ON SKELETAL MUSCLE MASS AND FUNCTION IN MICE

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Background. Skeletal muscles are highly sensitive to conditions that affect energy balance such as fasting (FAST) or caloric restriction (CR). However, there is a complex interplay between utilization of fat and lean body mass under conditions of negative energy balance. **Aim.** The aim of this study was to compare effects of CR and FAST on skeletal muscle mass and function in mice. **Methods.** C57BL/6J male mice were given 70% of total daily food intake for 13 weeks in CR group (n=9) or no food for 48 hours in FAST group (n=8). Plasma IGF-1 levels, muscle mass and contractile properties of soleus (SOL) as well as extensor digitorum longus (EDL) muscles were compared in mice from CR and FAST groups. **Results.** IGF-1 levels did not differ between CR and FAST groups, but CR group showed greater ($p < 0.05$) decrease in body mass and muscle mass than FAST group. Reduction in peak force of SOL was also greater ($p < 0.05$) in CR compared to FAST group. 1/2 relaxation time was faster ($p < 0.05$) in SOL, but slower ($p < 0.05$) in EDL of FAST compared to CR group. **Conclusion.** 30 % CR has greater negative effect on SOL muscle mass and force than 48h fasting in spite similar declines in plasma IGF-1 after these interventions. On the other hand, relaxation time of EDL is more sensitive to FAST than CR. Thus effects of CR and FAST on physiological functions vary significantly.

COMPARISON OF THE PHYSIOLOGICAL EFFECTS OF INDIVIDUALIZED AND STANDARDIZED TEAM WARM-UP PROGRAMMES IN MALE BASKETBALL PLAYERS

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The aim of this study was to compare acute physiological effects of individualized and standardized warm-up programs in male basketball players. Twenty

participants took part in the study (mean age \pm standard deviation: 24.6 \pm 3.5 years; body mass: 91.6 \pm 7.1 kg; height 195.0 \pm 5.2). First, basketball players performed their individual ordinary pre-competition warm-up program (IWU) for which no limits were set concerning the time or number of exercises performed, and no related recommendations were given. After two days they performed the specially designed basketball warm-up program (SWU). In order to compare the physiological effects of the two warm-up programs, heart rate (HR), skin temperature of thighs, isometric twitch contractile properties and maximal voluntary contraction (MVC) force characteristics of knee extensor (KE) muscle were measured. The duration of IWU was shorter than SWU ($p < 0.05$). An average HR during IWU was higher than during SWU ($p < 0.05$). The stretching part in IWU was shorter, but more intensive than in SWU ($p < 0.05$). The skin temperature of thighs increased equally after both warm-up programs ($p < 0.05$). Twitch peak force and MVC force of the KE muscles increased 13.9% and 12.8%, respectively, after IWU ($p < 0.05$), therefore force characteristics did not change significantly after SWU. It was concluded that the duration of IWU was longer than of SWU. Therefore force generation capacity of KE muscles enhanced only after IWU. The skin temperature of thighs increased equally after both warm-up programs.

THE RELATIONSHIP BETWEEN STIFFNESS AND PAIN FOLLOWING UNACCUSTOMED ECCENTRIC EXERCISE

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Purpose. To determine how muscle stiffness and pain are affected by gentle stretching and repeated eccentric exercise.

Methods. 21 healthy female undertook eccentric exercise of the elbow flexors and changes in resting elbow flexion angle (as a measure of muscle stiffness), pain on stretch scale, pain elicited by pressure (PPT pain) and upper arm girth were followed for 7 days. The effects of gentle passive stretching on pain and muscle stiffness were investigated 2 and 4 days after exercise. 11 participants also repeated the exercise with the same arm 6 weeks after the initial bout.

Results. There was a significant relationship between the pain on stretch scale and increased elbow flexion angle (Day 4; $R^2 = 0.65$, $p < 0.001$), whereas there was no relationship between elbow flexion angle and PPT pain. Elbow flexion angle was reduced by passive stretching and pain on stretch scale was also reduced from 3.0 (1.4, 5.1) to 0.75 (0.0, 2.0) (median (IQR) $p=0.01$). PPT pain was unaffected by the passive stretching, as was muscle swelling. Following the repeated bout, increases in elbow flexion angle were much reduced, as was pain on stretch scale ($p=0.02$). However, PPT pain was not significantly different between the two bouts of exercise.

Conclusions. The results indicate that reductions in pain on stretch scale, either by gentle passive stretching or as the result of repeated exercise, are primarily due to reductions in muscle stiffness which develops after eccentric exercise, whereas pain with pressure is relatively unaffected.

THE SPORT TRAINING OF PROFESSIONAL ROAD CYCLIST R. N. DURING FOUR OLYMPIC PERIOD YEARS

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The success of highly trained athletes is mostly influenced by the structure of their training program (Balyi, Way, Higgs, 2013). The aim of this study is to examine the sports training and achievements of the professional road cyclist R. N. during the four years of the Olympic period. This research applied the methods of document content analysis and case analysis. Descriptive statistics were used to analyze the following data: the arithmetic averages, standard deviation, the highest and lowest values. The data was processed by using the SPSS (Statistical Package for Social Sciences) program package. The professional road cyclist R.N. achieved the highest sports wins between the ages 25 to 27. The greatest achievement by R.N. at an international competition was winning 3rd place in the Road World Championship in Richmond (Virginia, USA). The cyclist gained this achievement at 27 years of age. R. N. has also won the 19th place at the most prestigious „Tour de France“ race in 2014. At that time he was 26 years old. „Giro d'Italia“ race is one of three highest level races, where R. N. won the 11th place in 2013. The age when R.N. achieved his highest sports results corresponds to the age specified in literature. Therefore it can be proposed that the prestigious races can only be won by highly trained athletes whose training is planned rationally in four-year and one-year cycles. The yearly duration of R.N.'s physical load was 931,25 hours. On average, 864,75 hours were appointed for work on the road, during which

R.N. cycled 30044,50 km in total. This is less than recommended for cyclists with high mastery. While analyzing the dynamics of the physical exertion during the four years of the Olympic period, it was revealed that the 4th year of the Olympic period was the most strenuous. The scientists recommend to decrease the amount of physical exertion during the Olympic year or to keep it the same as the previous years of the period. The analysis of his annual exertion showed that in 2013 and 2014 R. N. participated in two prestigious races „Giro d'Italia“ and „Tour de France“, both of which last 21 days. In 2015, when R. N. placed 3rd in the Road World Championship, he participated only in „Tour de France“. During the Olympic year, R. N. participated in both prestigious races. The cyclist placed 35th in the Olympics. The analysis of research data suggests that the exertion during the 4th year of the Olympic period was too strenuous and this prevented the cyclist from achieving a higher place at the Olympic Games.

OPEN AND SQUARE FOOT STANCE INFLUENCE TO THE BOW DRAWING PROCESS IN ARCHERY. PILOT STUDY

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An archer pushes the bow with an extended arm, which is statically held in the direction of the target, while the other arm exerts a dynamic pulling of the bowstring from the beginning of the drawing phase until it is released through dynamic execution. The release phase must be highly reproducible (H. Ertan et al., 2011). The basic technical skill of archery: stance, set, nocking, set up, drawing, full draw, release, follow through. (H. Takai et al., 2012). Nowadays top level archer used open or square foot stance, which the archers adopts. The aim of this pilot study was to compare the influence of open and square stance on archery technical skills – the bow drawing and release. Subjects and methods. 2 archery male shooters participated in this pilot study (17, 19 years old). All athletes a right hand is dominant and their regular shooting stance position is square stance. In total 96 shots were performed (recurve bow – 70”, 44Lbs; at 6 arrows in each series) from 5m and 10m distance (from A/B/C index) in each stance). A FitroDyne Premium device was used to measure basic biomechanical parameter during weight lifting exercise in graphical and digital form: the mean and maximum force $F(N)$ and power $P(W)$ from concentric phase of drawing the bow and the release. In this test the device was located in the direction of the bow force draw line. To analyze data was used Excel as the statistical package. Results. In the shooting test from 5m distance

without target (n=12 in each stance) in square stance F mean 196.38 ± 0.14 N, max 541.47 ± 111.71 N, in open – mean 196.49 ± 0.21 N, max 503.66 ± 29.02 N. Power results in this test – square stance mean 17.33 ± 3.91 W, max 263.00 ± 34.26 W and in open stance mean 20.21 ± 6.18 W, max 267.27 ± 46.75 W. Force results in the shooting test from 10m (n=36 in each stance) in square stance mean 196.44 ± 0.37 N, max 544.44 ± 179.35 N, in open – mean 196.36 ± 0.21 N, max 496.31 ± 35.14 N. Power results in shooting with aiming: square stance mean 16.47 ± 7.14 W, max 273.33 ± 44.20 W; in open stance mean 17.41 ± 3.90 W, max 270.46 ± 41.23 W. Conclusion. In square stance force F(N) max measurements were 7.51% higher (without target), and 9.7% higher (with target). In open stance P(W) max measurements were 1.62% higher (without target), and 1.06% lower (with target). For more reliable results there is a need for experiment with participants with open regular shooting stance.

PREFERRED STEP FREQUENCY IN RACE WALKING (A CASE STUDY)

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Step frequency is one of the most often studied biomechanical characteristics of human locomotion, included race walking. The aim of the study was to evaluate differences in physiological characteristics, while walking with changed step frequency form preferred step frequency. Methods: analysis of scientific literature; heart rate monitoring; lactate monitoring; respiratory analysis; ergometry; optical – electronical method; accelerometry; mathematical statistics. Two male national level race walkers took part in the study. Athletes performed 5 separate walking trials with their preferred and changed step frequency ($\pm 4\%$ and $\pm 8\%$). Results showed interindividual and intraindividual changes in spatiotemporal parameters of walking.

SEDENTARY BEHAVIOUR AND PHYSICAL ACTIVITY IN ASSOCIATION WITH WORK-RELATED MUSCULOSKELETAL PAIN IN FEMALE OFFICE WORKERS

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Aim: Sedentary behaviour is often represented by the absence of physical activity due to long lasting sitting. The aim of the present study was to evalu-

ate sedentary behaviour and physical activity in association with work-related musculoskeletal pain (MSP) in female office workers. **Subjects and Methods:** In this study, 215 female office workers aged from 22 to 75 years were participated. They have worked with computer 7.5 ± 3.0 (mean \pm SD) hours per day in sitting position, 37.1 ± 8.8 hours per week. Working experience as office worker was 10.9 ± 11.0 years in average. The computer workplaces were designed so that they acted mostly sedentary behaviour during work time. Physical activity was assessed by Baecke Physical Activity Questionnaire. Participants filled modified Nordic questionnaire, which evaluates MSP in different body regions. Also, the questionnaire about sedentary behaviour was used. **Results:** The office workers mostly (99.1% from worktime) spent in sitting position on chair. Overall 56% of participants practiced sport during leisure time. Thirty five percent of participants think that their physical activity is same as other persons in same age group, and 30.2% evaluated them more active, while only 3.3% thought they are more active than others. Leisure time physical activity was a quarter (26.5%) of participants less than 5 minutes in day. Also, in leisure time main activity was often walking (42.2%) and watching TV (27.4%). There was 13.5% of participants who never practice sport at leisure time. The prevalence of work-related MSP in office workers during last 30 days was higher in low back (75%) and neck (77%) region. A significant ($p < 0.05$) correlations between sitting hours per workday and work-related MSP was suggested in neck, in trapezius muscle (left and right side), in right hand fingers, and in shoulders (both left and right shoulder). Sixty-two percent of participants had ergonomic workplace in their opinion, not enough ergonomic was quarter of office workers, whereas 13% of participants self-assessed their workplace design non-ergonomic. Most of participants (90%) had time to take rest breaks, and 92% of office workers had satisfied with their work. **Conclusions:** In female office workers, working hours in sitting position were associated with work-related MSP in neck, shoulder and finger region. Approximately one-half of measured office workers practiced sport during leisure time.

AGE-RELATED CHANGES IN GLUCOSE TOLERANCE AND THE RELATIONSHIP WITH MUSCLE HYPERTROPHY IN THE M.PLANTARIS OF THE MOUSE

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Aim: Age-related decline in skeletal muscle mass and fatigue resistance are both important factors that contribute to the decline in quality of life in old age. Resistance exercise can induce hypertrophy and increase in muscle strength. In rodents, compensatory hypertrophy (CH) can be induced by muscle ablation or denervation of synergists and is accompanied by an increase in muscle mass, endurance and force generating capacity and provides thus a good model to study the limits of muscle plasticity in old age. The aim of this study was to assess the age-related changes in glucose tolerance and to what extent this is related to impaired muscle plasticity in old age. **Methods:** Ten- (young-adult; n=10) and 27- (old; n=9) month-old C57BL/6J mice were used. Dietary intake was monitored from the age of 6 or 25 months until the terminal experiment. Compensatory hypertrophy of the right m.plantar is was induced under anesthesia by denervation of the m.gastrocnemius and m.soleus; the left hindlimb served as contralateral control. Six weeks post-surgery, glucose tolerance was measured from blood that was collected at 0, 15, 30, 60 and 90 mins after administration of an intraperitoneal bolus injection of D-glucose (1g/kg body mass). To measure the contractile properties of the m.plantar is in situ, the animal was anaesthetised and the muscle was dissected free from other muscles and tissues, while maintaining its nerve and blood supply. The distal tendon was attached to the lever arm of a 400A force transducer (Aurora Scientific, Aurora, Ontario). The muscle was then supramaximally stimulated and optimal length was set. Following this, the ½ relaxation time, twitch contraction time, maximal tetanus force and fatigue index were measured. This was also done for the control leg and randomly the control or hypertrophied muscle was measured first. On completion of the contractile measurements, the animal was sacrificed with an overdose of carbon di-oxide and the m.gastrocnemius, m.plantar is and m.soleus muscles weighed and frozen in isopentane cooled in liquid nitrogen for later analysis. **Results and Conclusion:** The denervation of synergists overloads the plantaris muscle which will develop hypertrophy. It is hypothesised that hypertrophy will be attenuated in old mice and at least be partly attributable to insulin

resistance, as reflected by impaired glucose tolerance. Preliminary data will be presented and discussed at the conference.

FASTER VO₂ KINETIC AND GREATER VENTILATORY THRESHOLD IS DETERMINED BY HIGHER PHYSICAL ACTIVITY VOLUME IN ELDERLY WOMEN

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The aim of the study was to estimate relationships between physical activity variables, ventilatory threshold (VeT), oxygen uptake (VO₂) and heart rate (HR) kinetics in older women. Subjects and methods: Participants included 19 elderly women (67.1 ± 5.1 years). They completed increasing intensity walking exercise and two moderate intensity 6 min long constant walking exercises on a treadmill. The VeT was determined using a ventilatory equivalent method. The VO₂ and HR kinetic responses during on- and off transition were calculated by applying mono exponential equation. Physical activity was objectively measured using the accelerometer ActiGraph GT3X. Results: Time constant of VO₂ kinetics was negatively correlated with total activity counts (TAC), steps, moderate-to-vigorous intensity physical activity (MVPA) and light intensity physical activity per day (r = -0.735; r = -0.696; r = -0.626; r = -0.494 respectively, p<0.05) only during on-transition to moderate intensity walking. Furthermore, VeT was related with TAC, steps, MVPA and sedentary time per day (r = 0.532; r = 0.569; r = 0.506; r = -0.574 respectively, p<0.05). Conclusion: Higher physical activity volume is related with faster oxygen uptake kinetics response and higher ventilatory threshold. Longer sedentary time is related with lower aerobic capacity.

DO THE EFFECTS OF A WEB-BASED INTERVENTION PROGRAM FOR PHYSICAL EDUCATION TEACHERS ENDURE? – A 15-MONTH FOLLOW-UP INVESTIGATION

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Aim of the study A recent four-week web-based intervention designed to enhance physical education (PE) teachers' autonomy-supportive behaviour and to diminish controlling behaviour toward their students was effective (Tilga

et al., 2019). It was found that experimental group students reported significantly higher perceptions of cognitive, procedural, and organisational autonomy support from their PE teachers at one-month follow-up compared to students in the control group. The intervention also led to an increase in students' need satisfaction for autonomy, competence and relatedness, but not in intrinsic motivation. The present study collected follow-up data to investigate whether these effects endured also 15 months after the intervention. Subjects and methods A 2 (study group: experimental vs. control) x 3 (time: baseline vs. one-month vs. 15-month follow-up) randomized controlled design was adopted. The experimental group consisted of 14 PE teachers and their 156 secondary school students. The control group consisted of 14 PE teachers and their 165 students. Dependent measures included students' perceptions of their teachers' organisational, procedural, and cognitive autonomy support, students' psychological need satisfaction for autonomy, competence, relatedness, and intrinsic motivation. Repeated measures ANOVA was used to test study hypotheses. Results Results revealed that experimental group students exhibited significantly higher perceptions of teachers' organisational autonomy support ($F(1, 170) = 9.892, p = 0.002$) and need for autonomy ($F(1, 170) = 5.125, p = 0.025$) at one-month and 15-month follow-up than control group students, whereas significantly higher intrinsic motivation ($F(1, 170) = 17.592, p < 0.001$) only at 15-month follow-up.

Conclusions. The possible reason for the intervention effects enduring over the 15-months follow-up on experimental group students' perceptions of their PE teachers' organisational autonomy-supportive behaviour and students' need for autonomy is that teachers likely used the earlier professional development experience to make gained knowledge long-lasting during PE instruction. The possible reason for significantly higher intrinsic motivation in PE among experimental group students compared with control group students at 15-month, but not at one-month follow-up, might be that changes in the experimental group students' intrinsic motivation towards PE took more time to apply.

ASSOCIATION OF AGT (RS699) AND AGTR1 (RS5186) POLYMORPHISMS WITH PHYSICAL PERFORMANCE PHENOTYPE OF LITHUANIAN ATHLETES

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Angiotensinogen (encoded by the AGT gene) and angiotensin II type 1 receptor (encoded by the AGTR1 gene) are important for cardiovascular and skeletal muscle adaptation to exercise. The aim of this case-control association study was to investigate the polymorphisms of AGT Met235Thr (rs699) and AGTR1 A1166C (rs5186) in Lithuanian elite athletes. Methods. A total of 205 elite athletes (endurance (n=85), sprint/power (n=56) and mixed (n=64) groups) and 265 non-athlete controls (healthy unrelated Lithuanian citizens) were genotyped for AGT (C>T, rs699) and AGTR1 (A>C, rs5186) variants by restriction fragment length polymorphism methods. Anthropometric measurements and muscle strength (grip strength, short-term explosive muscle power (STEMP), anaerobic alactic muscle power (AAMP)), and maximum oxygen uptake (VO₂max) were measured. Statistical analysis was performed using Rv3.2. Results. The phenotypic measurements were different and specific to each sports groups (p<0.05). Significant differences in AGT genotypes distribution were observed between mixed athletes and controls (CC/CT/TT: 48.4/50/1.6% vs 64.5/32.1/3.4%, p=0.025). The AGT gene T allele was higher in sprint/power-oriented (26%) and mixed athletes (26.6%) compared to endurance-oriented (19%) and controls (19%). The AGT CC genotyped endurance-oriented athletes had significantly higher VO₂max than CC genotyped sprint/power athletes (p=0.00004). Regarding the AGTR1 variant, genotypes distribution significant differed between sprint/power-oriented athletes group and controls (AA/AC/CC: 32.1/55.4/12.5% vs 54/35/11%; p=0.008). The AGTR1 C allele frequency is more prevalent in sprint/power athletes (40%) compared to endurance athletes (29%), mixed (25%) and controls (25%) (p<0.05). The findings indicated that the AGTR1 heterozygous AC genotype is more prevalent in sprint/power athletes (55.4%) compared with endurance (39%), mixed (28%) athletes and controls (35%). AGTR1 AC genotyped athletes had significantly higher STEMP than AA genotyped athletes (p=0.036). Conclusions. Our findings provide support for an association AGT (C>T, rs699) and AGTR1 (A>C, rs5186) with athletic status in

Lithuanian athletes: the AGT T allele and AGTR1 C allele are associated with sprint and power ability. AGTR1 C allele (AC and CC genotype) confers ability to achieve better muscle efficiency in short-term, maximum-effort requiring physical activity and AGT CC genotyped athletes have better aerobic capacity.

DOES HEART RATE RECOVERY CHANGES AFTER MAXIMUM OXYGEN CONSUMPTION TEST DIFFERS DURING DIFFERENT PERIOD OF TRAINING FOR HIGH CLASS MALE FLATWATER KAYAKERS?

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Aim: Heart rate is one of the most important physiological figures during exercise. There are studies that prove that for untrained people, when they start to do endurance trainings, heart rate during exercise and recovery time improves. Heart rate is a known indicator of stability in our body, namely, increased heart rate is the body's regulatory system fault indicator. The source (V.N. Platonov, 2004) states that heart rate recovery changes when athlete's functional condition grows. The source (Willmore & Costill 2004) states that after endurance trainings heart rate adapts to training load and its values are on lower level. Evaluating our own and other athletes data analysis after testing in a sports laboratory, heart rate regeneration rates began to generate different thoughts and ideas on whether recovery from year to year really improves, whether it is a full-fledged functional readiness indicator from that we can judge the condition of athletes. So we set a goal to determine functional condition influence on heart rate changes in the recovery period after maximum oxygen consumption test. Subjects and methods: We took 12 high class paddlers – flatwater kayakers (Latvian National team members, international competition participants, finalists). They were repeating maximum oxygen consumption test for several years (3-4) and data of heart rate recovery and functional condition were collected, to determine the functional condition influence on heart rate changes in the recovery period after maximum oxygen consumption test. Various methods were used in research: ergometry, heart rate monitoring, blood lactate measuring during exercise, mathematic statistics. Results: Wilcoxon criterion indicates that the heart rate parameters (heart rate, total percentage drop) for kayakers after maximal oxygen consumption tests, improving their functional condition, changed (increased) by 0.46%. However, the criterion indicates that the sample, in this case the heart

rate drop in the total percentage differences on an occasional basis and the difference is not reliable. $T > T_{\alpha n}$. Heart rate recovery changes of 12 high-class paddlers were evaluated. Conclusions: Heart rate recovery dynamics in workout routines can be used as a direct effect of training estimator it cannot be transferred to a remote training effect (using a long period of time). For further conclusions study of athletes training loads are required. Although, studies in other sports would be necessary.

PSYCHOMETRIC PROPERTIES OF THE SPORT IMAGERY ABILITY QUESTIONNAIRE IN LATVIA

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Aim of the study: to adapt the Sports Imagery Ability Questioner (SIQA) in the Latvian Sports environment. SIQA was completed by 215 Latvian athletes. It is designed to measure and to assess the athletes' ability to imagine a variety of different content. The adaption was implemented by translating and customizing SIAQ to be used in the Latvian language and ensure adequate reliability and validity. Study methods: research and analysis of literature sources, questionnaire, mathematical and statistical methods. Results: internal reliability was assessed using Cronbach's Alpha (CR). Through assessment of the five subscales of SIAQ adaption to the Latvian language (skill, strategy, goal, affect and mastery), the results demonstrated adequate and high CR. To determine the validity factor analysis was performed. SIQA Latvian adaption has five factors. The factor number is the same as in the original version. However, one item from SIAQ did load onto different factor. Test-retest was carried out with interval of two weeks in between, in order to determine temporal reliability of questionnaire. Conclusion: the results indicate that the SIQA Latvian adaption measures imagery ability with respect to five types of imagery content. Therefore, the developed questionnaire has a good reliability and validity to use it in the Latvian environment.

PRESENTATIONS

INTERDISCIPLINARY COMPETENCIES IN SPORTS CLASSES AT PRIMARY SCHOOL

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Introduction. Interdisciplinary approach is one of the newly developed approaches that are now commonly used in a wide spectrum of disciplines. The modern-day trend in the pedagogical process of sports classes towards competency education for teachers produces a need to select and integrate mutually reinforcing themes into the lesson. The aim of this research is: to work out a competency-based sports class content for third grade students, implementing an inter-subject connection between native language and sports lessons. Methods: theoretical – analysis of literature sources and documents; empirical – approbation of sports class content for third grade students; teachers' self-assessment. Interdisciplinary education is a process in which two or more subject areas are integrated with the goal of fostering enhanced learning in each subject area. The three interdisciplinary teaching models – connected, shared, and partnership – provide approaches for integrating the skills and concepts of two or more subject areas (Cone, & Cone, 2001). The basic aim and purpose of interdisciplinary approach is to cultivate skills and values such as cooperatives, flexibility, adaptability, solidarity, but above all to provide basic knowledge, exploration, classification, selection, evaluation, resolution, and observation (Kaïttani, Derri, Kioumourtzoglou, 2016). Sport is a significant factor in the development of children and youth self-esteem, identity and feelings of competence. Using sport to promote competence in youth has tremendous benefits and sport can play in pedagogical process facilitating positive development of personality (Nedeljko, 2014). During the research teachers created a unified sports class theme in accordance with the (Latvian) language lesson theme. Teachers strived to help students notice how skills acquired in one subject were useful in the other, and also played a role in life outside school. After approbation of the lessons, a reciprocal connection from students and teachers' assessment of the lesson progress was obtained. Results show that students generally give positive feedback about teacher's interdisciplinary approach in content of sports classes, and teachers emphasize the enhancing of student's competencies and attitudes toward activities in sports classes. The interdisciplinary approach provides many benefits that

develop into much needed lifelong learning skills that are essential to a youth future learning.

PHYSICAL FITNESS AND MEDITERRANEAN DIET ON CARDIOVASCULAR DISEASE RISK IN ADOLESCENTS

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The aim of the study was to investigate the combined association of cardio-respiratory fitness (CRF), muscular fitness (MF), and adherence to a Mediterranean Diet (MeDiet) on cardiovascular risk in adolescents. Subjects and methods: A pooled study including cross-sectional data from 2 projects [2477 adolescents (1320 girls) aged 12–18 years]. Shuttle run test was used to assess CRF. MF was assessed by the standing-long jump and handgrip tests. Adherence to a Mediterranean Diet was assessed by Kidmed questionnaire. A cardiovascular risk score was computed from the following components: age and sex, waist circumference, triglycerides, systolic blood pressure, HDL-cholesterol, and glucose. Results: Analysis of covariance showed that participants classified as Optimal (High) adherence to a MeDiet/HighMF/HighCRF as well those classified as Low adherence to a MeDiet/HighMF/HighCRF had on average the lowest cardiovascular risk score ($F = 15.6$ $p < 0.001$). In addition, the High adherence to a Mediterranean Diet /LowMF/LowCRF group had the highest odds of having a high cardiovascular risk (OR= 7.1; 95% CI: 3.4–15.1; $p < 0.001$) followed by the low adherence to a Mediterranean Diet with LowMF/LowCRF group (OR= 3.7; 95% CI: 2.2–6.3; $p < 0.001$), High

adherence to a Mediterranean Diet with HighMF/LowCRF group (OR= 3.1; 95% CI: 1.4–7.0; $p = 0.006$), Low adherence to a Mediterranean Diet with LowMF/HighCRF group (OR = 2.5; 95% CI: 1.5–4.4; $p = 0.002$) when compared to those with High adherence to a Mediterranean Diet with HighMF/HighCRF, after adjustments for potential confounders. Conclusions: High muscular fitness and cardiorespiratory fitness seems to counteract the deleterious effect of having a low adherence to the Mediterranean Diet on cardiovascular disease risk. Therefore, these findings suggest that the combination of these two fitness components may be beneficial to adolescent's cardiometabolic profile, independent of Mediterranean Diet behaviour.

VARIATIONS IN FITNESS, BLOOD HEALTH MARKERS AND BODY COMPOSITION OF POSTMENOPAUSAL OVERWEIGHT WOMEN AFTER 12 WEEKS OF VARIED HIGH INTENSITY INTERVAL TRAININGS

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Aim of the study: Positive effects of high intensity interval training regimes on well-being and health parameters in both older populations and athletes are well established in the literature. However, data is scarce regarding the optimal combination of intensity and bout duration to get results that are more favorable through this type of exercise. The aim of this study was to determine the effects of high intensity interval trainings, which varies in intensity and interval duration, on blood glucose, insulin, cholesterol, triglycerides levels, body composition and cardiovascular fitness in postmenopausal women. Subjects: Forty-one overweight postmenopausal women (BMI > 25 kg.m², 55 ± 5.15 years of age) voluntarily participated in the study. Methods: All participants completed baseline fat mass (FM), lean mass (LM) and percent body fat (%BF) measures and fasting blood glucose, blood lipids, insulin and rating of perceived exertion (RPE) measures. To determine the peak power output (PPO) and individual training loads, an incremental rowing exercise test was performed. Subjects randomly assigned into sprint interval training (SIT), high intensity interval training (HIT) and continuous training (COT) groups. SIT and HIT groups completed 12 weeks of rowing ergometer training, 3 days/week, consisting of either 6 x 30 seconds (sec) bouts at 130% PPO with 3 and a half minutes (min) rest at 40% PPO or 4 x 2 min bouts at 90%

PPO with 4 min rest at 40% PPO. COT group performed 40 min at 65% PPO. After 12 weeks of training, all measurements repeated. Results: Body composition improved significantly after twelve weeks of SIT, HIT or COT. Significant developments were also determined in blood lipids, glucose and insulin profiles compared to baseline values ($p < 0.05$). Besides, cardiovascular fitness that was determined by PPO values was increased approximately 13% in all groups. However, the differences between the groups were not significant. RPE found significantly lower in SIT compared with HIT and COT. Conclusions: Both moderate intensity and high intensity rowing ergometer trainings determined to be an efficient modality to improve health related blood markers, body composition and fitness in overweight postmenopausal women. However, shorter duration intervals (SIT) were distinguished as easier by participants and can be favorable in terms of maintainability and exercise motivation, which is vital for populations such as overweight-obese individuals.

THE EDUCATION OF EMOTIONAL SKILLS AMONG SENIOR HIGH SCHOOL AGE STUDENTS IN PHYSICAL EDUCATION CLASSES

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Background. Physical education classes, during which students experience intense emotional situations, reveal students' character and personality and is the perfect environment for the development of students' social and emotional skills (Siskos, 2012). The aim of the study was to reveal the peculiarities of the education of emotional skills among senior high school age students in physical education classes. Study hypothesis – the application of education programme would allow expecting more developed emotional skills among senior high school age students in physical education classes. Subjects and methods. Participants in the study were 51 pupils of the ninth grade (15.15 ± 0.36). Experimental group consisted of 25 and the control group of 26 senior high school age students. The measures of emotional skills were evaluated using Schutte Self-Report Inventory (SSRI), Rosenberg Self-Esteem Scale, and Grasmick et al. (1993) Self-control scale. Educational experiment was used as a method to verify the efficiency of the educational programme. Repeated measures (RM) multivariate analysis of variance (2×2 (Group \times Time) MANOVA) was used in order to analyse the effects of the educational program.

Results. Univariate tests of RM MANOVA confirmed effects of the educational programme on three components of emotional skills. After the end of the educational experiment experimental group students demonstrated better abilities to assess emotions ($F(1,49) = 5.28; p < .05; \eta^2 = .10$), self-esteem ($F(1,49) = 13.10; p < .01; \eta^2 = .21$), and self-control ($F(1,49) = 6.68; p < .05; \eta^2 = .12$) skills in physical education classes. In contrast, the educational experiment had a small effect on students' abilities to use personal positive emotional experience and abilities to understand and analyse emotions in physical education classes ($p > .05$). Conclusions. During the educational experiment the applied measures of educational impact had a statistically significant effect on the components of experimental group senior high school age students' abilities to assess emotions, self-esteem, and self-control skills in physical education classes.

Key words: emotional skills, educational program, senior high school age, physical education classes.

THE EXPRESSION OF EMOTIONAL SKILLS AMONG INDIVIDUAL AND TEAM SPORTS MALE ATHLETES

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Background. Athlete must recognize and manage one's emotions, as well as their opponents and teammates emotions, in order to perform well in sports. For athletes, higher emotional skills have been linked to higher performance in sports. The purpose of the research – to reveal the peculiarities of the expression of emotional skills among individual and team sports male athletes. A hypothesis is raised in the work that male athletes who compete in team sports will have more developed emotional skills than those in individual sports. Subjects and methods. The participants comprised of 259 individual sports (gymnasts, swimmers, track and field athletes, badminton players, table tennis players, bodybuilders, and cyclists) and 267 team sports (basketball, football, volleyball, hockey, handball, and rugby players) male athletes from Lithuanian sport clubs/schools, age ranged 15 to 18 years old. The measures of emotional skills were evaluated using Emotional Intelligence Questionnaire – Short Form (TEIQue - SF), Social Emotional School Readiness Scale (BUSSESR), and Rosenberg Self-Esteem Scale. In order to analyse data, descriptive statistics (mean, standard deviation), Student's t test, and Cohen's d were utilized. Results. Student's t test for independent samples

showed that team sports male athletes have more developed self-awareness ($t(524) = -2.03$; $p < .05$; $d = .18$) and self-regulation ($t(524) = -2.00$; $p < .05$; $d = .17$) skills than individual sports male athletes. Meanwhile, Student's t test for independent samples showed that there no significant differences between individual and team sports male athletes in terms of their abilities to express emotions, and self-esteem skills ($p > .05$). Conclusions. The comparison of the expression of emotional skills among individual and team sports male athletes revealed that team sports male athletes have higher rate of self-awareness and self-regulation skills than individual sports male athletes. According to the other components of emotional skills (ability to express emotions and self-esteem) between individual sports and team sports male athletes statistically significant difference was not observed.

PECULIARITIES OF PRE-COMPETITION EMOTIONAL STATE OF THE LITHUANIAN NATIONAL KAYAK AND CANOE ROWING TEAM MEMBERS AND JUNIOR KAYAKERS AND CANOEISTS

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Research problem. The pre-competitive state of an athlete is dependent on an athlete's psychological preparation. Pre-competitive emotional state is a condition that occurs to athletes about two weeks prior to the competition and continues until it begins (Malinauskas, 2010). The pre-competitive state manifests itself for each athlete individually, and the manifestation of this state depends on the significance of the race, the competitor's capacity, the quality of organizing the match, the coach and other important human behavior patterns as well as the individual characteristics of an athlete. Research object was the pre-competitive emotional states of Lithuanian kayak and canoe rowing team and junior kayakers and canoeists. Research aim was to identify and compare the pre-competitive emotional states of Lithuanian kayak and canoe rowing team members and junior kayakers and canoeists. Methods: scientific literature analysis, questionnaire, statistical data analysis. Research discussion and conclusions. The questionnaire survey and the result analysis of the SAN test revealed that the pre-competitive state of members of the Lithuanian national kayak and canoe rowing team did not differ statistically from the state of junior kayakers and canoeists ($p > 0.05$). However, a high level of pre-competitive emotional state (77%) dominated among members

of the Lithuanian national kayak and canoe rowing team as compared with junior rowers when slightly more than half of the athletes had an average level of emotional state before the competition (54%). This means that the members of the Lithuanian kayak and canoe team did not have a negative impact on their state during the competition and they felt better than junior kayakers and canoeists. Differences in well-being and mood between the Lithuanian kayak and canoe rowing team members and young kayakers and canoeists were not statistically significant ($p > 0.05$), but the activity of both groups appeared to be statistically significant ($p < 0.05$). The activity of elite Lithuanian kayakers and canoeists was higher than that of young kayak and canoe rowers. The situational and personal anxiety of Lithuanian kayak and canoe rowing team members and junior kayakers and canoeists was not statistically significant ($p > 0.05$).

SUSTAINABLE TOURISM DEVELOPMENT: MEANING AND ACTIVITY

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Sustainable development can be defined as the philosophy of development based on systematic thinking, the essence of which are the core laws of nature that human beings should not violate in order to ensure the sustainability of the system, while ensuring social justice and economic prosperity. Aim of the study – to identify sustainable development activities in a tourism organization. Methods: analysis and synthesis of scientific literature. The World Tourism Organization identifies the main aims of sustainable tourism: optimum use of natural resources that have an impact on tourism development, ensuring ecological processes and helping to preserve natural heritage and biodiversity; respect the socio-cultural authenticity of the living cultures, preserve their life heritage and traditions, and contribute to intercultural understanding and tolerance; ensure possible long-term economic impacts that bring socio-economic benefits to all stakeholders, including stable employment. From a scientific point of view, various problematic issues related to sustainable tourism are explored. Balezentis and Paulauskiene (2012), Niedziółka (2012), Krankalis and Anzelyte (2013), Paulauskiene (2013), Barkauskiene and Snieska (2013), Stravinskiene (2013), Dagiliute et al. (2015) Jones et al (2016), Jankauskaite (2017), Agyeiwaah et al. (2017), Ponnappureddy et al., (2017), France-Massin (2016) et al analyze the problems of ecotourism as a

component of sustainable tourism, the impact of the principles of sustainability on the organization and the community, the links between sustainability and reputation, the role of the public sector in developing sustainable tourism, the benefits of the preservation of natural resources. It is important to develop a sustainable tourism company and distinguish the areas of sustainability and the tasks in activities: to create products and services that enable the areas to be more energy efficient and integrate renewable energy; to develop the products and services using „smart grid“ principle, i.e. smart use of electricity; to use renewable energy in their own institutions; to provide services that focus on improving energy accessibility, energy efficiency and using renewable energy; to introduce employees to energy saving and the benefits of renewable energy. To sum up, it can be concluded that, although sustainable development and sustainable tourism are gaining more and more attention, this is not fully implemented either by tourism providers or by tourists themselves. In order for sustainable and responsible tourism to become a public norm, it is necessary to educate systematically organizations, personnel and consumers. The preconditions for the development of a sustainable organization are created by promoting a voluntarily changing approach and behavior in the social, environmental and economic field.

COMPARISON OF BALANCE SKILLS OF VISUALLY IMPAIRED AND NON-IMPAIRED JUDO ATHLETES AND GOALBALL/ FUTSAL PLAYERS

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Aim of the study: In order to sustain the performance in sport, it is necessary to constantly struggle with the factors which disrupt balance, and maintain the desired balance. The purpose of the present study is to compare and demonstrate the effects of sight grade on static and dynamic balance, and fall risk parameters in visually impaired and non-impaired judo athletes and goalball/futsal players. **Subjects and methods:** A total of 26 male athletes (13 Judo, 13 Goalball/Futsal) participated in the study voluntarily. The participants performed two balance tests as Overall Stability Test and Fall Risk Test with the eyes open and eyes closed. The parameters observed were static and dynamic overall stability, anterior-posterior, and medial-lateral index, and fall risk. **Results:** According to the findings, there

were significant differences in all the parameters with the eyes open and eyes closed conditions in visually non-impaired athletes regardless of the sport branch, while visually impaired athletes showed no significant difference. However, more loss of balance was observed in all the parameters for visually impaired athletes. Conclusions: These findings show that visual system has a crucial role on balance, and athletes with visually impaired have more advanced vestibular system and proprioceptive senses to maintain their balance. It was also understood that visually non-impaired athletes tend to show more deteriorated balance level when their eyes were closed. Future studies could examine the vestibular and proprioceptive senses besides visual system to provide information about how balance is affected from other systems.

YOUNG ADULTS, MEDIA AND HEALTH PERCEPTIONS: SOCIO-LINGUISTIC APPROACH

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With the rising anxiety levels among young adults, mainly caused by their daily use of social media (Griffiths, Kuss, Demetrovics, 201), it is hypothesized that one of the major reasons why young adults are becoming more physically passive is determined by implicit media influence on shaping their perceptions of health and healthy lifestyle. This study aims to clarify how media created reality in the context of health and healthy lifestyle can be affecting Lithuanian young adults and their perceptions of health. To achieve the above, two procedural steps were followed. First, over 40 articles from the Lithuanian media sources such as Delfi, Lrytas and 15min. were collected and analysed in the theoretical framework of cognitive linguistics (Lakoff, 1996; Lakoff and Johnson, 1999) and Critical Metaphor Analysis (Musolff, 2016, 2017; Semino 2008; Goatly, 2007) by procedurally applying Metaphor Identification Procedure (Pragglejaz Group 2007). The media texts were analysed by using the bottom-up approach to deconstructing systematic metaphor and its ideological functions. Second, 42 young adults participated in the online health survey, where they provided answers to both closed and open questions. The findings have shown that the prevalent media scenario correlates with young adults' responses, whose underlying narrative is driven by such frames as health is a (luxurious) commodity, health is a natural phenomenon, people are passive observers etc. Thus, it can be argued that media consumerist approach to health negatively affects young adults' perceptions and

resonates with an idea of health as an obtained commodity, which deprives young adults of any conscious attempts to become healthier and make their own conscious decisions about a healthy lifestyle.

OPTIMIZATION OF FLIGHT PHASE DURATION IN COMPETITIVE RACE WALKING (A CASE STUDY)

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In race walking the technique must not only be economical and efficient but also performed according to the IAAF rules. One of those rules says: no visible (to the human eye) loss of contact with the ground should occur. Theoretically, there should be no flight phase in race walking, but previous research shows that it still appears (Salvage & Seaman, 2011). The task of race walkers to optimize the flight phase duration following the rules of competition. In this study flight phase during different walking velocities was analyzed. One national level race walker took part in the study. Race walking was performed on a motorized treadmill. Flight phase duration was measured with an optical system (Optojump Next). Heart rate and oxygen consumption data were registered. Flight phase was analyzed and optimized in consideration with several tactical race situations.

PHYSICAL RECREATION TO IMPROVE THE WELL-BEING OF 55–65 YEARS OLD MEN

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Recreation is the value for both - an individual and a society and participation in recreational activities as well as a regular physical activity is associated with improvement of a self-image and self-esteem, reduction of depressive symptoms, reduction of stress and anxiety, gaining the ability to better accept the self, changes in anti-social behavior and improvement of a psychological well-being. It can be concluded that by improving, promoting and satisfying people's involvement in physical and recreational activities in the right intensity and amount, their well-being and quality of life can be improved because of that the aim of this research is to discover how the natural means for outdoor recreation (biking, Nordic walking) influence the beta-endorphin levels

in the body and the positive and negative emotions of 55–65 years-old men. For that we will ask our subjects to fill in our questionnaire Polls – “Physical activity in my daily life“, and the international survey on physical activity (IPAQ), then by using ELISA (determination of the beta-endorphin levels in blood plasma), facereader 3.0 (testing emotions), semi-structured interview, analysis of qualitative data, mathematical-statistical methods, we will see the results.

THE EFFECTS OF PLYOMETRIC TRAINING AND BLOOD FLOW RESTRICTION ON EXPLOSIVE POWER IN TAEKWONDO PLAYERS

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The aim of this research was to investigate the effects of plyometric training with blood flow restriction on explosive power in Taekwondo players. Method: twenty taekwondo players who were volunteers to participate in the project, and the conditions of entry into the study (including 14–17 year old, at least 2 years in the provincial league and the minimum red belt, were selected into two groups of plyometric exercises (n=10) and BFR group (n=10), from both groups the pre-test for the variable study (vertical jump) then plyometric training program for the two groups, including six weeks of practice, each week two sessions, the time of each session was 45 to 60 minutes, except that in one of the groups before exercise, vascular obstruction was performed in the thigh area, obstruction of the vessels by closing an elastic cuff around the thigh muscle in the proximal portion of both legs was closed and a pressure of 120 mm Hg was used. The results of this study showed that plyometric training with vascular obstruction cannot have a significant effect on explosive power. In order to obtain better knowledge in this field, hormonal, neuromuscular and other mechanisms cell metabolites should be investigated.

SOCCER TRAINED 6-11 YEAR OLD CHILDREN DEMONSTRATE BETTER EXECUTIVE FUNCTION COMPARED TO UNTRAINED PEERS

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The aim of the study was to compare the executive function (EF) between soccer trained (ST) and untrained (UT) 6–11 year old children. In addition, the relationship between EF and aerobic fitness was evaluated. In all, 18 ST children and 12 UT children participated in this study. EF was evaluated using the ADAM4 battery. Pulmonary oxygen uptake (VO_2) was measured during constant treadmill walking (6 km/h, 4% grade, 6 min) and during an increasing walking exercise (modified Balke test). The ST children demonstrated better visual tracking and attention ($95.97 \pm 1.74\%/94.4 \pm 1.59\%$), response inhibition ($96.49 \pm 1.35\%/93.72 \pm 3.16\%$), speed of processing and alternating attention with a motor speed component ($97.18 \pm 3.0\%/93.72 \pm 2.16\%$) compared to the UT children ($p < 0.05$). The time constant of VO_2 kinetics during the constant walking exercise was shorter and the maximal VO_2 was higher in the ST children (16.88 ± 2.19 s; 57.2 ± 6.0 ml/kg/min) compared to the UT children (20.99 ± 1.46 s; 48.1 ± 7.4 ml/kg/min) ($p < 0.05$). There was a significant negative correlation between the cognitive tests and time constant of the VO_2 kinetics. We concluded that the ST 6–11 year old children demonstrated and better as well as higher aerobic fitness EF compared with their UT peers. There was no correlation between aerobic fitness and EF indicators in any group of subjects.

GROSS MOTOR DEVELOPMENT DIFFERENCES IN CHILDREN LIVING IN ORPHANAGE HOUSE AND FAMILY SETTINGS

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Previous studies by Roeber et al. (2012) and Hearst et al. (2014) has showed that institutionalized settings do not provide the early life experiences needed for the development of age-level motor skills later in childhood and that simple environmental enrichment following adoption is not enough to remediate skills. Children who have experienced early institutional care may benefit from early identification and targeted intervention. Compared to children

living in family settings (noninstitutionalized), children living at orphanage house are clearly at increased risk for physical-growth deficits and anemia. Given the significant delays in cognitive and motor development relative to expected standards, it seems likely that the same could be said regarding development, even though the latter was not specifically measured in our sample of noninstitutionalized children in local childcare facilities. 38 (18 girls, 20 boys, mean age 6.78+/- 1.22) children living in orphanage house and 40 (19 girls, 21 boys, mean age 6.69+/- 1.38) took part in research. The purpose of study was to evaluate and compare development of children living children living at orphanage house and family settings. Bruininks-Oseretsky test of motor proficiency has been used to collected data of both, gross and fine motor skills development level. Data analysis are still in progress and will be presented at BSSS.

CELL FREE DNA (CFDNA) AS A NOVEL MARKER TO PREVENT CHRONIC OVERTRAINING

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Acute strenuous exercise leads to a dose dependent transient inflammation and can lead to muscle tissue trauma. Without sufficient recovery, a more severe form of chronic tissue trauma can develop which finally leads to reduced performance and overtraining syndrome. Here, we aim to analyse the kinetics of cell free DNA (cfDNA) and classical markers such creatine kinase (CK), after the induction of delayed onset muscle soreness (DOMS). Inflammation related, acute, and transient increases in cfDNA have been observed in a number of different exercises and chronic increases have been observed after 12 weeks of high intensity resistance training. However, the tissue specificity of the cfDNA has not been evaluated yet. Next to the conventional analysis of cfDNA kinetics we will start to establish and conduct an analysis of muscle specific DNA sequences (ms_cfDNA). The analysis will be based on de-methylated DNA sequences, which are main regulatory sequences during muscle cell development. The analysis might result in a highly specific and sensitive muscle tissue marker to prevent chronic overtraining. The study was supported by Baltisch-Deutsches Hochschul Kontor project.

THE EFFECT OF FITNESS EXERCISE ON ANAEROBIC POWER AND AEROBIC POWER

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Abstract There are many discussions about how to increase anaerobic power and anaerobic power capacity in cross-country skiing. Many scientists research the possibilities of increasing anaerobic power and anaerobic power capacity in this sport. The aim was to research the possibilities of increasing anaerobic power and anaerobic power capacity. A pilot study was carried out. Two BJSS "Arkādija" cross-country skiing specialization participants (15 years old girl (G) and boy (B)) participated in the study. The following methods were used in the study: test exercises (bench press, leg press, push up, pull down, pull up), WO2 max, skierg Concept-2, skierg Thorax and mathematical statistics. Fitness exercises used one month after that three month period of endurance exercise and last month fitness exercises again. The results: having stated the result difference before fitness exercises and after it. The participant G and B results difference in anaerobic power test was 48,7% and 37,1% and aerobic power test results was 39,8% and 32,4%. Conclusions: the obtained data from both BJSS "Arkādija" specialization participants prove that after the fitness exercise periods the results have improved. The results testify significant improvement of double pooling results on skiergs, what is showed by the difference of the mean results.

EFFECT OF LOCAL VIBROSTIMULATION AND PHYSICAL ACTIVITIES ON FOCUS PERSISTENCE OF OFFICE WORKERS

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Today many jobs and occupations do require to have continuous focus, especially office work with personal computers. Loosing attention and focus can lead to mistakes and errors, which can be very costly and time-consuming to correct, especially in a job with data input and calculation. It is recommended to have physical activities in each hour to maintain wellness and attention during a working day, but we had a previous research, that local vibrostimulation can indirectly stimulate sympathetic nervous system to help maintain

focus, as with local vibrostimulation there is possibility to have tonic and relaxing effect on affected muscle. Aim of research: Assessment of local vibrostimulation combination with physical activities effect on focus persistence. Subject: Female office workers 30–45 years old. Methods: Focus persistence control exercise, quasi – experiment with one group pretest – posttest design, mathematical statistics. Design of experiment: During one workweek in a work break subjects were asked to pass digital focus test. During a second week, a local vibrostimulation was added before a digital focus test. During a third week, we added a physical activities as exercises for upper back and shoulder muscles. Results: During a three week experiment we obtained a following data – mean focus persistence in first week was 0.956sec, with application of local vibrostimulation on upper back muscles during second week mean result in focus persistence was 1.381sec and with physical activities and local vibrostimulation subjects were able to maintain focus for 1.489sec. Conclusions: Results show, that it is possible to combine local vibrostimulation tonic effect with physical activities to help maintain focus during working week. It is possible to increase focus with local vibrostimulation only, but physician is required to correctly carry out this procedure, subject can participate only passively. Physical activities can not be replaced by any other means, so it remains most recommended way to maintain an attention and focus, as local vibrostimulation can come to aid in this goal.

IMPACT OF SINGLE BOUT OF MODERATE INTENSITY AEROBIC TRAINING ON PARAMETERS OF COGNITIVE FUNCTION AND MOTOR LEARNING IN SENESCENT POPULATION

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Aims of the study. Aging causes many changes in the brain structures, which decreases the neurochemical properties of the brain. After an acute moderate intensity aerobic exercise workload begins neurochemical processes, which has effect on cognitive function improvement for young people, but is not known how a single bout moderate intensity aerobic training (MIAT) load affects the movement and how the improvement of cognitive function influence learning movements of older people. (i) Based on earlier studies, which have used a single bout aerobic workload for the elderly people, we believe that 20 minutes of moderate-intensity single bout aerobic training (AT) improves

cognitive function. (ii) Based on earlier studies with young people as aerobic load affect motor learning, and knowing that after 20 minutes of a single bout aerobic exercise increases brain-derived neurotrophic factor and improves cognitive function, we believe that training will improve the motor learning of older adults. The aim of study is to determine the impact of a single bout of MIAT on parameters of cognitive function and motor learning in senescent population. Subjects and methods. Twenty-four physically inactive elder adult women and men aged 64.3 ± 7.0 years were tested in control and experimental groups randomly. Experimental groups were tested under two parameters – cognitive function and motor learning tests of ANAM4 and subjective fatigue evaluation before and after 20 minutes single bout MIAT. Subjective perceived exertion on the Borg scale, heart rate evaluated during exercise. Results. The study demonstrated that subjective perceived effort rated as slightly difficult (13.1 ± 1.1). Subjective fatigue evaluation indicators did not change and there was not statistically significant between groups ($p > 0.05$). Reaction time was statistically significantly ($p < 0.05$) shortened after single bout MIAT. Accuracy in pursuit tracking task was statistically significantly increased after single bout MIAT ($p < 0.05$). Also statistically significant differences were found in motor learning accuracy after 24 hours from exercise intervention between groups ($p < 0.05$). Conclusions. We found that after a single bout of AT for older adults, (i) cognitive function improved, but did not affect the working memory, (ii) a significant improvement in motor learning accuracy and (iii) a trend was observed towards maintaining a positive residual effect of this training.

SHOOTING ANALYSIS OF LITHUANIAN NATIONAL BASKETBALL MEN'S TEAMS IN DIFFERENT AGE CATEGORIES

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Aim of the study. One of the most important problems for players, coaches and scientists is improving the accuracy of shooting the basket. Basketball is the most important technique for playing basketball, and its dependence on performance is multifaceted. The aim of this study is to determine and to evaluate quantitative and qualitative indicators of basketball shots of different age groups of Lithuanian national basketball teams. Subjects and methods. All 37 games in the 2015 European Championships in U16, U18, U20

and men's national team were analyzed. Data was selected from the official boxscores of FIBA (International Basketball Federation). The following absolute game-related statistics were gathered: free-throws, 2-point and 3-point field goals (both successful and unsuccessful). The obtained values of the rate of success of 2-point, 3-point and free throw shooting were tested by the non-parametric Mann – Whitney U - test. All statistical analyses were done using the SPSS 20.0 statistical software package, and statistical significance was set at $p < .05$. Results. The most 2-point shootings were done by the U18 team and the least was by the U20 team, however there was no difference between all the significant variables ($p > .05$). Comparing the accuracy of shots taken from 2-point distance, it indicates that there was no significant difference between men of different ages ($p > .05$). Most 3-point shots were done by U16 youth team, the least was men's national basketball team, a significant difference in the indicators ($p < .05$) was found between all the teams, except between men's national team and U18 ($p > .05$). Comparing free-throws indicators between different age groups, most throws were done by U16 team, the least were done by the U20 team ($p < .05$) however, there were no differences between the other significant indicators ($p > .05$). Comparing free-throws accuracy indicators between the different age groups of basketball teams, significant differences in indicators was found between men's national basketball team and U20, U16 ($p < .05$). Conclusions. The count of 2-point shots made in Lithuanian different age's basketball national team's games was more or less similar. Most 3-point shots were made by U16 team and national men team made least 3-pointers. The indicators of accuracy didn't have a significant difference between national teams, except free throws: men national team made these shots most accurately, opposite situation was with U16 team.

BODY IMAGE ASSESSMENT OF BOYS

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Research background and hypothesis. Previous studies have shown that adolescents experience major physical, social, emotional and moral changes. Due to such ongoing changes, adolescents' physical appearance becomes one of the top concerns (Cash, Pruzinsky, 2002; Polivy, Herman, 2007). It is known that dissatisfaction with the physical appearance among boys – a desire to be bigger, taller, become more muscular and have a nice body shape. Research has proven that adolescents have a very precise physical appearance, which is related to their own mental representation. However, there is

a gap in research analyzing dissatisfaction with the physical self-image, i.e. body parts, among boys. Research aim – during the analysis process of body part satisfaction of adolescents undergoing the early period of adolescence, to compose a combined body image of this specific age period. Research methods. The research was conducted during the months of March-April-May of 2012. A random probabilistic sampling method was used with the 8th grade pupils from 24 general education schools located in various cities and towns around Lithuania. The research sample was comprised of boys n=674 (8th grade pupils). Conclusions. Results of the present research allow to conclude that adolescents are more dissatisfied with such areas of the body build which are phenotype dependent and more satisfied with the individual morphological features of the body (facial skin, feet, cheeks, ears, hair, chin, lips, eyes, neck) which are genotype dependent.

FACTORS OF HIGH PERFORMANCE SPORT MANAGEMENT IN LATVIA

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Sport is an important sector which inflicts political, educational, economic, social, cultural, and health benefits (Luika, 2012). Up until the 1970s, the typical elite sport system operated in a basic fashion, where talented or elite athletes would train with a coach under the supervision or direction of sports federation (Houlihan & Zheng, 2013). Since the mid-1980s high performance sport evolved from this “athlete-coach-federation” relationship to encompass an increasing complex team of support staff, including specialists from other fields (Collins, Trower, & Cruichshank, 2013). The desire to be successful in high performance sport has led to increased research to improve sport management system. Results show the development of high performance sport system is directly and indirectly influenced by many factors. The aim of this study, in respect of the environment and cultural aspects in Latvia, is to explore the management of high performance sport and to find factors necessary to develop to promote success in high performance sport. Research subjects were selected randomly from the sports field in Latvia. The research included 472 respondents. Methods: literature review, questionnaire, factor analysis, axial coding, modelling. The findings in the study show that to promote success in high performance sport it is necessary to develop each of the following factors:

1. Establishment and organisation of a high performance sports structure.
2. Financial support for high performance sport.
3. Provision with qualified coaches and coaching provision in the sports sector.
4. Support for athletes during and after athletic career.
5. Material and technical supply of sports infrastructure.
6. To establish a system for talent identification and development.
7. Provision with scientific research in the sports sector.
8. Development of sport for all.
9. Ensuring the participation of athletes in national and international competitions.

LITHUANIAN JUDO SEMI PROFESIONAL FEMALE SPORTSMEN AEROBIC ENDURANCE INDICATORS AND SJFT RESULT CHANGES IN MESOCYCLE

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Judo athletes technical actions and their combinations vary depending on the athletes' fitness (Santos, L., Fernandez-Río, J., Almansba, R., Sterkowicz, S., & Callan, M. 2015). Many coaches do not dare to increase their aerobic workouts in the training process, afraid of having a negative impact on the physical characteristics of other judo athletes values. That's why there is a problematic question: how does the physical fitness of judo athletes change by increasing the number of aerobic exercises during the preparatory period? The aim of the study was to identify and evaluate changes in aerobic power, special judo fitness test capacity (SJFT) and some structural features (body mass index and body fat) of judo athletes at the end of the preparatory periods before Lithuanian women judo championships. Research methods and organization. Twelve Lithuanian national judo athletes [(20 (\pm 3 04) years of age, body weight 66.88 (\pm 9.72), height 1.70 m (\pm 7.78), BMI 23.25 (\pm 2, 64)) kg · m⁻² and body fat% 22.45 (\pm 5.15)] performed a V_{O2}max workout test on the treadmill. SJFT was performed to evaluate anaerobic preparation. The total number of throws, the heart rate immediately after the third series and the minute after the end of the test is estimated using this data to calculate the SJF test index. The training process was increased by two additional weekly aerobic workouts. Results and conclusions of the study. During the test the maximum oxygen consumption of Lithuanian judo female athletes was determined

before: 40.88 ± 4.69 ml / kg / min and 44.02 ± 5.15 ml / kg / min in the end of experiment. Increasing the number of aerobic training sessions has not only improved the maximum oxygen demand, but also improved the results of the SJF test index. It can be said that the results of a special Judo test are related to VO_2 max. During the study, we found that increasing the weekly aerobic load improves not only VO_2 max results, but also the SJFT index. The same study showed a statistically significant change (decrease) in fat mass of Lithuanian judo athletes during the mesocycle (after the change of training program). This study can recommend coaches to use a special judo test for aerobic athletes' performance during training, especially when no laboratory testing is possible. Based on these studies, we recommend modifying the training process program by increasing aerobic loads, as this has a positive effect not only on the training of the judo athletes, but also on reducing the fat mass of the body.

DEVELOPMENT OF ORIENTATION IN SPACE AND TIME FOR 10–12 YEARS OLD TENNIS PLAYERS

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Background to the topic. To enhance the efficiency of the game, one of the most important reserves where to look for answers in the preparation of players is the emphasis on increasing the coordination capacity. Co-ordination capabilities play a key role among other physical abilities in acquiring basic tennis skills. The hitting techniques for mid-level tennis players should allow for future battles to be increased, as well as emphasizing the need for at least two potential components of the game to be improved - the impact and the movement area. The purpose of the study was the development and approbation of a set of exercises, coordinating the ability to orient in time and space for the development of young tennis players. Subject / base of the study - 10–12 year old tennis players The subject of the study / research boundaries. Improving the footwork of young tennis players hitting groundstrokes. The research methods. Analysis of sources of information. Survey (questionnaire). Pedagogical observation (expert method). Testing change direction and hitting groundstrokes accuracy. Constant experiment. Mathematical statistical methods (Average arithmetic. Standard deviation. Variation factor). Results. The author of the study succeeded in obtaining the following results: 1) As a result of the questioning, it was investigated that the most important techniques for the preparation of 10-13 year-old tennis players are hitting

groundstrokes, footwork, serve. When setting training goals and objectives, it is important to know which physical fitness abilities play a special role in their respective ages. Respondents highlight the development of coordination in the process of physical preparation, following speed. Flexibility exercises are also common. The results of the questionnaire helped the author to gain assurance and reasoning in the course of the further research to choose the methods of testing and the direction and means of developing the physical preparation, namely, it was decided to study the process of physical training of young tennis players in order to improve the mobility skills for young tennis players by developing coordination abilities. As a result of scientific literature research, coordination ability was selected based on the importance of developing the ability to develop sensitive age groups according to the requirements of the sport. 2) As a result of pedagogical observation, experts found deficiencies in athletes "A" movement technique in groundstrokes: insufficient or often non-slip, ready position, which interferes with the first step of reagents; almost does not make a "push", changing the direction after the shot is not the last reactive step; moves well with the steps of the pitch, but lacks the quality of movement at a closer and further distance from the opponent in the ball, retreating or going deeper into the field; insufficient "read" opponent's game; insufficient "braking" steps to take a hit position - often run close or far, explaining the rhythm problems. 3) Assessing the quality of the movement of the new 10–12 year old tennis players in the Spider run test, it was concluded that the average arithmetic result of the testing of young tennis players in the test was 20.23 and in the second test 19.49; in turn, the increase in results the average arithmetic increase is statistically significant ($\alpha < 0.05$), because the Student's t-criterion for embedded samples (3,733) is greater than the theoretical value for the two-sided division (2.201), stating that the differences between the results of the first test and the 2nd test are essential, indicating the effectiveness of the exercises and methodology used in physical training for young tennis players. 4) In order to test the hypothesis of the study about the potential improvement in groundstrokes accuracy, a "groundstrokes accuracy" test was performed, groundstrokes down the line and diagonally to the right and left. Students in the interest curriculum did not show statistically significant performance, while U-12 group athletes showed statistically significant performance hitting from the right side in line-first testing. The accuracy of the U-12 tennis players hitting on the right-hand side showed an average arithmetic score of 8.25, but in the 2nd test, 12.00, thus, the increase in the results or the mean arithmetic increase is statistically significant ($\alpha < 0.05$), because the student t-criterion for the related samples is of an empirical value (15,000) greater than the theoretical

value for a two-way distribution (12,706). Conclusions. The result of such results could be explained by the fact that using specially prepared and racing exercises for the development of coordination for young tennis players who are not yet technically and physically prepared, it is difficult for children and young tennis players to combine co-ordination with specific movement activities or it is possible to limit it, therefore the development of coordination abilities takes place during a long term period of many years of training. The performance of individual student technology may have indicated the mistakes of technique that occurred before the experiment, which resulted in specific movement characteristics associated with motion asymmetry in the functioning of the body system, for example, for some time “neglecting” any of the technical elements. It is believed that the repetition of such large movements is dangerous because of the lack of coordinating skills that are unrivaled for the athlete, which not only complicates the learning process, but inevitably leads to an increase in the number of errors and technical disturbances in times of high nervous system tension or fatigue. It is necessary to continue to look for other means to improve the acquisition of technology, including the development of other forms of manifestation of coordination abilities, such as the ability to match movements, kinetic differentiations ability (accuracy, force differentiation), “sense of the ball”, which in the scientific literature are related to the technique of training, the models of the game in play and its variants, and to combine the development of forms of coordination manifestation, for example, in the orientation room and in time with a sense of rhythm which is essential the role of improving the range of motion and movement (“getting to the ball” -the optimal movement of the rhythm, due to the correct and timely attachment to the bolls, they create optimal forward-forward conditions to achieve a sufficient distance from the body, release the balls freely and with the required amplitude, accentuate the optimum speed of the rockets, and control the correct space-time orientation. As a result of the study, the author came to the conclusion that research is needed to reveal the causes of the different qualifications of young tennis player asymmetries and their impact on the quality of the typical movements of tennis players, as the influence of physical preparation tools on the acquisition of technology, interactions, other factors affecting the effectiveness of the performance, psycho-emotional, in order to provide an individualized, holistic approach to the various preparation for the new tennis. By realizing the set tasks, summarizing and scientifically substantiating them, the goal of the work was implemented: a set of exercises was created that was tested. The research hypothesis was confirmed partly - the exercise set is useful for use in the orientation room and during the development (movement) of young tennis players, but partly to improve hitting groundstrokes.

DEVELOP SPORT PERFORMANCE ANALYSIS SOFTWARE FOR YOUTH FOOTBALL PLAYERS

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Introduction: In the world of sport, huge number of children and teenagers are dreaming to someday be a successful athlete. Unfortunately, due some external reasons such as relative age effect, different manners of sport coaches and the club environment or facilities many talents are wasting. Sport performance can be defining as the interaction of different technical, tactical, physiological and mental actions. Sport Performance Analysis provides the coaches and athletes with objective information that helps them understand performance. Athletes benefits from performance analysis are included improving tactical and technical knowledge, decision making and confidence. Also, the advantage of performance analysis for coaches are included assists in understanding of athletes' strengths and weaknesses, develop coaching process.

Aim: The aim of this project is designing a sport analysis software for youth football players. Having a suitable procedure or technique to analyse significant skills of players and let them to compare themselves with different group of ages, players who have similar physical characters or position can help to develop the athlete and coaches' awareness about their abilities and performance. **Research design and methods:** It is suggested that 30 participants (elite youth football players with 13 ± 1 years old) are required to reach the aim of this research to design the analyzing software. This analysis is required as the software's initial and standard data. To measure the data, it is required to have some qualitative and quantitative interviews with elite football coaches to select some important skills to analyse. Then research to find the best methods to measure each parameter from the elite players. **Potential implication:** Finally, football players are able to compare their performance with the group of elite players, their teammates or other youth players from different age groups by this sport analysis software. One potential advantage of this software could be that the players find the group-ages who have similar performance to avoid talent wasting due different period of adolescence.

THE RELATIONSHIP BETWEEN MEASURES OF SHOULDER MOBILITY, HAND SIZE, GRIP STRENGTH AND UPPER BODY MULTI JOINT MAXIMUM MUSCLE STRENGTH IN FEMALE PHYSICAL EDUCATION STUDENTS

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Aim of the study: The aim of this study was to examine the relationship between measures of shoulder mobility, hand size, grip strength for left and right hand, one repetition maximum (1RM) chest press and 1RM shoulder press in female physical education students. Subjects and methods: Sixteen female Physical Education students aged 20.8 ± 2.1 (\pm SD) years old with a body mass of 58.1 ± 9.3 kg and height of 162 ± 6.6 cm volunteered to participate in this study. None of the students reported any current or ongoing neuromuscular diseases or musculoskeletal injuries and none of them were taking any dietary or performance supplements that could have affected testing results during this study. Informed consent was received from all participants in this study after verbal and written explanation of the experimental design and potential risks. This study was carried out according to the Declaration of Helsinki and the study protocol was pre-approved by the local Ethics Committee of the University of Jordan. Height and weight were first assessed using a wall mounted stadiometer and InBody 570 body composition analyzer, respectively. Prior to maximum strength testing, a general warm-up consisting of 5 minutes of low intensity jogging aimed at increasing heart rate, blood flow and deep muscle temperature. Then a specific warm-up consisting of one set of 10 repetition maximum (RM) followed by one set of 5 RM on both the seated chest press machine and the seated shoulder press machine. The following testing order was followed: (I) shoulder mobility using the recommendations from the functional movement system; (II) grip strength using a digital hand dynamometer (III) 1RM chest press using LifeFitness seated bench press machine; (IIII) 1RM shoulder press using LifeFitness seated shoulder press machine. All tests were conducted at the Fitness First Gym laboratory. Results: A strong and statistically significant relationship were observed between left and right shoulder mobility ($r = 0.889$; $P < 0.01$). similar observation was detected between right and left grip strength ($r = 0.764$; $P < 0.01$). Only the dominant arm grip strength was notably related to 1 RM measures from both chest press ($r = 0.655$; $P < 0.01$) and shoulder press

($r = 0.650$; $P < 0.01$). No further statistically significant relationships were observed between variables. Conclusion: The dominant arm grip strength had a marked relationship with upper body multi joint strength in female physical education students.

NEUROMUSCULAR FATIGUE DURING REPEATED HIGH-INTENSITY MAXIMAL ISOKINETIC CONTRACTIONS IN ATHLETES AND UNTRAINED MEN

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Aim. The purpose of this study was to compare changes in isometric maximal voluntary contraction (MVC) force and electrically evoked submaximal tetanic contraction characteristics of the knee extensor (KE) muscle after short-term high-intensity fatiguing isokinetic exercise in male power-trained athletes (sprinters and jumpers) (PT) ($n=13$), endurance-trained athletes (long-distance runners) (ET) ($n=13$) and untrained men (UM) ($n=13$) aged 20-25 years. **Methods.** Submaximal isometric tetanic contraction ($\sim 25\%$ MVC) of KE muscle evoked by transcutaneous electrical stimulation from a standard electrostimulator with a frequency of 50 Hz, rectangular impulse duration of 1 ms, and train duration of 1 s was performed. Fatigue test consisted of 60 repeated maximal isokinetic knee extensions at angular velocity $1.57 \text{ rad}\cdot\text{s}^{-1}$ ($90^\circ/\text{s}$) (KIN COM isokinetic dynamometer, USA). MVC peak force of evoked tetanic contraction (PFES), rates of force development (RFD) during MVC and electrically evoked tetanic (RFDES) contractions, as well as half-relaxation time of evoked tetanic contraction (HRTES) were measured before, one minute, ten minutes and fifteen minutes after the exercise. Fatigue index was calculated. **Results.** A total mechanical work output during isokinetic exercise were greater ($p < 0.001$) in PT than in ET and UM. Fatigue index was greater ($p < 0.01$) in PT than in ET and UM. Fatigue index of UM was greater ($p < 0.01$) in ET. MVC force, RFD, PFES, RFDES were lower ($p < 0.01$) and HRTES was prolonged ($p < 0.01$) immediately after exercise in PT than in ET and UM as compared to pre-exercise level. These characteristics recovered to pre-exercise level in ET and UM groups within 10 min after the exercise and in PT group within 15 min after the exercise. **Conclusions.** High-intensity short-term repeated isokinetic knee extension exercise resulted in acute neuromuscular fatigue with decrease of isometric maximal voluntary and electrically evoked submaximal tetanic force-generating

capacity, and prolongation of relaxation time of evoked tetanic contraction of the KE muscles. Well-trained PT athletes produced a significantly greater total work output and fatigued faster during repetitive maximal isokinetic knee extensions compared to ET and UM. A marked peripheral fatigue has been observed after the end of isokinetic exercise, which was more expressed in PT than ET and UM. The recovery of isometric MVC force and electrically evoked submaximal tetanic contraction characteristics of the KE muscle was more delayed in PT than in ET and UM. Acknowledgements. This study was partly supported by Estonian Ministry of Education and Research, project IUT20-58.

PHYSICAL EDUCATION PRESERVICE TEACHERS' PERCEPTIONS OF THE PHYSICAL EDUCATION TEACHER PROFESSION AND PERSONAL LEARNING EXPERIENCE

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Preservice teachers' beliefs and perception are important for understanding and improving educational processes, especially of the nature of teaching and learning. Previous research suggests that there are significant relations between teachers' beliefs, attitudes and practices, classroom management and discipline.

Aim of the study is to determine relation between physical education preservice teachers' perceptions of the physical education teacher profession and personal learning experience.

Subjects and methods. The research sample 378 preservice teachers, voluntary participants, 41.8% – female, 58.2% – male, age 23.1 ± 4.16). Methods: a theoretical – analysis of scientific literature, an interpretative phenomenological semi-structured interview, open and axial coding (applying AQUAD7 software).

Results and conclusions. Preservice teachers are less to see PE teaching as the creative and innovative profession and are more likely to see PE teaching as the difficult profession with a high level of responsibility. Preservice teachers' perception of the nature of learning include more constructivist beliefs about learning and instruction.

CARBOHYDRATE AND FAT RATIO IN HYPOCALORIC DIETS WITH EQUAL PROTEIN AND CALORIE CONTENT DOES NOT AFFECT ENERGY METABOLISM IN OBESE MICE

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Aim of the study. Two main dietary strategies of weight loss opposing each other have been suggested during past years. The older strategy supports dietary fat restriction, whereas the new one idolizes carbohydrate restriction with scientifically unsupported claims of its metabolic advantage. Aim of our study is to determine, which of these two dietary strategies is more effective in obesity treatment and energy metabolism regulation in mice. Methods. Male C57BL/6J mice were fed high fat high sucrose diet (HFHS) for 18 weeks to induce obesity. Thereafter mice were subjected for 6 weeks to two calorie and protein equated hypocaloric diets with different fat and carbohydrate ratio: low fat (LF; 60, 20 and 20% calories from carbohydrate, fat and protein, respectively) and low carbohydrate (LC; 20, 60 and 20%) (n=9 each). Age-matched mice on ad libitum HFHS served as controls (n=9). Body mass was measured throughout a dieting period. Energy metabolism was assessed after overnight fasting in the last week of dieting by indirect calorimetry including these metabolic parameters: energy expenditure (EE), respiratory quotient (RQ) and physical activity (PA) under the free moving condition. Results. There was a large reduction in body mass after 6 weeks ($P < 0.001$) but final body mass did not differ between diets (26.6 ± 4.0 vs. 29.2 ± 4.8 g for LF vs. LC, $P > 0.05$). Absolute EE was similar in both LF and LC (8.7 ± 1.4 and 9.3 ± 1.3 kcal · day⁻¹, $P > 0.05$) and tended to be lower compared to HFHS controls (10.7 ± 1.4 kcal · day⁻¹) with LF reaching statistical significance ($P < 0.05$). Relative EE was similar between LF and LC (132.9 ± 18.3 and 132.7 ± 10.9 kcal · day⁻¹ · kg^{-0.75}, $P > 0.05$) and higher compared to HFHS (113.1 ± 15.2 kcal · day⁻¹ · kg^{-0.75}, $P < 0.05$). RQ did not differ between LF, LC and HFHS (0.70 ± 0.04 , 0.72 ± 0.05 and 0.73 ± 0.03 , $P > 0.05$). PA was similar between all groups ($P > 0.05$). Conclusions. Both dietary carbohydrate or fat restriction strategies promote similar body mass reduction when overall calories and protein are equated. Low carbohydrate diet has no superior effect on energy metabolism to low fat diet in obese mice.

SOFT TISSUE TECHNIQUES FOR INCREASING RIB MOBILITY FOR IMPROVE SOUND TONE MAINTENANCE FOR OBOJISTS.

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Literature indicates that not only the athlete, but also musician needs to have the body balance. It is also pointed out that the functional state of the respiratory system can affect the quality of movements. In situations when person being all the time in one forced position, can cause muscle imbalance and tone, which in turn can cause changes in the functional state of the respiratory system. Knowing that musicians regularly play their musical instrument, it may be considered that they have a changed functional state of the respiratory system, and thus the sound quality and durability of the wind-instruments have changed. The aim: to study the effect of the mobility of rib pairs (3,4,5) on the sound quality and duration of obojists' playing. The methods and materials of the research: measurements of the sound quality and duration; photogrammetry to determine the mobility of 3,4,5 rib pairs; mathematical statistic methods. The experiment involves 12 oboists (women and men), the average age of the study group is 22, who have played the oboe for 6 years, play the oboe every day, i.e. and play in an orchestra, group, etc. The oboists have no respiratory diseases and are currently not engaged in physical activity. The reasearch took place at Latvian Academy of Sport Education, in physiotherapy laboratory.

Results. The movement of separate pairs of ribs (3, 4, 5) was evaluated in the sagittal plane along the X and Y axis. The results shows that before the muscular correction on the X axis, the 3rd left rib mobility for the group is $1,73 \pm 0,21$ cm, after muscle and diaphragm correction- $2,08 \pm 0,16$ cm. 3rd right rib mobility is on average $1,63 \pm 0,21$ cm, after correction $2,01 \pm 0,19$ cm. 4th left rib mobility in the group is on average $2,07 \pm 0,24$ cm, after correction- $2,45 \pm 0,16$ cm. 4th right rib mobility is on average $1,99 \pm 0,23$ cm, after correction- $2,36 \pm 0,19$ cm. 5thleft rib mobility- the average of the group is $2,29 \pm 0,28$ cm, after correction- $2,77 \pm 0,16$ cm. 5th right rib mobility is on average $2,21 \pm 0,30$ cm, after $2,55 \pm 0,22$ cm. Changes are statistically significant ($\alpha \leq 0.05$). Y axis 3rd left rib mobility is on average $2,04 \pm 0,29$ cm, after correction- $2,51 \pm 0,23$ cm, exchange is not statistically significant ($\alpha \geq 0.05$). 3rd right- rib mobility is on average $1,92 \pm 0,25$ cm, after correction- $2,61 \pm 0,22$ cm. 4th left rib mobility is on average $2,04 \pm 0,29$ cm, after correction- $2,68 \pm 0,29$ cm. 4th right rib mobility is on average $1,92 \pm 0,27$ cm, after correction- $2,53 \pm 0,22$ cm. 5th left rib mobility is on average $1,85 \pm 0,29$ cm, after

correction- $2,47 \pm 0,28$ cm. 5th right rib mobility is on average $1,59 \pm 0,29$ cm, after correction- $2,27 \pm 0,25$ cm. Changes are statistically significant ($\alpha \leq 0,05$). In evaluating the duration of sound quality, we found that before the mobilization diaphragm and muscle correction, the study group had an average of $32,8 \pm 2,85$ seconds, after $39,3 \pm 3,4$ seconds. Average sound increase is 6,6 seconds, these changes are statistically significant ($\alpha \leq 0,05$).

Conclusions: The results show that mobilizing diaphragm and stretching of breathing muscles with PIR have a positive effect on the sound quality and duration of oboists' playing. Using PIR and the diaphragm mobilization on individual respiratory muscles, (M.Trapezius, M.Sternocleidomastoideus, M.Scalenii, M.Pectoralis major, M.Pectoralis minor, M.Rhomboideus) it is possible to improve the mobility of individual rib pairs (3,4,5 rib) along the X and Y axes This results in statistically significant changes in the improvement of the quality and duration of the sound, with an average increase of 6.6 seconds ($\alpha \leq 0,05$).

PROSPEKTS OF SPORTS AND EVENTFUL TOURISM DEVELOPING IN THE REPUBLIC OF BELARUS

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The purpose of the research. In the article the author tries to assess the prospects of development of sports and events tourism in the Republic of Belarus. The object of the research Sports and events tourism, as one of the modern directions in the industry of tourism and hospitality. Methods of the research The analysis of sources and literature on the research topic. The review of the legislative framework of the Republic of Belarus and the assessment of it's impact on tourism development, SWOT-analysis, information processing placed on official websites of the President of the Republic of Belarus Administration and Sports and Tourism Ministry of the Republic of Belarus. Results of the research Tourism is one of the most effective and dynamic directions in the world economy. Today, 155 countries are involved in the tourism industry from 195 states of the world. According to the latest World Tourism Barometer UNWTO international tourist arrivals around the world rose by 7% in 2017 reaching in total of 1 billion 322 million people. It is expected, that this impulse will remain actual for 2018, and the growth of the tourist flow is on average 4 – 5%. According to expert estimates of many researchers, one of the prospective trends in tourism, including Belarus, is events tourism, which makes the tourist product for the modern consumer much more attractive.

On the one hand, it gives an opportunity of tourism development not wield traditional positions: the sun, sea and sand. On the other hand, it demands the creation of individual national and territorial concepts of tourism development. Unsubs of sports and events tourism as consumers of the offered tourist product are spectators, fans, members of fan-clubs, who come to attend sports events, are active participants. There are favourable conditions for sports and events tourism development in the country. For example, the geographical location of Belarus allows to carry out sports events by the mass visit of fans and spectators of all European countries, as well as from Russian Federation. The material and technical base of sport is considerably strengthened and continues to develop. There are more than 23,000 physical, sports facilities in the country. More and more large objects are being built in regions. In recent years, the cultural and entertainment Sports Complex “Chizhovka-Arena”, the freestyle training center with sports and health complexes, the technical center of national teams on football have been put into operation in Minsk. The reasonable efficiency of the state model of sports management: an active participation in sports life of state and public organizations. One of the most dynamically developing directions of work of the sports branch was the attraction and organization of the largest international sports competitions on the territory of the Republic of Belarus. Lately have been carried out such major sports events as the world championships in ice hockey, cycling on the track, Thai boxing, powerlifting, and many other international competitions. The high international sports rating of our state should be noted. Our country is constantly among 200 strongest countries of the world, which take part in the Olympic Games. May 19, 2017, at the annual congress of the International Ice Hockey Federation, in Cologne (Germany), it was decided, that the 2021 Ice Hockey World Championship would be held in two countries: Belarus and Latvia. In 2016 Belarus won the right to host the II European Games 2019. Among the problematic stances are the lack of qualified personnel with practical experience in sports management and marketing, both in the public sector and in non-governmental organizations. Foreign experience in the organization of long-term and short-term sports events is used fragmentary, without adaptation to the Belarusian sports model. The low level of service and the lack of standardization, that is understandable for foreign tourists, reduces their interest in sports events, which are held in Belarus. It is necessary to develop innovative projects and involve the maximum number of interested parties in order to form a long-term strategy for the development of sports and events tourism and constant marketing monitoring.

ASSOCIATION BETWEEN DIET AND HANDGRIP STRENGTH: A CROSS-SECTIONAL STUDY FROM UK BIOBANK

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Ageing is associated with a loss of muscle strength, which has been shown to be associated with adverse health outcomes. It is well-known that the muscle strength is affected by diet and specific dietary components have been suggested to play an important role in the age-associated decline (1–3). However, current data investigating the associations of diet with muscle strength are limited to small studies. UK Biobank a large data set offers the possibility to investigate relations handgrip strength. The aim of the current study, therefore, was to investigate the associations between diet and grip strength. In this study 68,002 participants (age 63.8 ± 2.7 years, 50.3% women, 49.7% men) from UK Biobank, a prospective population based-study were included. The participants had data on diet, nutrition (carotene, retinol, potassium, vitamin C, foliate, vitamin B12, vitamin B6, iron, vitamin E, calcium, magnesium, sugar, carbohydrates, protein, polyunsaturated fat, fat, starch and saturated fat) and handgrip strength. Associations were compared using regression analyses using STATA 14 statistical software, with adjustment for age, sex, monthly assessment, ethnicity, deprivation index, height, comorbidities and total energy intake. All analyses were carried out stratified by sex. Current data demonstrates that there were negative associations ($p < 0.05$) between processed meat, carbohydrates and grip strength in both sexes. Similarly positive associations ($p < 0.05$) between non oily/oily fish, fruits, vegetables, carotene, retinol, potassium, vitamin B12, iron, protein, magnesium and grip strength were seen in both sexes. In women only positive associations ($p < 0.05$) were seen between unsalted nuts, cheese, red meat, vitamin C, foliate, vitamin E and hand grip strength. In men only negative associations ($p < 0.05$) seen between bread and grip strength. The current study highlights the main dietary factors which are associated with handgrip strength in men and women aged ≥ 60 years old. Further, appropriately designed trials are needed to confirm if these associations are causal.

SPECIAL WEIGHTLIFTING EXERCISE FOR INCREASING WEIGHTLIFTING CLEAN

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Improvement of weightlifters technical skills and special physical qualities involves use of different instrumental control methods, which are necessary for obtaining biomechanically accurate quantitative parameters of the athlete's movement structure. Such control, using biomechanical methods, allows us to substantiate the parameters of the exercise techniques for competitions and to identify factors that affects the effectiveness of the movement activity. Our research aim was to evaluate the effect of non-standard barbell lifting exercises on results of weightlifting competition. The study subjects was healthy 15 weightlifters. The assessment of dynamic parameters was done before and after the set of exercises by using non-standard weightlifting bar using FITRO Dyne Premium (Slovakia). The maximum muscle strength dynamics was performed by the REV 9000 Technogym (Italy) isokinetic dynamometer, along with the registration of muscle biopotentials (EMG). Data was analyzed using Excel statistics 3.1. After ascertaining experiment with a set of exercises with an non-standard barbell lifting on clean exercise, the dynamic parameters of the controlled barbell lifting on weightlifting clean exercise (standard performance) were improved. Such control, using biomechanical and electromiography methods, allows us to substantiate the parameters of the exercise techniques for competitions and to identity factors that affects the effectiveness of the movement activity. These set of exercises with an non – standard barbell lifting on clean exercises of their components are developed in order to improve the technique of the exercises and introduce the exercises into the sports practice. It was established that the effective realization of movements can be achieved by using different movements structures of the barbell. Obtained data was compared with both the model parameters and the previously obtained individual biomechanical parameters of the athlete. Afterwards the analysis of technical errors in the movement structure of the athlete during the performance of the particular exercise was done. Coaches in these circumstances should take these facts into account when planning training process of weightlifters, including exercises by using non – standard weightlifting bar.

ASSOCIATION ANALYSIS OF ACE AND ACTN3 GENES POLYMORPHISMS IN ITALIAN, UKRAINIAN AND LITHUANIAN TRACK AND FIELD PROFESSIONAL ATHLETES

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The aim of this study was to determine the association of the ACE I/D (rs4646994) and ACTN3 R/X (rs1815739) polymorphisms, with track and field (T&F) athletic status in three European Caucasians cohorts from Italy (IT), Ukraine (UKR) and Lithuania (LT). **Subjects and methods.** A total of 360 T&F professional athletes (45 IT, 233 UKR, 45 LT) and 310 non-athlete controls (healthy unrelated 96 IT, 60 UKR, 154 LT citizens) were genotyped using PCR and/or restriction enzyme digestion. The athletes were stratified into endurance (n=89) and sprint/power-oriented (n=271) groups. **Results.** The results of the study showed that significant differences in genotype distribution of ACE was observed across nationalities among the control groups (II/ID/DD: IT 10.4/36.5/53.1% vs UKR 31.7/50/18.3% vs LT 20.8/42.8/36.4%; $p < 0.05$), also between UKR and LT athletes (II/ID/DD: UKR 16.3/39.5/44.2% vs LT 31.7/40.3/28%, $p = 0.004$). In the UKR sample, significant differences in ACE genotype distribution were found between controls (II/ID/DD: 31.7/50/18.3%) and T&F endurance (II/ID/DD: 9.8/44.3/45.9%; $p = 0.0008$) and between controls and T&F sprint/power athletes (II/ID/DD: 18.6/37.7/43.6%; $p = 0.002$). In the LT sample, the ACE II genotype (31.7%) was over-represented when compared to the UKR (16.3%) and IT (13.3%). Regarding the ACTN3 variant, in the all studied populations the R allele (RX-+RR genotypes) was more common in combined T&F athletes (95%CI:1.12–2.95, $p = 0.001$; OR=1.8) and in T&F sprint/power athletes (95%CI:1.27–3.73, $p = 0.004$; OR=2.2) than in controls. **Conclusions.** We conclude that ACE gene (I/D) variant describes genetic differences among studied populations. The ACE DD genotype determine T&F sprint/power status for Ukrainian athletes, while the ACE II genotype provides an advantage in the LT athletes compared to UKR and IT athletes and controls. All athletes, especially sprint/power, were less likely to harbour the ACTN3 XX genotype compared with

controls. Our findings provide support for an association between ACTN3 R allele (RR and RX genotypes) and T&F sprint/power athletic status in the three European populations.

INFLAMMATORY BIOMARKERS, BODY COMPOSITION AND ASSESSMENT OF HABITUAL PHYSICAL ACTIVITY IN OLDER ADULTS

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Aim of the study: to examine the associations between inflammatory biomarkers, body composition parameters and habitual physical activities in older women. Subjects and methods: A group of older women (N36) aged 68-81 years (mean age of 73.9 years) participated in this study. The body composition was measured by dual-energy x-ray absorptiometry. Bone mineral density (BMD), bone mineral content (BMC), skeletal mass index (SMI), lean body mass and appendicular lean mass (ALM), absolute and relative values of body fat were assessed. Venous blood samples were collected and fasting serum concentrations of interleukin-10 (IL-10), tumor necrosis factor α (TNF- α) and interleukin-6 (IL-6) were determined. Interviewer - questionnaire of previous-week household, walking, exercise, and occupational/volunteer physical activities was measured by the Voorrips habitual physical activity questionnaire. Results: Serum IL-10 correlated ($p < 0.05$) positively with BMC of arms, legs, BMC total ($r = 0.42$, $r = 0.47$ and $r = 0.42$, respectively), and with relevant BMD criteria ($r = 0.39$, $r = 0.37$ and $r = 0.39$, respectively). Serum IL-10 and IL-6 concentrations correlated ($p < 0.05$) positively with BMC, BMD and body fat mass. Positive correlations ($p < 0.05$) were noted between IL-6 and BMC of trunk, spine and pelvis ($r = 0.52$, $r = 0.49$ and $r = 0.47$, respectively) as well as BMD of trunk and spine ($r = 0.37$ and $r = 0.37$, respectively). Fat of trunk, visceral and total had positive correlations ($p < 0.05$) with IL-6 ($r = 0.47$, $r = 0.38$ and $r = 0.39$, respectively). No significant correlations were noted between serum TNF- α and assessed body composition parameters. TNF- α correlated ($p < 0.05$) negatively with Voorrips total score ($r = -0.42$). Voorrips total and sport scores correlated ($p < 0.05$) positively with SMI ($r = 0.37$ and $r = 0.35$, respectively). Conclusion: These analyses demonstrate an association between inflammatory markers (IL-6, IL-10) with BMC, BMD

and body fat mass values, whereas TNF- α concentration associated negatively with physical activity. Acknowledgments: This study was supported by EU 7th framework program project MYOAGE (HEALTH-2007-2.4.5-10).

SOME PSYCHOMETRIC CHARACTERISTICS OF THE LITHUANIAN EXERCISE MOTIVATIONS INVENTORY (EMI-2)

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Motivation for physical exercising is a significant object of investigation in sports science (Markland & Ingledew, 1997; Moreno-Murcia, Hernández, Vaillo, Camacho, 2012); therefore, it is important to apply reliable research instruments to investigate it. The Exercise Motivations Inventory (EMI-2) is one of such instruments (Markland & Ingledew, 1997). EMI-2 has been used in Lithuania in several research studies; however, the said investigations were narrowed down to some specific populations and the samples of them were small. The demand for a Lithuanian research instrument to investigate motivation for leisure sports exercising as well as insufficient psychometric exploration of the EMI-2 were the causes that led to the formulation of the research aim which is to carry out psychometric assessment of the Lithuanian version of the EMI-2. Organisation and methods of the research. Motivation of individuals who exercise in their leisure time was measured by using the EMI-2 (Markland & Ingledew, 1997). The process of translation of the EMI-2 into the Lithuanian language and revision proceeded in several stages. The research involved 1512 adults (661 men and 851 women) attending various Lithuanian sport, health promotion clubs or/ and exercising independently. The age of the surveyed was 18–65 years; the average age was 33.06 ± 11.09 years. The average duration of exercising in leisure time was 6 ± 7 years. Reliability and inner coherence of the sub-scales have been found grounding on the following: 1) Cronbach α coefficient; 2) correlations of the statement with the subscale by the ITC (Item-total Correlation) coefficient and 3) Cronbach α c, efficient having eliminated the statement (α e.t.). Linear statistical links between the variables have been found out by applying Spearman correlation coefficient. Results. The scales of Cronbach α coefficient values varied from 0.656 to 0.888; the mean was 0.791. A minimal value of a coefficient of correlation between separate statements and sub-scales varied from 0.404 to 0.678; and a maximum value varied from 0.534 to 0.797. The test of Cronbach α having eliminated the statement demonstrated that after elimination of any statement from the sub-scale the values of Cronbach α coefficient would not

increase significantly. The values of Cronbach α coefficient are very close to the original version of the Exercise Motivations Scale. Conclusion. Psychometric parameters of the Lithuanian EMI-2 are quite good; therefore, the inventory is suitable for measuring and assessing the expression of adults' (18–65 years) motivations for exercising in their leisure time.

PERFORMANCE INDICATORS OF LITHUANIAN NATIONAL SOCCER TEAM

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Introduction. Performance indicators are variables, or more likely, combinations of variables by which we determine a performance has been successful or otherwise. It is known that teams use different strategies when winning, drawing and losing. More and more often performance indicators such as goals for, total shots, shots on goal, shots for a goal, ball possession, crosses, fouls are analyzed. The aim of the study was to analyze performance indicators in the last official matches of Lithuanian national soccer team. Methods. Firstly we used notation analysis in this study to analyze main performance parameters in two lost matches and secondly we used data from the database of UEFA website. We analyzed two matches of Lithuanian soccer team and we compared our data with the data from the website about played ten matches in European-qualifiers. Individual and the whole team actions during a match were counted. Short passes, long passes, shots on target, shots off-target, goals scored, goals against, fouls committed, fouls suffered were analyzed. We also compared the efficiency of four variables: short passes, long passes, shots on target, tackles won. Results. The results show that Lithuanian players possession indicators are too low: 42 percent and in average 349.1 passes attempted. Lithuanian soccer team has low variables in total shots – 9.2 and shots on target – 3.1 in average. Our study of two lost matches showed that the number of total shots was in average 7.5 and shots on target – 3. Shooting efficiency in two lost matches was about 40 percent. However the official statistics showed the shooting efficiency of Lithuanian squad – 33.7 percent. Conclusions: 1. Lithuanian soccer team performance indicators are too low and coaches should focus more on finishing situations: crosses, shooting. 2. To be more successful team in the future we need better passing and possession indicators to.

SPORT VALUES OF YOUNG ATHLETES

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The aim of this study was to analyse and compare sport values among Lithuanian cadets and junior athletes. Subjects and methods. Cadets (15–16 years old athletes) and junior athletes (17–18 years old) were recruited in randomized way from Lithuanian basketball and football schools. The participants of the study were 74 (15–16 years old) basketball and football players and 68 (17–18 years old) junior players. The modified questionnaire of orientation values by Rokeach (adapted version by Budreikaite Adaskeviciene) was employed. Five terminal values were provided to the participants (winning/losing, pleasure of sports matches, honest communication, compatibility of team actions, abilities and eight instrumental values were provided alike (persistence, responsibility, hard work, optimism, bravery, leadership, obedience, goodwill). The participants had to evaluate the values to eight-point system according to their importance. All the answers were evaluated in an adequate score: 1 – if it is irrelevant, 8 – if the value is really important. We were interested in high indicators (7–8 points) whereas they display which of the qualities show the priority. Consequently, the average of the evaluations was not counted, only the percentage of how many of the athletes evaluated (7 or 8) each of the values. In order to reveal the similarities and differences of the values we assorted all the terminal and instrumental values from the first (the most important) to eight (least important). The statistical hypotheses were tested by applying the Student t-test.

Results. Statistically significant difference were found in respect to high evaluation of the instrumental values between cadets and junior athletes: persistence was more characteristic to cadets ($t(140) = 1.97; p < 0.05$) but responsibility ($t(140) = 1.99; p < 0.05$) and obedience ($t(140) = 2.01; p < 0.05$) were more typical for junior players. No statistically significant differences ($p > 0.05$) were observed between cadets and junior athletes in respect to terminal values.

Conclusions. The comparative analysis of sport values among Lithuanian cadets and junior athletes showed that persistence was more characteristic to cadets and responsibility and obedience were more typical for junior players.

ADOLESCENTS' ATHLETIC IDENTITY IN RELATION TO PERCEIVED VARIETY OF TEACHING STYLES USED IN PHYSICAL EDUCATION LESSONS

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Aim of the study was to investigate the relationships of adolescents' athletic identity with the perceived variety of the teaching styles used in their Physical Education (PE) lessons. The subjects of this cross-sectional study were 14 year old boys and girls ($n=86$) from one secondary school in Kaunas city. Methods. The athletic identity was measured using 40-item Athletic Identity Questionnaire (AIQ Adolescent) were components such as self-perceptions of athletic appearance, competence, importance of physical activity (or sports), and encouragement for activity (from parents, teachers, and friends) were assessed by a scale 1 („totally disagree“) to 5 („totally agree“). Teaching styles in PE were evaluated by the modified questionnaire developed by the scientists of Tartu university to investigate how often the eight different situations (from reproductive such as Direct Teaching to productive such as Divergent Discovery teaching scenarios) are being used in their PE lessons (in a scale from 1 – „never“ to 5 – „very often“). Results. The mean score of athletic identity of adolescent boys and girls was 3.3 ± 0.6 . The highest evaluation was for the sport competence subcomponent (4.0 ± 0.7); the lowest for the encouragement from friends (2.7 ± 1.1). Based on students perception, the reproductive teaching styles (eg. Method A and B) were much more often used in their PE lessons than the productive styles (eg. Methods E-G): 4.3-4.1 vs. 2.7-2.9, respectively. The significant correlations were found between athletic identity and perceived teaching styles used in PE except for Method D ($r=0.22-0.34$; $p<0.05$). It is interesting to note, that productive teaching styles (Method E-H) were significantly related to more subcomponents of the athletic identity such as appearance, encouragement from parents, friends and teachers ($r=0.22-0.40$; $p<0.05$) in comparison to reproductive styles. The subcomponent „competence“ was not associated with any of the teaching styles used in PE lessons of the adolescent boys and girls.

Conclusions. The adolescents' athletic identity is greater the more often a variety of different teaching styles is being used in their Physical Education lessons. The usage of productive (student-oriented) teaching styles is more related to greater athletic identity of teenage boys and girls than the reproductive (teacher-oriented) teaching styles. Therefore it is important that PE teacher

education should focus on future-to-be as well as in-service PE teachers' facilitation to use productive, student-oriented teaching styles in their lessons more often.

INVESTIGATION OF RETINAL VESSELS DURING THE LONG-TERM INTENSE EXERCISE WITH DIGITAL PORTABLE EYE FUNDUS CAMERA

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Relevance of the research. The influence of physical activity on athletes' eye blood circulation has not been widely analyzed, but changes in the eye fundus (the status of the eye nerve disc and retinal blood vessels) and changes in overall health, including life-threatening changes to the cardiac vessels, may result in brain circulation dysfunction during physical activity. Novel, noninvasive technology is allowing advances in knowledge by showing, for example, changes to athlete's ocular blood vessels following physical activity; this may be used to establish risk factors and even to prevent serious complications or disability. In fact, static physical load for elite power athletes (at the time of maximum weight lifting) increases arterial blood pressure up to 450/380 mmHg, and the resulting heart rate can increase to as high as 166 bpm. These effects increase risk due to weightlifting for: stroke, subarachnoid hemorrhage, retinal detachment, subconjunctival hemorrhage, and episodes of unconsciousness referred to as "heavyweight's blackouts". Research aim – to determine retinal vessels changes during the long-term intense exercise with a digital portable eye fundus camera. Research methods and organization. Twelve men were tested (age = 44.9 ± 6.6 years) who played soccer twice a week and were not active athletes. All of the subjects were free of any known autonomic dysfunction and cardiovascular and ocular disease, and were not taking any medications. Evaluation of vessels. The eye fundus was observed using a digital portable eye fundus camera (Optomed OY, Finland). Pulse monitoring. Heart rate was recorded during warm-up exercises through the end of the game at 5-second intervals using a Polar S610i pulse meter. Arterial blood pressure measurement and oxygenation. To determine partial pressure of blood oxygenation, a Jerry-f Fingertip Pulse Oximeter was used. Arterial blood pressure was measured using the Korotkov method with Microlife BP A80 and average arterial blood pressure was calculated. Experimental

procedures. Eye retinal vessels, arterial blood pressure, and oxygen saturation were measured before physical activity. After stretching and a five-minute warm-up, two games each lasting 60 minutes were played on a 40×20 m field (the size of a handball court). During each game, a five-minute half-time interval was used for rehydration. During the 2–5 minutes immediately following each game, clearing of retinal vessels, arterial blood pressure, and oxygen saturation were measured. Results. After physical activity there was a statistically significant ($p < 0.05$) expansion in the lower central retinal vein branch and the lower branch of the central retinal artery in the right eye. In the left eye significant ($p < 0.05$) changes were observed only in the expansion of the upper and lower central retinal vein branches. Heart rate for men playing soccer increased from baseline to 2–5 minutes after beginning physical activity ($p < 0.05$). Baseline average arterial blood pressure was 129.1/80.9 mmHg, and mean arterial pressure was 96.8 mmHg. Following physical activity, nine of the 12 men tested experienced a significant change in blood pressure. For all 12, their increases in heart rate were statistically significant ($p < 0.05$), and the average increase was 38.9 bt.min. Change in oxygen saturation was also statistically significant ($p < 0.05$) and decreased by an average of 3.3% Conclusions. Our hypothesis—that playing soccer during the long-term intense exercise middle-aged men will suffer ocular vein dilatation and arterial constriction will increase as it depends on ocular blood flow and heart rate intensity—was partially supported. During the long-term strenuous exercise central venous branches dilatation and arterial constriction occurred for middle-aged men who play soccer. During dilatation there is a risk to experience bleeding into the vitreous, which may lead to retinal detachment, and during constriction retinal ischemia develops with the risk of vision loss. A digital portable eye fundus camera is very informative and accurate method for the image analysis and for use before, after and during physical activity. A digital portable eye fundus camera is more informative and accurate method comparing with photograph negatives.

THE STRATEGIES OF COORDINATION TRAINING IN PREPARATION OF HIGH-PERFORMANCE ATHLETES

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Introduction. Coordination training (CT) forms indispensable part of high-performance athletic preparation, which greatly affects obtaining of

technical mastery and sport excellence. Despite the recognized importance of CT, its general interpretation is far from complete. The principles, general concepts and basic approaches to purposeful training need appropriate clarification and verification. Similarly the guidelines for monitoring and training compilation should be proposed and implemented to practice. Aim. Introduction of basic positions related to content, essence and conceptual interpretation of CT for its successful realization in preparation of high-performance athletes. Material and methods. The computerized literature search using Google Scholar search engines, PubMed, MEDLINE, SIRC electronic databases has been fulfilled. Results. There are proposed the general principles of CT administration which postulate the following: CT is an indispensable part of the whole preparation system (1), stimulation of basic coordination abilities should be integrated into technical preparation (2), coordination programs should accentuate individual strengths and properties of athletes (3), they should be closely connected with conditioning training (4), and the monitoring of coordination competence should be a part of the entire preparation system (5). Taxonomy of basic coordination abilities (CA) operates with kinaesthetic differentiation, spatial orientation, body balance, rhythmic ability, agility and complex motor reaction. These CA should be properly evaluated and their monitoring allows provide successful long-term preparation of youth and adult high-performance athletes. The settings of evaluation trials are proposed for various age categories and their implementation is highly recommended. In addition there are proposed three principal approaches to development of basic and sport-specific CA namely: complex concurrent enhancement of many CA within macrocycle; -- accentuated training stimulation of selected CA within several blocks; and administration of mesocycle with highly concentrated coordination program. Conclusions. CT contains valuable resources for elaboration of more efficient preparation's system for high-performance athletes. These possibilities are associated with compilation of properly designed sport-specific CT programs, monitoring of coordination competence and implementation of CT into long-term preparation of young athletes.

RELATIONSHIP BETWEEN HARMFUL HABITS OF ATHLETIC AND NON-ATHLETIC SENIOR PUPILS AND THEIR AGGRESSIVE BEHAVIOUR

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Nowadays the prevailing behaviour jeopardizing the health of adolescents is related to the traditional risk factors for illnesses, such as smoking, alcohol and drug use, etc. Unfavourable behaviour for their health is often associated with more aggressive behaviour, where the rates of unfavourable behaviour for males' health are significantly higher than those of females in the area of smoking, alcohol consumption and irrational nutrition. However, when analyzing individual components of aggression, male pupils can be characterized as more aggressive than female pupils. From the theoretical point of view of the harmful habits of senior pupils, it can be noted that the use of tobacco, alcohol and drugs is closely related to aggressive behaviour and bullying at school and it is becoming a topical issue that has a significant impact on adolescents' further development and social well-being. Therefore, the research has been carried out to identify harmful habits and links with aggressive behaviour of athletic and non-athletic senior pupils. The aim of the research is to analyse harmful habits and links of aggressive behaviour of athletic and non-athletic senior pupils. Objectives of the research: 1. To review the harmful habits of senior pupils from a theoretical point of view. 2. To identify the harmful habits and their link with aggressive behaviour of athletic and non-athletic senior pupils. The sample of respondents was based on a non-probability, convenience, purposive sampling. The sample consisted of N=68 senior pupils of "Žemyna" gymnasium in Klaipėda City, male pupils (N=43) in grades 1 to 4 (M=3,12; SD=1,03) and female pupils (N=25) in grades 1 to 4 (M=2,92; SD=1,23). Research methods: theoretical (analysis of scientific literature), empirical (written survey using ASEBA questionnaire), statistical data analysis. A self-assessment questionnaire for the 11-18 year old youth (ASEBA - YSR 11/18, Achenbach System of Empirically Based Assessment - Youth Self Report, Achenbach, 2001) has been used to evaluate emotional and behavioural characteristics. The following statements from the YSR 11/18 questionnaire have been used in the research to assess harmful habits of senior pupils: alcohol consumption without parental permission; smoking, chewing or sniffing of tobacco, use of drugs or medicine for non-medical purposes. The research has shown that the majority of senior

pupils (82,4%) have never used alcohol without parents' permission; however, 28.6% of athletic female pupils sometimes consume alcohol and tend to behave more aggressively than their peers. Most (75.5%) teenagers reported they never smoked, chewed or sniffed tobacco, but 28.6% of non-athletic male pupils and 16.2% of athletic male pupils as well as 20.0% of non-athletic female pupils sometimes smoked, chewed or sniffed tobacco and were more aggressive than their peers. The research has shown that most of senior pupils (88.2%) have never used alcohol, drugs or medicine for non-medical purposes, but 28.6% of non-athletic pupils indicated that they sometimes used alcohol, drugs or medication for non-medical purposes and were prone to aggressive behaviour.

PHYSICAL ACTIVITY OF ADOLESCENTS AT A SPORTS CLUB

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SUMMARY Current physical activity guidelines for adolescents recommend to exercise daily for an hour or more to improve their health and reduce the risk of various chronic diseases (World Health Organization, 2003). Research findings of many authors (Sallis et al., 2000; Armonienė, Lamanauskas, 2011) reveal that the biggest decline in physical activity is among adolescents aged 13 to 18. Physical activity is key to good health, social and economic well-being. Person's age, gender, health condition, well-being and interests determine the extent of physical activity. Sports and physical activity are crucial factors in everyone's life (Adaškevičienė, 2004). Research aim: to analyse the physical activity of adolescents aged 13 to 17, training at a sports club. The methods of the research. Research methods: analysis of literary sources, questionnaire, mathematical analysis. The survey was conducted in August, 2018 at Klaipėda sports center "Šansas". The research sample consisted of 80 adolescents aged to 13 to 17: 40 female (50%) and 40 male (50%) adolescents. Research results. The obtained results revealed that the research participants aged 13 to 17, training at the sports club "Šansas", are active, motivated to engage in sports not just for leisure but also daily. The adolescents are also aware of the importance of physical activity and positive influence on their health. Conclusions. The gender-based research results differed only slightly. The findings show that both male and female participants, who have joined the sports club, are physically active and consider their physical activity as good and very good. However, the male adolescents are more physically active compared to their peer female adolescents.

THE ANALYSIS OF PAIN QUESTIONNAIRE SUITABILITY FOR CROSS-CULTURAL AND LITHUANIAN LANGUAGE ADAPTATION

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Purpose. To establish suitability of Orebro (short form) pain questionnaire (OSFQ) for cross cultural and Lithuanian language adaptation. **Subjects and study methods.** 30 subjects complaining of nociceptive pain and those who met selection criteria were randomly chosen for research. Subjects received individual treatment, using TENS, compressive therapy, functional electrical stimulation, massage and therapeutic exercises. In order to evaluate kinesiophobia and pain subjects were tested on 1st, 6th and 12th procedures, using OSFQ and TAMP questionnaire, VAS. Strength of shoulder muscles (m.trapezius, m.rhomboid, m.infraspinatus) was evaluated by digital dynamometer; pain threshold by algometer; head ROM (flexion, extension, rotation, side-bending to the right and left) by goniometer; hand grip strength by hand dynamometer before and after the trial. Subjects received 12 procedures 3 times per week. OSFQ was translated to Lithuanian language and then translated back to English by different translators. After OSFQ reached final adaptation stage it was confirmed by the commission that it can be used in the research.

Results. The internal validity of OSFQ, after 1st procedure were ($r=0.794$), 6th ($r=0.824$), 12th ($r=0.847$). Between OSFQ and different testing procedures: 1st and 6th ($r=0.783$); 6th and 12th ($r=0.855$). When OSFQ was compared to TAMP questionnaire, strength of correlation was ($r=0.669$); compared with VAS ($r=0.941$). Pain threshold in m.trapezius ($p=0.001$), m.rhomboid ($p=0.002$), m.infraspinatus ($p=0.005$) significantly changed when comparing results before and after. Strength of maximal isometric hand flexors before trial on right side was 46.36 (kg), after 56.83 (kg), ($p=0.04$) on the left side before treatment 45 (kg), after 54.73 (kg), ($p=0.02$).

Conclusions. OSFQ internal validity correlation was strong. Average correlation between OSFQ and TAMP questionnaire results were established while between Orebro and VAS correlation was very strong. Pain threshold in m.trapezius, m.rhomboids, m.infraspinatus significantly increased, which has shown higher tolerance of nociceptive pain after the treatment.

THE RELATIONSHIP BETWEEN MOTOR FUNCTION FATIGUE AND STRESS MARKERS AFTER PHYSICAL TASK OF BILATERAL SUSTAINED ISOMETRIC MAXIMAL VOLUNTARY CONTRACTION

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Aim. The main aim of this study to observe the relationship between motor function fatigue and stress markers after physical task of bilateral sustained isometric maximal voluntary contraction of knee extension. **Methods.** Motor function (EMG peak, 3s MVC, CAR), heart rate and stress markers (cortisol in saliva's, heart rate variability) were assessed in healthy 20-30yr old female and male (n=11) before, immediately after and 30min after 6x1min bilateral sustained (BIS) maximal voluntary isometric contraction (MVIC) of knee extension at 90 degrees of knee flexion within 3min rest by dynamometer. **Results.** Were found significantly ($p<0.05$) increased cortisol concentrations after physical task. When looking at the changes in motor function, only MCV was significantly decreased. Significant changes were found on heart rate and heart rate variability, accordingly heart rate increased when heart rate variability decreased. To analyze the relationship between stress markers and heart rate were found significant positive moderate ($r = 0.3$ to 0.39) relationship, hence heart rate variability significant negative moderate ($r = -0.3$ to -0.39) relationship. When looking at the relationship between motor function and stress markers were found significant negative moderate relationship in other data's were found not significant and weak correlations. **Conclusions.** Our study suggests that physical task of bilateral sustained isometric maximal voluntary contraction of knee extension has influence to motor function fatigue, stress markers and moderate relationship between each of these parameters.

EMPOWERING YOUTH IN PHYSICAL EDUCATION: IMPLICATIONS FOR ATTITUDES TOWARDS PHYSICAL EDUCATION, EXERCISE MOTIVATION AND PHYSICAL ACTIVITY

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Background. Evidence suggests that sufficient physical activity is positively related to physical, social and cognitive health of children and youth. We need to promote children and youth physical activity by fostering motivation, positive attitude towards physical activity. Framed by integration of self-determination and goal orientation theories, the aim of this study was to examine the teacher-created empowering motivational climate in physical education relations with children's attitudes towards physical education, exercise motivation and physical activity. Methods. Sample consisted of 13–18 years old children (n=362), who completed the Teacher-Created Empowering and Disempowering Motivational Climate Questionnaire in Physical Education, the Attitudes Towards Physical Education Scale, and the Behavioural Regulation in Exercise Questionnaire. Physical activity was measured according to HBSC guidelines. Results. Survey showed that children perceived higher levels of physical education teacher-create empowering climate than disempowering. Research data suggested that children have a relatively positive attitude toward physical education. They consistently scored equally in the affective and cognitive domains of attitudes, but with the increase of participant's age, there is an apparent affective (especially affective teacher) domain. Girls were more intrinsically motivated for exercising than boys. Around 25 per cent reported being four or more hours physically active per week. Participants' perceptions of an empowering motivational climate were significantly and positively associated with children's positive attitudes towards physical education, more intrinsic exercising motivation, but not with daily physical activity. However more positive attitudes (specifically affective domains) were positively related to physical activity. Conclusions. Results indicated that the creation of more empowering motivational climate in physical education may contribute to more positive attitudes towards physical education and encouraging more autonomous motivation for physical activity. Future studies on relationship between teacher-created empowering climate and children physical activity are also needed.

TEACHERS' OCCUPATIONAL HEALTH AND WELFARE: THE REVIEW OF SCIENTIFIC EVIDENCE

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Aim of the study was to review the scientific evidence of teachers' occupational health and welfare. Subjects and methods. Narrative literature review was applied. Scientific publications were searched in databases: „Academic search complete (EBSCO)“, „Medline“, „PubMed“, „Science Direct“, „Web of Science“. The following key-words applied: Teachers or/and Educators, Occupational Health or/and well-being. From the scientific publications data were collected on the target population, the survey indicators, the main results, recommendations. Since the number of publications on the chosen topics is limited, the studies published since 2000 were included. Results. Findings matching the search criteria showed that a number of studies focus on work-related teachers mental-health issues, impact of psychosocial factors on teachers health and job satisfaction, and also development of professional competences. Some studies focus on teachers' lifestyles (physical activity, nutrition) and their relation to health. In broader coverage, wellbeing in schools was examined in different health-promoting school programmes, such as the European Network of Health Promoting Schools Project. Systemic approach to teacher's occupational well-being was studied by Finish scientists. In a series of studies they theoretically based and created an instrument for monitoring the well-being of the school community staff. The model include four aspects, named „maintaining ability to work“ (health, mental and physical work load, individual resources), „working conditions“ (physical working environment, safety at work), „working community“ (work management and organization, leadership, social support, information), and „professional competence and need to develop them“. The work index form based on content model serves as a good tool for schools and occupational care in evaluating and developing occupational well-being.

Conclusions: Finish studies suggest that the work index form based on the content model serves as a good tool for schools and occupational health care in evaluating and developing occupational wellbeing. This model could be tested and adapted to assess and monitor the occupational health of Lithuanian teachers.

PERCEIVED AUTONOMY SUPPORT FROM THE PHYSICAL EDUCATION TEACHERS, PEERS AND PARENTS INFLUENCING ADOLESCENTS' OBJECTIVELY MEASURED LEISURE-TIME PHYSICAL ACTIVITY: AN APPLICATION OF THE TRANS-CONTEXTUAL MODEL

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Aim of the study Based on trans-contextual model (TCM), the current study was designed to investigate a motivational sequence in which perceived autonomy support from teachers in a physical education (PE) context and from peers and parents in a leisure-time physical activity (LTPA) context predict autonomous motivation, intentions and objectively measured LTPA of Estonian adolescents. **Subjects and Methods** In a three-wave design, adolescents ($N = 215$) aged between 12 and 15 years completed measures of perceived autonomy support and motivation in PE. Five weeks later they answered questions regarding perceived autonomy support from the peers and parents, autonomous motivation in LT, attitudes, subjective norms, perceived behavioural control (PBC), and intentions towards LTPA. Another five weeks later, at wave three and at wave one to assess past-behaviour, participants wore an accelerometer (ActiGraph GT3X) during seven consecutive days to monitor their vigorous PA during LT. To examine the hypothesized relationships among the study variables, the structural equation modelling was used. **Results** The hypothesized model demonstrated acceptable goodness-of-fit statistics: $\chi^2 = 31.99$, $df = 14$; CFI = 0.98; RMSEA = 0.077. Controlling for past behaviour, the model showed that adolescents' perception of autonomy-supportive behaviour from the PE teacher was positively associated with their autonomous motivation in PE which was positively related to autonomous motivation in LT. Autonomy support from the parents but not from the peers was positively related with autonomous motivation in LT. Autonomous motivation in LT was positively associated with attitude and PBC, which, in turn, were associated with intention towards LTPA. There was a significant negative relationship between PBC and LTPA. Objectively measured past behaviour was the strongest predictor of LTPA. The model explained 29% of the variance in objectively measured LTPA of adolescents. **Conclusions** The findings of the study partially support the applicability of TCM among Estonian adolescents when predicting their objectively measured vigorous LTPA. The results demonstrate that PE teachers and parents play an important role in

influencing adolescents' motivation. Research using self-reported measures of PA have shown a positive relationship between intention and PA which was not evident in the current study. Future studies using objective measures of PA are needed to investigate the motivational predictors of LTPA.

FOOD SUPPLEMENT CONSUMPTION, EATING HABITS AND PHYSICAL FITNESS INTERFACE AMONG MALE STUDENTS

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Research carried out by Lithuanian and foreign scientists shows that the number of people using food supplements is increasing. Adolescents are also noticeable among consumers. Finding links between the use of adolescent dietary supplements, dietary habits and physical fitness is important. Not always food supplements are used purposefully; most often their use is based on friends or adult, coaches' opinions. Inappropriate and not always necessary dietary supplements in adolescence can cause unwanted or even toxic effects in the body. It is therefore important to carry out such studies in order to take preventive measures. The aim of the study is to analyze the consumption of dietary supplements, physical habits and physical capacity of male students and to determine the correlation between these indicators. Research methods. 1. Analysis of scientific literature. 2. Questionnaire. The survey conducted a questionnaire on the dietary habits of gymnastics, the approach to the use of food supplements and the prevalence of their use - an adapted international questionnaire 3. Physical Capacity Testing was performed using EUROFITO (2002) and ARISTO (2015) project protocol tests. 4. Statistical Analysis. Conclusions. Analyzing subjects' consumption of food supplements we found that 26 percent of the students were consumed supplements. Most popular supplements were protein powder and amino acids. The main cause why students start to take supplements is thinking that they are lack of these nutrients. Consumption is influenced mostly by friends, family or coaches. Analyzing the eating habits of students consuming and not consuming food supplements, we have found that those teenagers who consume food supplements are more rational. They often eat porridge or flakes, rice or pasta, curd cheese, eggs, fish, fresh fruit or berries. Students, non-consuming food supplements are more likely to eat fried potatoes, meat, confectionery, candy or chocolate, use energetic drinks, or drinks consuming much sugar: lemonade, juice. Physical fitness research shows, that there was no statistically significant difference between the physical development and physical capacity indices between these groups.

CHANGES OF MOTOR SKILLS AND SALIVARY TESTOSTERONE AFTER THE ADDITIONAL AFTERSCHOOL EXERCISES IN ADOLESCENTS

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Aim of the study: The aim of this investigation was to compare fine and gross motor skills and salivary testosterone concentration before and after the intervention. The second hypothesis was that changes of testosterone relates to changes of fine and gross motor skills. **Subjects and methods:** Participants (N = 135, 12.8 years, 68 girls, 67 boys) were randomly assigned to a control, coordination exercise or a cardiovascular exercise group. They underwent the Flamingo test (to evaluate static balance) and Flower trail test (to evaluate fine motor skills) before and after the intervention period that involved 10 weeks of an additional afterschool exercise (coordination or cardiovascular) program, which took place three times a week for 45 min. (except a control group). Also a testosterone concentration in saliva was measured before and after 10 weeks. **Results:** coordination exercises improved static balance after the intervention ($p < 0.05$) and cardiovascular exercises improved fine motor skills after the intervention ($p < 0.05$). There were no statistically significantly correlations between motor skills and salivary testosterone. **Conclusions:** coordination exercise program is a preferred activity for motor skills in adolescents but changes of salivary testosterone do not relate to changes of motor skills after 10 weeks of the additional afterschool exercises.

THE EFFECTIVENESS OF THE GAME INDICATORS OF ELITE BASKETBALL PLAYERS, PLAYING IN DIFFERENT POSITIONS

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Aim of the study. While basketball is evolving, the positions are changing as well, they can be determined by players' anthropometry and physical qualities, which allow particular players to play at various different positions throughout the entire game. Players, that are able to play at several different positions, stand out not only by their anthropometry but also their game indicators and efficiency. The aim of this study was to determine and evaluate Euroleague men's basketball tournament players, playing in different positions,

game indicators and their efficiency. Subjects and methods. An analysis of the protocols of the Euroleague men's basketball tournament was performed (n=48). Qualitative and quantitative analysis of the effectiveness of basketball players, playing in different positions (players n=96, 32 players in each position). These indicators were analyzed: players' height; played minutes; points scored; two point, three point and free throws quantity and accuracy; defensive, offensive and total rebounds; assists; steals; turnovers; blocked shots, and blocks received; fouls and fouls received; efficiency rating and efficiency rating per minute. All data were tested by the non-parametric Mann – Whitney U - test. Statistical analysis was done using the SPSS 20.0 statistical software package, and statistical significance was set at $p < 0.05$. Results. On average point guards were shortest players, they played the most minutes, had the highest scoring, their free throw percentage was the highest; they also had the most assists, steals, turnovers and had the best efficiency ratio. Centers were the tallest players, they had the most rebounds, both defensive and offensive, had the best efficiency per minute ratio, also shot the best percentage, both two and three point shots. Conclusions. The determined quantitative and qualitative indicators of basketball players, who competed in different positions, differed: there are statistically significant differences in the comparison of positions. The game indicators remained almost the same when comparing the statistics of different positions in basketball players during the regular season and the playoffs. Point guards had the highest efficiency ratio, but centers demonstrated the highest efficiency per minute, forwards in both categories showed the worst results.

CHANGES IN PHYSICAL FITNESS OF PERMANENT COMPULSORY MILITARY SERVICE SOLDIERS (2015–2016)

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Changes in physical fitness during the PCMS are becoming a very important aspect in the context of a national and international security. Physical preparation is one of the main components of the military training. Today's youth lifestyle, their habits and hobbies, occupational activity - unavoidably affects the success of a service. The level of physical abilities often does not meet the requirements that are set for them. The soldiers face various challenges more often. The aim of the research was to describe changes in physical fitness of soldiers during the PCMS. The methods of the research. 934 PCMS soldiers of the LGD Butigeidis dragoon battalion of mechanized infantry brigade

“Žemaitija” of Lithuanian armed forces participated in the research. Research sample was comprised of 477 soldiers of the selection of 2015 and 457 soldiers of the selection of 2016. Changes in physical fitness of soldiers was evaluated according to the analysis of the results of the performed SPFT, grouping the participants of the research based on their age, year of the selection, and dates of testing. Research results. It was determined that both soldiers selected in 2015 and soldiers selected in 2016 usually met the physical training requirements that were set for them. Statistically significant links of the soldier basic exercise performance results revealed to their age. The changes of soldiers physical fitness observed in the results of testing performed during both selections. First tests revealed poor level of soldier physical fitness. The soldiers who started PCMS were not physically and mentally ready, had various health problems. During the second testing physical fitness of PCMS soldier's has improved ($p < 0.05$). During the third testing, the number of soldiers who passed SPFT increased rapidly, and of those who failed – shrunk. This improvement of latter indicators prove a benefit of a systemic and consistent training of physical abilities. The analysis of the change of SPFT evaluations during different periods of testing revealed statistically significant mutual links of variables.

Conclusions. At the time of PCMS, the SPFT results were statistically significant improved ($p < 0.05$). PCMS soldiers physical fitness varies consistently and uniformly. Physical fitness effectiveness depends on education and training differentiation and individualization processes.

OLYMPIC TEAM ROWERS STROKE TECHNICAL ANALYSIS

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Abstract It is much spoken about and researched how to increase the speed of moving in rowing. Many scientists as (Kleshnev V. 2010, 2011., Hawkins D. A. 2000., Hofmijster M. 2010., Nolte V. 2011., Nilsson J. 1977), a.o. have researched the technical aspects in rowing. Most part of researches is based on oxygen maximal consumption and other physiological changes during a load. Although there are various researches, stating the technical nuances of leg and arm work, comparatively little attention is paid to the role of the arm work. The cycle length in different distances and having different water flow – before the wind, against the wind and with the side wind is stated. The aim was to research one stroke technical nuances in rowing looking for stroke rate from 24 till 34. A pilot study was carried out. One Lithuanian Olympic team rower

was participated this pilot study and he was tested in different stroke rate. The following methods were used in study: test exercise, video analysis with KinezioVideoAnalyzer 3.0. and mathematical statistics. The results: having stated the result average of stroke rate was 28.6 and speed of stroke was 0.82 sec. Conclusions: the obtained data from rower show small differences changing stroke rate.

PUPIL PERSONALITY BUILDING DURING JUDO CLASSES

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In order to promote moral education, it is necessary to include the Judo's moral approach in school. The aim of the study is to study and collect knowledge in scientific literature on moral parenting in the learning process of the Judo. The use of specialised parenting techniques that can be covered by the Judi classes enables the development of movement activity as well as the moral qualities of pupils – courtesy, benevolence, dignity, friendliness and other personality – autonomy, targeting, confidence in themselves, will, leadership. The specific spotlight is, with constantly more complicated tasks requiring new approaches to the education and education of the young generation, as never before, Judo is an excellent tool for addressing parenting problems.

STUDENTS ABOUT DUAL CAREER IN LASE

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IAim. The results of this study reflect only the views of LASE students on Dual career, which is part of the study on high-level athletes in Latvian universities. Subjects and methods. After finishing high school, talented athletes have to make an important choice for their future: to start their studies at university, to focus on a sports career or to combine both goals. Combining academic studies with high achievements in sports is the goal of Dual career. Dual career is a serious step for each and every new talented student. Parents and friends, as well as coaches and teachers, can help to make a decision either in favor of it against it, choosing one way or the other. But the decision and its implementation remain at the discretion of the athlete. What kind of help do high-end athletes expect and receive, and how they implement it in life – answers to these questions have been received from LASE students-participants

of national teams, who mainly study according to the individual plan. Results. Family, friends, and support from lecturers or trainers, goals set in life, as well as desire to secure their future after the athlete's career are the most important factors motivating the Dual career. According to students' responses high fatigue after intense training, long absence from the country, match-fixing at the academy, inconsistency of lectures and trainings etc, are the factors that discourage to choose dual career.

Conclusion. The study summarizes the views of how LASE helps, what more should be done, what the athletes need to do, and how they need to plan and organize their time. The athletes express their opinion whether and how sport helps or distracts from studying, and whether and how studies help or distract achieving high results in sport.

AGGRESSIVE BEHAVIOUR IN SPORT: LITHUANIAN CASE

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Aim of the study. Children love to play: through play they learn social and physical skills, tolerance, discipline and respect for others. During recent years, however, it has become evident that sport is not always a safe space for children, and that the same types of violence and abuse sometimes found in families and communities can also occur in sport and play programmes. The aim of this study was to determine the frequency of aggressive behavior and social exclusion through questionnaires and observations in the youth environment. Subjects and methods. The survey covered 127 respondents (8-14 years old): 67 athletes and 60 students. Data were collected through two broad measures: assessment of the Youth Environment and assessment of the Youth Characteristics. The scores for individual factors are calculated based on the key. For data analysis SPSS 20.0 statistical software was used, the correlations between the tested variables were calculated using the Pearson correlation coefficient. Results. The frequency of aggressive behavior is 22.8% of young people experienced violence in some degree, with the average age of 11.3 years, with no drastic gender differences: 12.5% of boys and 10.3% of girls. The differences are more pronounced when it comes to different groups, so 9.4% of athletes experienced some degree of violence, or 21.2% of the students surveyed. Results showed that prosocial behavior and cohesion, are present to a high degree in the examined sample. In terms of prosocial behavior, the majority of children in both groups have a score of 3.5, which means that the ratings are high (sport club 45%; school 40%), but there are

no significant differences between the groups studied. Estimates of Cohesion are distributed between moderate and extremely high (3–4.5) scales. In accordance with a high level of cohesion and prosocial behavior, there is a rare presence of any of the three measured types of aggression (physical, verbal and indirect), whether in a sports club or school. Conclusions. There have been identified reasons of aggressive behaviour: leadership, jealousy, characteristics of the victim, physical characteristics, psychological weakness. Most respondents have a high level of hope and self-esteem, and young people have high optimism.

MARKERS FOR MONITORING INTRINSIC RISK FACTORS FOR ACHILLES TENDON OVERUSE INJURIES IN MALE MARATON RUNNERS

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Aim: To identify markers for monitoring the intrinsic risk factors for Achilles tendon (AT) overuse injuries in male marathon runners. **Subjects and methods:** Twenty-four male marathon runners aged 28–44 yrs participated in this study. They were divided into two groups: (1) runners without complaints in AT (n=12) and (2) runners with complaints in AT (n=12). Ankle active range of motion (ROM) in different directions was measured with goniometer. Staheli index of the foot was calculated using Podoscanalyzer. Muscle stiffness measurements were performed with Myoton-2 device. Squat jump, counter-movement jump and drop-jump (DJ) tests were performed on force platform. **Results:** The greater ($p<0.05$) ankle subtalar ROM in inversion was recorded in runners with complaints in AT as compared to asymptomatic runners. Staheli index was normal in both groups, although the individuals with complaints in AT had a tendency towards high foot. The gastrocnemius medialis muscle stiffness increased ($p<0.05$) in standing (loaded) compared with sitting (unloaded) positions, whereas tibialis anterior (TA) and gastrocnemius lateralis (GL) muscle stiffness increased ($p<0.05$) only in runners without complaints in AT. The difference in GL stiffness in standing and sitting positions correlated negatively with ankle ROM during inversion ($r=-0.6366$; $p<0.05$) in runners with complaints. DJ height was lower ($p<0.01$) in individuals with complaints in AT, compared to asymptomatic runners. The stretch shortening cycle utilization ratio (SSC) was significantly higher ($p<0.01$) in asymptomatic group. **Conclusions:** Higher inversion in subtalar

joint and longitudinal arch, deficit in muscle calf stiffness and low SSC utilization ratio in runners with complaints compared to asymptomatic sportsmen may be the markers for monitoring overuse injuries of AT in male marathon runners.

MYOSTATIN DYSFUNCTION DOES NOT AFFECT METABOLIC RATE, BUT IS ASSOCIATED WITH REDUCED LEVELS OF PHYSICAL ACTIVITY IN MICE

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Aim of the study; Interference with myostatin function have often been suggested as a promising strategies for preservation of muscle mass in chronic diseases (Bogdanovich et al. 2002) and ageing (Fife et al. 2018). Our aim was to investigate effects of myostatin dysfunction on physical activity and energy expenditure under control (CON) and caloric restriction (CR) conditions. Subjects and methods; We assessed physical activity by automated video analysis (CleverSys, Inc, Reston, USA) and energy expenditure by indirect calorimetry (Physiocage, Panlab Harvard Apparatus, Spain) in 30-week old males of BEH and BEH+/+ mouse strains, expressing mutant or wild-type myostatin, respectively, under conditions of ad libitum feeding (CON group) or after 12-week 30% caloric restriction (CR group). Results; BEH+/+ mice moved longer distances than BEH mice in CON group (153.7 ± 28.8 versus 128.4 ± 19.3 m/day, $P < 0.05$, respectively). CR was associated with increase ($P < 0.05$) movement distance and the differences between strains became insignificant (194.1 ± 52.4 versus 166.9 ± 52.6 m/day, for BEH+/+ and BEH, respectively, $P > 0.05$). BEH mice had ~1.6 times greater body mass normalized muscle mass than BEH+/+ mice, but energy expenditure differed between strains neither in CON group (16.5 ± 1.4 versus 14.7 ± 0.7 kcal/day, respectively, $P > 0.05$) not in CR group (15.9 ± 1.8 versus 15.6 ± 2.7 kcal/day, respectively, $P > 0.05$). Conclusion. Myostatin dysfunction causes a significant increase in muscle mass and a decrease in physical activity, but does not affect energy expenditure in mice.

15-16 YEARS ADOLESCENT PHYSICAL ACTIVITY DIFFERENCES BY GENDER

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Aim of the study – to identify the differences in the physical activity of adolescents from a gender perspective. Subjects and methods. The study was accomplished in 2018 in one of Vilnius County schools. 126 respondents from 9 to 10 grades (15–16 years old) participated in the study: 54 girls and 72 boys. The research uses the Physical Activity part of Health Behavior in School-Aged Children (HBSC) questionnaire. Statistical data analysis was performed using data collection and analysis software package SPSS 19.0. The Chi square (χ^2) criteria were used to compare the results by gender. The significance index $p = 0.05$ was used to check the statistical reliability. Research results. The research found that more than a third of girls and a little less than half of the investigated boys are exercising independently in their leisure time, with one third of girls and boys doing sports in organized school clubs or sports school training. However, even nearly a quarter of surveyed teenagers do not exercise at leisure time. No statistically significant gender differences were identified. Half of the surveyed adolescents were active more than 4 times a week (at least 30 minutes a day), and more than a third of the respondents were actively exercising 60 minutes a day. There are significantly more boys with moderate physical activity (who exercise 2–3 hours a week) than girls ($p < 0.05$). Almost one third of the respondents are not physically active – they exercise one hour a week or even less. Up to 7 hours a day, over two-thirds of girls and about half of the surveyed boys spend their time in the sitting position ($p < 0.05$). Almost half of the surveyed boys had a sitting time of up to 12 hours a day, with only one-fifth of the girls sitting so long ($p < 0.05$). During the study, we found that there were statistically more girls than boys who were sleeping enough ($p < 0.05$). More than half of the boys in the study did not sleep enough - just 7 hours a day or even less.

Conclusions: 1. According to the type of physical activity (self-exercise, sports schools or school groups), no statistically significant differences in gender were identified. 2. The WHO recommendation for physical activity corresponds to more than one third of surveyed adolescents. From a gender perspective, it was found that statistically significantly more boys than girls had moderate physical activity. 3. It was found that the guys were sitting more hours per day and less hours sleeping than girls ($p < 0.05$).

BIOMECHANICAL PRINCIPLES OF COORDINATED MOVEMENTS FOR THROWS FOR DISTANCE

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The most important factor influencing the distance thrown is the velocity of release, a measure of the kinetic energy given to the implement. It is the only factor that can be maximized by the athlete's action. The implement's movement (and speed) is the outcome of the movements (and speeds) of several body segments - legs, trunk and arms. Each body segment takes part in two movements: turning around the proximal joint axes and movement together with a joint. Thus, there arises the following question: how should the individual movements be coordinated to make the speed of the hand and the implement maximal. Hypothetically, there exist several ways of obtaining maximal velocity of the hand and implement. The first possibility, maximum velocity may be achieved when the speed of all body segments is maximum. According to the principle of 'particular impulse coordination' (Hochmuth, 1984), temporal coincidence of the maximum legs-trunk and maximum arm speeds should lead to an increase in the release velocity. A second possibility is that implement's speed is maximal, when the body segments are activated in sequence from proximal to distal (Dyson, 1982; Zatsiorsky, 1997). And third, if one or more segments are engaged in the activity, the lower segments should be fixed, providing a stable base for more effective performance by the upper segments (R. Enoka). The determination of the best combination of individual segment forces and their pattern of activation becomes more complicated, as the thrower must combine all types of interaction. All types of body segment's interaction should be combined to best utilize the 'explosive power capacity' of the athlete during the 0,12-0,15 s in javelin and 0,25-0,30 s in shot put available for the final application of force. Skillful throwing should follow the biomechanical principles of coordinated movements: 'general laws, based on physics and biology which determine human motion' (Bober, 1982). These principles are subdivided (Bartlett, 1999) into: - universal principles, which are valid for all activities, including throwing; - principles of partial generality, valid for large groups of activities, for example, throws for distance. Principles of partial generality are: sequential action of joint and muscle action; minimization of inertia; principle of impulse generation; maximizing of the acceleration phase; stability, checking of linear and rotational motion. In conformity with the experimental data of many researchers (Elliott et al., 1999; van Ingen Schenau et al., 1997; Lanka 2000, Lanka et al., 2017) athlete's

executing the movements of throwing a ball, discus, javelin, and putting the shot attain maximal speed when the body segments and muscles are activated according to these principles. About the according which principles trainers in fifties, sixties and later worked when these biomechanical principles of coordinated movements were not defined? On what kind of principles was based famous javelin trainer's V. Mazzalitis training system? These problems will be discussed in our presentation.

CHANGES IN LEFT VENTRICULAR HYPERTROPHY IN RESPONSE TO AEROBIC TRAINING (CASE STUDY OF ATHLETES)

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In competitive sports, regular intensive training load causes adaptive cardiac changes. Endurance and aerobic training load promotes cardiac enlargement by mainly causing left ventricular dilatation, but strength and anaerobic training load promotes cardiac enlargement by mainly causing left ventricular hypertrophy (Maron et al., 2017; Pelliccia et al., 2012). These changes of cardiac hypertrophy may sometimes be uncertain and similar exist in healthy exercise-induced cardiac adaptation and underlying hypertrophic cardiomyopathy (Kim et al., 2016). Aim of the study. To determine changes in left ventricular hypertrophy in athletes in response to low intensity aerobic training. Materials. Two athletes participated in the study: 26 year old male wrestler and 18 year old basketball player, both with left ventricular posterior wall and interventricular septum hypertrophy. Methods. anthropometry, echocardiography, heart rate monitoring. Results. The cardiac structural and functional data determined by echocardiography showed that wrestler had the left ventricular posterior wall hypertrophy (10 mm), but basketball player's (14 mm) over-reached normal limit. Athletes had interventricular septum hypertrophy, wrestler 12 mm and basketball player 14 mm, both over the normal limit (Lang et al., 2015). Excluding participation in their sports discipline training and competitions, and instead of it, using an aerobic training – 3 sessions per week of swimming or cycling, with heart rate frequency approximately to anaerobic threshold (140 bpm). After two months of an aerobic training, left ventricular posterior wall thickness decreased by 21% for basketball player and by 10% for wrestler. Interventricular septal thickness

decreased by 21% for basketball player, remaining a little over normal limit and decreased by 33% for wrestler – corresponding to normal limit. Left ventricular end diastolic diameter values increased for both athletes and left ventricular mass index decreased for both athletes. Conclusion. Two months of aerobic training regime resulted in decrease of left ventricular posterior wall and interventricular septum thickness, so most likely, the participants of the study had physiological left ventricular wall and interventricular septal thickening. Applying changes in training regime by decreasing overall training load and using only aerobic load, the reduction of left ventricular posterior wall and interventricular septum thickness was achieved.

ADOLESCENTS' ENGAGEMENT IN PHYSICAL ACTIVITY AND THEIR ATTACHMENT TO MOTHERS, FATHERS, AND PEERS: A PSYCHOLOGICAL INVESTIGATION

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Physical activity (PA) is one of the key components in promoting a healthy lifestyle in children. PA offers a number of health benefits to children and their families. However, a large proportion of children do not meet the current PA guidelines (at least 60 min of PA daily). This study is aimed at examining the links between adolescents' engagement in physical activity and their attachment to their mother, father, and peers (trust, communication, alienation) as well as their socio-economic status (SES). We applied a quantitative cross-sectional study design. A total of 835 students aged from 15 to 18 (females = 480 and males = 355, M age = 16.0, SD = 1.1) completed the questionnaire. This study revealed that physical activity had a weak positive correlation to mother ($r = 0.13$, $p = 0.01$) and father attachment ($r = 0.18$, $p = 0.01$), trust ($r = 0.17$, $p = 0.01$), and communication ($r = 0.16$, $p = 0.01$) with both parents and a weak negative correlation with father alienation ($r = 0.13$, $p = 0.01$). The overall study results show that adolescent communication to father, male gender, a younger age, and a higher SES are important factors in relation to adolescent physical activity.

PROFESSIONAL COMPETENCES OF SPORT COACH

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Each sport discipline has a different character and differs from the others by many factors influencing the competitors ultimate sport success. One of the most important factors determining the achievement by the sport coach and his competitors are the professional competences of the coach. The research was given to 50 combat sports coaches with a minimum second sports class. A questionnaire was used as a research tool. Research has revealed that among the universal features of combat sports coach they found, among others apart from the obvious, such features as the ability to create the right atmosphere, good sense humour and friendliness for people, as well as the ability to communicate but also a high level of personal physical fitness. In addition, it was observed that the respondents, primarily as a way of career advancement, pointed to High School Coaches, level courses and methodological conferences, which probably affects their quality of work as a coach. It was also revealed that an important element of professional professionalization of the respondents was their knowledge and pursuit of pro-health lifestyle influencing not only their quality of life but their charges.

THE ROLE OF SPORTING ACTIVITIES AND PERSONAL MONITORING SYSTEM IN CHANGING THE SELF-ESTEEM OF MEN IN SOCIAL EXCLUSION

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The aim of the study is to reveal the importance of sporting activities and personal monitoring system for the change of self-esteem of men experiencing social exclusion. Object of the research: self-esteem of men in social exclusion. Research methods: Men experiencing social exclusion participated

in selected sports activities three times a week, and a personal monitoring system was applied. In order to verify the change of self-esteem of men who are experiencing social exclusion, a Rosenberg scale questionnaire of self-esteem was used. Using a personal monitoring system, a personal help plan has been created. Results of the research: study participants were men experiencing social exclusion, young men with socially risky behavior, men prone to crime, young men showing socially unacceptable behaviors, born in social risk families, male prisoners, men experiencing crisis, men suffering from various addictions. All of the men who participated in the study are suffering from personality problems: low self-esteem, lack of self-confidence, health issues and from social problems: job loss, family crisis, decline of social status. Men involvement in sports has helped them to better assess themselves, have greater self-confidence. Using of a personal monitoring system has helped to identify the factors that prevent socially excluded men from participating in social life. It was found that men are a very specific social group, and therefore there is need for sporting activities as a tool for self-awareness, understanding and changing socially unacceptable, inappropriate behavior. For the male social group sport is the most appropriate and motivating activity and personalized assistance in drawing up a personal assistance plan. Research findings: 1. The self-esteem of men experiencing social exclusion was rated as very low and inadequate for individuals to be able to make decisive decisions to reduce their exclusion. 2. The application of the monitoring system helped to identify the factors that hinder the change of self-esteem of men experiencing social exclusion. 3. The inclusion of socially excluded men in sports activities and the use of a monitoring system has been identified as an opportunity for their self-esteem change and a suitable way to address their exclusion issues.

NATIONAL SPORT AND PHYSICAL ACTIVITY LABOUR MARKET IN LATVIA

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The development of every sector of the economy, including the sports sector, is based on labour force. Recognizing the impact of labour force and the development of the sports sector, it is important to identify the current situation in the labour market in sport, what was done in the framework of project “A European Sector Skills alliance for sport and physical activity” supported by European commission (Agreement reference number – 2016-3283/001-001, Project number – 575668-EPP-1-2016-1-FR-EPPKA2-SSA-N). Aim: to find

out the trends of development in the labor market of sport in Latvia in years 2011–2016. Subject: employees in sports sector Methods: analyses of scientific literature and statistical data, ex post analyses. Results: 1. The number of people employed in the sports sector has increased: in 2011, there were 3333 employed in the sports sector, but in the 2016 there were 3642. 2. In years 2011–2016 the highest number of employees in the sports sector in was in age category 26–49 annually, and the number of women annually exceeds the number of men.

Conclusions: 1. In the years 2011–2016 the number of employees in the labor market tends to increase. 2. The lack of detailed statistics, such as education of employees, working hours, salary, hinders a qualitative assessment of the sports labor market in Latvia.

MONITORING TRAINING LOAD, STRESS RESPONSE AND PHYSICAL PERFORMANCE IN UNDER18 AND UNDER20 LITHUANIAN WOMEN NATIONAL BASKETBALL TEAMS PREPARING FOR THE WOMEN'S EUROPEAN BASKETBALL CHAMPIONSHIPS 2018 - DIVISION B

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Aim of the study. This study aims to investigate a) the differences between under20 and under18 Lithuanian women's national basketball teams in training load and stress responses during the 3-week preparation period for the Women's European Basketball Championship 2018 - Division B and b) teams' pre-post preparation period changes in physical performance. Subjects and Methods. Twenty-four basketball players competing in the Lithuanian national women's Under-18 and Under20 teams (12 players each) were monitored during the 3-week preparation period for the Women's European Basketball Championships 2018 - Division B. Players' external load was evaluated using PlayerLoad (PL) calculated by microensors, while internal load was measured by means of training load (TL) calculated from session-RPE and training impulse (TRIMP). The investigated stress response variables were heart rate variability (HRV), well-being (WB) questionnaire, salivary cortisol (C), testosterone (T) and their ratio (T/C). The following tests were used pre- and post-preparation period to assess players' performance: 10-m and 20-m sprints, countermovement jump (CMJ), Yo-yo intermittent recovery

test level 1 (YYIR1). Data were analysed using linear mixed-model. Results. Significantly lower PL, TL and TRIMP values were found for Under20 team ($p<0.05$), while HRV value were significantly higher ($p<0.05$) compared to Under18 team. There was no difference in salivary C ($p>0.05$) while T and T/C were significantly higher in Under20 team. The WB did not differ between two teams. Pre- and post-values in physical test did not differ between teams, however the analysis within each team showed that Under20 increased the performance in 10-m sprint, CMJ, YYIR1, while Under18 increased in YYIR1 only ($p<0.05$). Conclusion. It is important to monitor external and internal training load and stress response during intensified preparation periods to optimize training prescription and maximize players' physical performances lowering their stress state before participating in elite international competition such as Women's European Basketball Championship - Division B. Specifically, our findings indicate that a very high training load volume in an intensified preparation period might not have beneficial effect on players' basketball physical performance compared to a more adequate training stimulus.

ASSOCIATIONS OF CARDIOMETABOLIC HEALTH TO SEDENTARY AND MODERATE-TO-VIGOROUS PHYSICAL ACTIVITY ACCUMULATION IN 10-13-YEAR-OLD BOYS

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Aim of the study. The aim was to examine how the accumulation of bouts of sedentary time and MVPA associates to cardiometabolic health in children independently of total sedentary and MVPA time. Subjects and methods. A sample of 123 10-13-year old (at baseline) boys participated in this study. Sedentary and moderate-to-vigorous physical activity (MVPA) bouts were determined using 7-day accelerometry separately in weekend days and weekdays. Time in sedentary bouts (min per day) accumulated per day was analysed in bouts lasting for 1–4, 5–9, 10–14, 15–29, and ≥ 30 min and time accumulated in MVPA bouts per day was analysed in short (< 5 min), medium (5–9 min), and long bouts (≥ 10 min). Body height, body mass and waist circumference (WC) were measured, and BMI was calculated. In addition, age-adjusted BMI cut-off points were used to define overweight and obese subjects. Each bout was compared with cardiometabolic risk factors and with the risk score (MetS score) that was calculated using standardized values of

BMI, WC, HOMA-IR, triglycerides (TRG), and total cholesterol/high-density cholesterol ratio (TC/HDL).

Results. Time accumulated in 5-9-min sedentary bouts was positively associated with TRG ($b=0.006$) in weekdays and negatively with BMI ($b=-0.011$) in weekend days ($P<0.05$). Time accumulated in 10- 14-min sedentary bouts was negatively ($b\leq-0.010$) associated with MetS score in both weekdays and on weekend days and with TRG ($b=-0.003$) in weekend days ($P<0.05$). Time accumulated in 15-29-min sedentary bouts was positively associated with BMI ($b=0.007$; $P<0.05$) on weekend days. Time accumulated in ≥ 30 -minute sedentary bouts on weekend days was positively associated ($P<0.05$) with insulin ($b=0.019$) and HOMA-IR ($b=0.001$). Time accumulated in ≥ 10 -minute MVPA bouts was negatively associated with MetS score ($b=-0.017$) and BMI ($b=-0.021$) in weekend days ($P<0.05$). In addition, negative association was found between total MVPA time in weekdays and MetS score ($b=-0.009$; $P<0.05$).

Conclusion. Sedentary time accumulated mostly on weekend days and MVPA time accumulated on weekdays were significantly associated with MetS score and single markers of MetS. However, being inconsistent for the bout length and in outcome measures, their effects on single MetS risk markers in real life might be small. Our results also suggest that sedentary time should be analysed in more detailed way than just total sedentary time, which might hinder the effects that sedentariness has on different health parameters.

2000 M ROWING ERGOMETER PERFORMANCE MODELLING OF THE OLYMPIC MEDAL WINNERS

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Aim of the study: Predicting and modelling performance changes from adolescence to elite level performance could indicate the potential of the athlete of the given discipline. The aim of the current study was to analyse the changes in performance from the start of their career to Olympic medal performance in comparison to those not reaching the medals. Methods: 29 male rowers were part of this longitudinal retrospective study. Among them were 10 medal winners from the Olympic games. The subjects were divided into two groups accordingly and were studied for their personal best 2000-meter time on Concept II rowing ergometer annually from the age of 14 until the age 27. Performance times were recorded either from the results from the National

championships or asked from their coaches if the subjects had missed the championships. Results: The 2000-metre rowing ergometer performance times increased significantly until the age of 21 for medal winners and until the age 20 in the rowers not reaching Olympic medals, but represented their country during U18 or U23 championships. However, there was still a 4 second improvement by the age of 23 (from 361.7 ± 7.5 to 355.4 ± 7.2 sec; $p > 0.05$) in medal winners. Performance times of medal winners were not significantly different from those not reaching the medals until 20 years of age (367.2 ± 9 sec vs 371.2 ± 7.6 sec, respectively; $p < 0.05$) and from that point forward the difference remained significant. Conclusions: Our results indicate the 2000-meter rowing ergometer performance development of 10 Olympic medal winners from the start of their rowing career until winning the medals compared to those not reaching the medals. These predictive models of performance during the long-term planning can be used to profile the targeted performance for the rower for the particular age.

TRENDS IN LITERATURE SOURCES FOR BACHELOR AND MASTER PAPERS AT LASE (2009-2018)

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As modern communication technologies evolve, the reading process is constantly changing. We are reading books less and less while spending more time at the computer. A contemporary student mostly reads sitting on the computer. When writing reports, articles, Bachelor or Master theses, and other papers, the Internet provides us an opportunity to use information sources that we could only dream of 5-10 years ago, incl. both scientific databases and YouTube, as well as the ability to view competition protocols, game calendars, laws, websites of different organizations, etc. without leaving the computer. It became the basis of the research: what literature sources – printed or electronic material – the students of the Latvian Academy of Sport Education (LASE) have chosen over the last ten years (2009-2018) when writing their Bachelor and Master Papers. The goal of the research is: Investigate literature sources for Bachelor and Master papers at LASE to find out what resources and what foreign languages LASE students use. To achieve the goal the following research methods were applied: investigation of the scientific and methodological literature and methods of mathematical statistics. The main results and conclusions: 1. Students, when writing their Bachelor and Master Papers, are using electronic literature sources more and more, but not as

much as we thought, however, printed material constitutes the greater part of used resources (approximately 60%–70%). 2. One should know how to work correctly with electronic sources as electronic texts unlike printed material are not always edited, so student have to develop their reading competence in order to critically asses electronic sources. 3. When writing their Bachelor and Master Papers earlier students mostly used literature sources in Latvian (58%–67%), Russian (11%–28%), English (8%–15%) and German (3%–8%) languages. But over the last three years, there has been a sharp increase in resources in English (45–50%) and a decrease in Russian literature sources (5–8%). 4. The growth of English language sources can be explained both by the availability of scientific databases and other electronic sources in the LASE, and by the improvement of the level of knowledge of the English language, so that in the development of Bachelor and Master papers it would be possible to freely use literature sources in English.

SHORT - TERM FORWARD HEAD POSTURE CORRECTION EFFECT FOR MAXIMUM BITE FORCE AND MASSETER MUSCLE ELECTROMYOGRAPHY ACTIVITY

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The aim of the study was to determine the effect of short – term forward head posture correction for maximum bite force and masseter muscle electromyography activity. Subjects. Twenty subjects who have upper cross syndrome (man and women; mean age 23.4 ± 4.27) without musculoskeletal disorders and temporomandibular (TMJ) joint dysfunction participated in the experiment. Methods. To evaluate head posture was measuring the craniovertebral angle formed by C7 – tragus – horizontal line. EMG data were recorded from the right masseter (RM) and left masseter (LM) muscles, test was performed doing maximal clenching effort. Were used frequency of EMG and Root mean square (RMS) parameters. Maximal bite force (MBF) were measured with sensors which were connected to a multimeter to detect the resistance changes. All measurements were perform in neutral head position, and after short – term head posture correction. Results. Short – term head posture correction significantly reduce ($p < 0.05$) craniovertebral angle from $26.38 \pm 2.08^\circ$ to $20.06 \pm 1.79^\circ$. In neutral head position were significant ($p < 0.05$) difference between RM and LM RMS (RM 0.16 ± 0.08 mV; LM 0.21 ± 0.15 mV). Short – term head posture correction reduce difference between sides and

difference become not significant ($p > 0.05$). We found that no significant ($p > 0.05$) difference between RM and LM evaluating EMG frequency in neutral head position and after short – term head posture correction results (in neutral position RM 152.83 ± 24.59 Hz; LM 159.16 ± 26.19 Hz, after short term head posture correction RM 158.61 ± 21.5 Hz; LM 168.12 ± 22.94 Hz). MBF results presented in kilo ohms (lower quantity show higher force). In neutral head position maximal bite force significantly ($p < 0.05$) higher in right side 11.90 ± 9.41 k Ω , and after short – term head posture correction difference between sides were significantly ($p < 0.05$) reduce 3.63 ± 2.52 k Ω . Conclusions. Short – term head posture correction improves craniovertebral angle people with upper cross syndrome. Forward head posture increases differences between RM and LM muscles EMG RMS and MBF. Short – term head posture correction helps to improve differences between sides for the better TMJ functioning, but have no significant result for RM and LM muscles in EMG frequency. Results of this study is basis to perform and determine long – term head posture correction effect for stomatognathic system.

THE USE OF ANTHROPOMETRIC AND PERFORMANCE CHARACTERISTICS TO IDENTIFY TALENTED ADOLESCENT WEIGHTLIFTERS ATHLETES

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The selection and development process of talented young athletes become important as the modern sport international competition has become more intense involving ever younger ages (Palamas et. al., 2015). The determination of the anthropometric and performance characteristics of athletes is invaluable to coaches and sport scientists alike as it assists with various aspects of sport such as performance enhancement, talent identification and training/recovery recommendations (Scanlan & Dascombe, 2011). The purpose of this study was to detect differences between talented and other young weightlifters and to identify those characteristics that could predict young athletes' selection. The participants of the research were adolescents of 15 to 17 years of age: 24 weightlifters athletes. In the course of the research, the following indicators of physical readiness were measured: height, body mass, lean mass, fat mass, hand power, time of psychomotor reaction and movement frequency per 10 s. These indicators were also measured: the power of one-time contraction of muscles (Bosco et al., 1983) and the anaerobic

alactatic muscle power (Margaria et. al., 1966). The calculations were done with the help of statistical programme SPSS, version 22. The talented weightlifters were lower on height, but all other anthropometric and performance characteristics were higher than the less talented weightlifters. The results of this study demonstrate that anthropometric and performance characteristics, discriminate between talented and less talented identified junior weightlifters athletes. However the selection should not be restricted to anthropometry, especially in young ages where maturation is involved. The measurement of physical characteristics in combination with specific weightlifters tests and psychological test should also be included. Other performance components (e.g., technical skills) also need to be considered in addition to these physical measures in a longitudinal manner if we are to better understand the process of talent development, as well as improve the predictive value and utility of applied models.

STRATEGIES AND METHODS FOR DEVELOPING HANDBALL SKILLS IN THE FORMAL PHYSICAL EDUCATION CURRICULUM

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Sports of playing games for the student competence are rapidly growing and beneficial in the process of the development of skills. Historically, training and learning sports and games were prevailing teaching methods in physical education, and modules, such as curriculum approach, could be useful for social purposes and healthy development. In terms of sport education, we understand the notion of “curriculum” as the contents of training, utilization of methods or organization of the full educational content. It has been established that sport education could contribute to the training of a healthy physical culture and the enthusiasm for students to participate in physical activities. Historically, physical education based on sports has been a predominant form. The effect of sport education, while playing games, on the student competence is growing fast, but has not received much attention from the scientists. A problematic question arises whether handball could be one of the components for the physical education program, which would stimulate the development of skills by applying the method of small-sided games (SSG). The research object: strategies and methods of handball. The aim: reveal the strategy of handball education with the help of SSG method. The following

conceptual provisions were used as references: The philosophical stream of pragmatism links the education of an individual to life practice. In their opinion, education takes place only through the direct individual experience of the learner, while experimenting with the reality, and children acquire knowledge and skills while playing and working. The representatives of humanistic pedagogy prefer self-education (the contents of training can help the learner to adjust to the society, realise their possibilities and express themselves. The article reviews the notions of physical education and sports, presents handball strategies in formal and informal physical education curriculum, and discusses the possibilities of handball education by applying the method of small-sided games (SSG). The article uses the analysis of scientific literature. Training based on techniques denies tactical training by dividing them, but gaming provides a new meaning, which allows to follow the integrity of the game (technique, tactics) education. Usually the basis for such gaming method relies on certain task limitations, which change the usual characteristics of the game, but maintain the main principle of the game. Conclusions. Handball training program based on game method is beneficial to the development of individual and team tactical, technical activities and improvement of other gaming components. Education through games allows the trainees to discover different solutions, teaches how to think fast and make right decisions. Training tasks are completely connected to certain handball actions by applying SSG method.

CORRELATION BETWEEN PHYSICAL ACTIVITY AND BODY MASS INDEX INDICATORS IN GYMNASIUM YEAR 1-4 STUDENTS

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Physical activity is one of the major factors determining human health and well-being. It shapes the human body and its functions, develops and strengthens all systems of the body, affects their functions and vitality. This is highly relevant to children and adolescents undergoing striking growth. Physical activity is the main biological factor of human development stimulating the body growth. Despite its value, the research shows that physical activity among Lithuanian students has reached a critical level. Only one in five students exercise more than the minimum required. Physical activity, which is highly crucial to healthy development, is often replaced by video

games, passive computer use for at least few hours. Lack of physical activity influences the growth of overweight and obesity problem. Research shows that the number of overweight children and adolescents continues to grow both in Europe and Lithuania. It should be noted that physical activity education is of paramount importance for children and adolescents. Adolescent behavior, their attitude to a healthy lifestyle often determines the quality of life in adulthood. In view of this fact, it is very important to educate children on healthy lifestyle skills at this point of life. Therefore, the research on physical activity characteristics of young people is relevant both at an international and national level. Research aim. Identify correlation between physical activity and body mass index indicators in gymnasium Year 1–4 students. Research object. Correlation between physical activity habits and body mass index in gymnasium Year 1–4 students. Research methods. The research sample included 502 pupils aged 15 to 18 years. Research was conducted using a questionnaire, analysis of correlation between physical activity and body mass index indicators and discussion of results. SPSS Statistics 20.0 software was used to analyze the obtained results. Results were evaluated using the descriptive and comparative analysis. Statistically significant difference, when $p < 0.05$. Research results. Results demonstrate that students' daily physical activity was inadequate. Most students used smart technologies daily for at least a few hours. Top favorite physical activities for girls include walking, dancing and swimming, while boys claim them to be basketball and weight lifting. Female research participants are mainly motivated to engage in physical activity wishing to be healthier and lose weight, whereas male participants want to be stronger and win against others. Conclusions. The body mass index of students who were more physically active was found to be lower than of those who spent more time using smart technologies. The latter had a higher body mass index and were more physically inactive.

ISOCALORIC LOW CARBOHYDRATE AND LOW FAT DIETS SIMILARLY IMPROVE BODY COMPOSITION AND GLUCOSE TOLERANCE IN OBESE MICE

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Background. Low carbohydrate diets are gaining popularity and are often promoted as superior to higher carbohydrate diets for improvement in body composition and metabolic health. These claims of metabolic advantage based

on carbohydrate-insulin model of obesity still lack scientific proof. The aim of study was to compare how different proportions of dietary carbohydrate and fat in isocaloric diets affect body composition and blood glucose control in obese mice. Methods. Male C57BL/6J mice (n=27) were fed ad libitum high fat high sucrose diet (HFHS) to render obesity until they reached 28 weeks of age. Then obese mice were subjected for 6 weeks to two energy-restricted (32%) diets differing in carbohydrate and fat content but equated in total calories and protein: low carbohydrate (LC; 20, 60 and 20% calories from carbohydrate, fat and protein) and low fat (LF; 60, 20, 20%) (n=9 each). Nine age-matched mice on ad libitum HFHS were left as controls. Body mass was measured weekly. A 6-time point intraperitoneal glucose tolerance test (IP-GTT) (at 0, 15, 30, 60, 90 and 120 min) was carried out during the final week after an overnight fasting. Hindlimb muscles and main adipose tissue depots were dissected and weighted in the end.

Results. All mice had a similar body mass at the beginning of dieting (37.5 ± 3.4 , 37.4 ± 2.5 and 39.2 ± 3.7 g for LC, LF and HFHS; $P>0.05$). Body mass significantly decreased after dieting compared to HFHS (40.9 ± 2.3 g, $P<0.001$) but with no difference between diets (29.1 ± 4.9 and 26.6 ± 3.8 g for LC and LF, $P>0.05$). Combined muscle mass did not differ between diets and compared to HFHS (421.3 ± 27.4 , 405.7 ± 39.9 and 442.3 ± 10.6 mg for LC, LF and HFHS; $P>0.05$). Dieting resulted in markedly lower combined adipose tissue compared to HFHS (7907.7 ± 710.6 mg, $P<0.001$) but not between diets (2780.4 ± 1901.5 and 1780.1 ± 1008.7 mg for LC and LF, $P>0.05$). IP-GTT curve decreased at 60-120 min time points after both diets compared to HFHS ($P<0.001$) with no difference between diets ($P>0.05$). AUC of IPGTT was similar between diets (78.1 ± 17.8 and 68.1 ± 19.7 A.U. for LC and LF, $P>0.05$) and lower compared to HFHS (114.9 ± 19.1 A.U., $P<0.05$).

Conclusions. Low carbohydrate diet is not superior to higher carbohydrate diet in improving body composition and glucose control. Calorie restriction rather than carbohydrate of fat content seems to be the main factor of favorable changes in body composition and glucose control in obese mice.

THE ATTITUDE OF LITHUANIAN STUDENTS TOWARD VALUES OF OLYMPISM

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Nowadays the process of education is based not only on the development of mind and intellect but also the body. The Olympic education means physic –

mental education. With the help of it children and youth are supposed to understand that the durability conditioned by sport enriches other goals of life and helps to find their own lodgment in a society. This is the basis of the activity of the association "Sport for everybody". The Olympic movement among students is not widespread. We think that universities are the main medium, which should first be implemented in the Olympic program, because if students are more concerned with the Olympic movement to be aware of is they give their knowledge, ideas, convey to children. On the theoretical level, research related to Olympism and Olympic education is indeed significant, but the empirical data gained much less. Lithuania is studies have examined the moral values in physical activity studied students' attitude to the Olympic values, but there is nothing about high school students. This raises the problem of how to organize the training of students in order to impart to them the knowledge of the Olympic movement and Olympism published humanistic principles of sport. We think that universities are the main medium, which should first be implemented in the Olympic program, because if students are more concerned with the Olympic movement to be aware of is they give their knowledge, ideas, convey to children.

Aim of the study. To investigate Olympic education in Lithuanian universities and in neighboring countries, identify the Lithuanian students' attitude to the values. The study hypothesis. Olympic education program for students in Lithuanian universities and academies preconditions youth to withdraw from the sport, cause an increase in health, positive effect on the formation of values and personality. Theoretical and scientific novelty. Olympic education topic Lithuanian universities are not research. Therefore, our work is significant that for the first time, we theoretically to stake Olympic educational opportunities in universities. We have interviewed 218 students from 16 higher education schools of Lithuania. 51% of the interviewed were females (111) and 49% males (107). The research group was chosen randomly – the questionnaire was distributed in Vilnius, Kaunas, Klaipeda and Siauliai higher education schools. The main part is devoted to investigate the students' attitudes towards the olympism values. The examination of attitudes to the Olympic values were the three blocks of claims, which form a common list of 52 values. For the statistical procedures there was used the SPSS 15 for Windows via the setting. The analysis of quantitative research data there were used various statistical analysis methods. Inside compatibility questionnaires scales determined by counting the Cronbach alpha coefficient. The students' attitude towards the values of the Olympic structure estimated using the essential components of extraction and Varimax factor rotation method. Differences were considered statistically reliable at a maximum of 5% of error

($p < 0.05$). The link is considered to be statistically significant at a wider than 5% of error ($p < 0.05$).

The results of the study. It was found that Lithuanian students tend to assign the values which are connected with human values and social virtues connected with Olympism. The least important values are connected with personal development. So, the students olympism mostly associate with honesty, two – way respect, cultural awareness, optimism, strength of the will, generosity, tolerance towards other nations etc. Such results are determined by an opinion about the Olympic games itself. Analysing the research results there has emerged that for the students is important social values, bounded with olympism. They find it very important a sense of community, heartiness, goodness, better world, gentlemanly behaviour, body and mind harmony etc. The least connected thing with the Olympic games the students named personal development, artificialness, career, collaboration etc. It was found that the students, who have Olympism classes at university, better understand the Olympic values and regulations. In Lithuania there are held olympism programs for schoolchildren but not for students. There is no system which would involve into the Olympic movement. The students shall experience olympism through learning, Olympic education, sports competitions and also sense the beauty of sport, alternation, depth of emotions and feelings, the bless and the underlying of the strength of values. Students, as young people, are full of enthusiasm, energy, drive for improvement and learning. They admire the Olympians and Olympic heroes and their deeds. Thus, this shall be used to open the system of the olympism values. Students assessing them given values, we think already take into account the experience gained in past time. Students already are looking to human values opposed than pupils, making us more difficult to assess their values. Most importantly, in universities we need to provide, to teach them how they could spread the Olympic values to younger people. For the students who graduated from universities, comes to life, where willing or unwilling becomes as example to the young people and children. Therefore, from the students' knowledge begins dissemination of values to young people. After the factor analysis we can see how individual values are compatible with each other and what the number is bigger, the connection stronger. The analysis separately for men and women groups has similar results.

PHYSICAL FITNESS AND MOTOR COORDINATION MONITORING DURING ENRICHED SPORT ACTIVITIES IN A SAMPLE OF CHILDREN LIVING IN LITHUANIA. THE ESA PROGRAM

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Physical fitness (PF), motor skills or basic motor competencies play a central role in the process of the development of physically active lifestyle. High PF in youth can positively affect health status and cognitive function of children and also in adult life. Children must have basic motor competencies and adequate PF in order to take part in sport and exercise. Though, in order to access the current level of fitness, proper test battery has to be applied. Enriched Sport Activities Program (ESA) is an evidence-based practice exercise program co-funded by the Erasmus+ Programme of the EU. It aims to enhance social inclusion, equal opportunities, sport motivation and psycho-physical wellbeing in school-age children through sport activities enriched by cognitive tasks. It is a well-structured program of 27 units with the aim of strengthening of motor abilities and basic executive functions through different sport activities enriched by specific cognitive tasks. The intervention of ESA program was carried out in seven European countries and here will be presented results from Lithuania. The aim of the presentation – to introduce the content of the ESA program, ESA fitness test battery and to test effectiveness of the program for children's PF parameters. The structured intervention (one physical education class and one swimming class per week) was conducted in three months. The subjects enrolled were 100 children in one Kaunas school with average age $M = 10.36$ (1.15) years; 62% were boys and 38% girls. The experimental ESA group consisted of pupils in grades 2 and 4 ($N=58$), and a control group - of pupils in grades 3 and 5 ($N=42$). Before and after the intervention, the PF of children was measured by 7 original tests of the ESA program. Majority of PF measurements increased significantly. Gender was not significantly related to any fitness parameters. However, higher weight significantly correlated with better seated ball throwing ($P<0.001$) and a poorer "crawling" (10 m run in quadruped position) test results ($P<0.012$). Interestingly, the higher age of the children was associated with better ball throwing and long jump tests ($P<0.001$), but worse 30 m sprint and endurance tests ($P<0.001$). A further development of the fitness assessment battery is envisaged within the

ESA project, where fitness is analysed in the sport context for young people, and also cognitive skills are considered together with motor component and technical skills.

FOOTBALL AS A TOOL FOR INTEGRATING REFUGEE CHILDREN AND YOUNG PEOPLE INTO SOCIETY

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Abstract. In recent years, the world has experienced the greatest massive human mobility since the Second World War. Increased forced displacement from Syria, Iraq, Eritrea for war crimes and persecution in these countries. On a global scale, the phenomenon of sport begins to be seen as a possible integration tool for refugees. The effectiveness of the refugee integration process through sport is not yet widely known, but it is relevant to this day. The crisis of the migration of children and young people from refugees has encouraged non-governmental organizations to write and implement sports projects to resolve the issue of refugee integration in the world. The aim of the article is to reveal football as a sports tool for integrating refugee children and young people into society. This article deals with the analysis and synthesis of scientific literature. An analysis of scientific literature has revealed that among refugees one of the most popular sports is football, as it is a global game played around the world. Through this sport, communication and social skills that encourage community involvement are evolving. The sports projects "Refugee Integration through Sport" are actively being implemented and implemented globally.

COMPARISON OF PLAYER-COACH PERCEPTIONS OF INTERNAL TRAINING LOAD AND RELATION WITH EXTERNAL TRAINING LOAD EXPERIENCED IN SEMI-PROFESSIONAL BASKETBALL PLAYERS

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The aim of the study – to compare player and coach perceptions of internal training load (TL) and investigate relation with external TL experienced in

semi-professional basketball players. Subjects and methods – 15 semi-professional basketball players and head coach of the team were recruited. From a total sample of 15 players, 7 players (age: 20 ± 1 yr; height: 195 ± 1.6 cm; body mass: 87.5 ± 5.8 ; training experience: 13 ± 3 yr) met the inclusion criteria: do not miss more than 3 training sessions during four weeks period (14 training sessions in total). Variables measured of internal training load (TL) were: percentage of maximum heart rate of the player (Player%HRmax); internal load of the player (ITL): calculated as rating of perceived exertion (sRPE) multiplied by the total duration of the training (in minutes); and coach intended training load (CTL): calculated as coach sRPE multiplied by the total duration of the training (in minutes). Variables measured of external TL were: total external player load (ETL) and external player load per minute (minETL). Results – the mean duration of training session was 85 ± 18 minutes and the mean Player%HRmax per session was 66 ± 3 %. Significant positive correlation was found between Player%HRmax and ETL ($p < 0.05$, $r = 0.59$). However, Player%HRmax did not correlate with ITL and minETL. No significant difference was found between players ITL and CTL ($P > 0.05$, $\eta^2 = 0.15$, $SP = 0.28$) with significant positive correlation between these variables ($p < 0.05$, $r = 0.77$). Significant positive correlation was also found between players' ITL and players' ETL ($p < 0.05$, $r = 0.84$). Conclusions – players' internal TL did not differ between players' external TL. Moreover, coach well predicted the training load of the players. Improved understanding of external- and internal-load monitoring may help to avoid maladaptive training.

CHANGES IN PHYSICAL AND FUNCTIONAL BASKETBALL PLAYERS' CAPACITY DURING DIFFERENT MODES OF INTERVAL TRAINING

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Physical activity of basketball players during the match is usually defined by the amount of work (distance, quantity of actions, duration, etc.) and intensity of work (frequency, rate, speed, etc.) by evaluating the interaction of these components in practice. However, duration of repeated sprints and recovery intervals are different depending on different situations of the game. The aim of this study was to determine and evaluate how different types of interval training affects physical and functional capacity of basketball players. Twelve

highly trained basketball players (age 21.19 y, weight 86.25.8 kg, height 189.66.8 cm, BMI 23.91.3 kgm⁻², standing reach 247.89.6 cm), voluntarily participated in this study. All participants had 12.19 y of basketball training experience with 10 h training per week. A single-group repeated-measures study design was selected for this study. The mode of interval training (IT1 and IT2) by manipulating the number of repetitions, rest time and length of running distance, but maintaining the same amount of work (900 meters), work to rest ratio (1:5) and recovery time (5 mins) was selected as independent variable. Running speed, duration, fatigue index, dynamics of recovery and response to a physical load (heart rate, oxygen quantity changes in muscle and blood lactate concentration) was evaluated as dependent variables. IT1 consisted of three series of ten 30 meters shuttle sprints (15 + 15 m) with a change of direction of 180°, intercepted by 30 s of passive recovery. IT2 consisted of three series of twenty 15 meters sprints, intercepted by 15 s of passive recovery. Research revealed that during different modes of interval training, influenced not only by the length of the running distance but also by the change of direction, different average running speed prevailed. During both modes of interval training, fatigue index suffered by basketball players was significantly different. Insignificant differences of oxygenation between interval trainings shows that activity of aerobic reactions is not related to the type of training. The changes of heart rate confirms this trend, but significant increase in both trainings shows fatigue of parasympathetic nervous system. Study showed that during different modes of interval training, the activity of anaerobic reactions is different. Although there was a slower running speed, longer work duration and lower fatigue index in IT1, blood lactate concentration after training was higher by 4.49 mmol/l ($p < 0.001$) than IT2. This allows to assume that part of the aerobic reactions are related to the elimination of metabolites and reimbursement of energy supplies in working muscles.

THE ESTABLISHMENT OF THE EDUCATIONAL AND SCIENTIFIC INSTITUTE OF PHYSICAL CULTURE AND SPORTS AND HEALTH TECHNOLOGIES OF THE NATIONAL DEFENCE UNIVERSITY OF UKRAINE NAMED AFTER IVAN CHERNYAKHOVSKYI

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The National Defence University of Ukraine named after Ivan Chernyakhovskiy, Ukraine

The physical training is one of the main subjects of the combat preparation of the forces and immediately affects the level of the Armed Forces (AF) of Ukraine combat readiness, as well as readiness of the military formations and law-enforcement agencies. The question of centralized preparation of the physical training and sports cadres for the structures of the security sector of Ukraine is very timely. The Ministry of Defense of Ukraine is conducting the systematic work to improve the military education to approximate to the preparation system of the NATO members. The experience of these countries confirms the tendencies of the centralization of the physical training and sports specialists for the AF and law-enforcement agencies preparation, and integration of personnel preparation and organization of scientific researches. From the 1-st of September the Institute commenced the preparation of the physical training and sports specialists for the AF of Ukraine and law-enforcement agencies. The procedure of physical training and sports specialists preparation licensing with the educational degree of “associate bachelor”, “sports and physical training instructor” and “master” by the specialty 017 “Physical culture and sports”, specialization “Physical training, specialized physical training and sport in the Armed Forces and law-enforcement agencies of Ukraine”. The Decree of the Ministry of Defence of Ukraine № 75 dated 13 May, 2016 “On the ratification of the Concept of the physical training and sports in the Armed Forces of Ukraine till 2020” the Institute of the NDU is designated as a main contributor concerning the scientific and scientific and technical activities in the sphere of physical training and sports in the Armed Forces of Ukraine. One of the main tasks of the Institute is to implement scientific activities by conducting the scientific researches concerning the development of the physical training and sports in AF and law-enforcement agencies of Ukraine, as well as the preparation of scientific personnel. With this aim the Center of the scientific activities is included to the Institute. The coordination and methodological committee is established on NDU

basis with the participation of the major scientists in the physical training and sports sphere for the security and defence sector of Ukraine. Institute establishment allows to perform multileveled preparation of the specialists of physical training and sports training from instructor – associate bachelor to military specialist of operational strategic level for the AF of Ukraine and other structures of security and defence sector on the basis of up-to-date material and technical base, high professional level of pedagogical.

PARENTS AS ANIMATORS OF PHYSICAL ACTIVITY: AN EXAMPLE OF EXERCISES FOR PARENT WITH CHILDREN

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The physical activity of young children is dependent upon many factors, including the attitudes of parents, guardians, and educators. We assumed that parent-child exercise, as a form of physical activity, is a good example of recreational behaviour modelling in the family, which children then bring into their adult life. Research shows that children brought up in families of physically active parents are more likely to live an active lifestyle in the future (Dempsey et al. 1993, Freedons and Evenson 1991). The aim of our research was to assess the behaviours of parents participating in a specially designed form of exercise improving mobility and motor skills, involving playful activities for parents and children. In addition, the authors sought to verify whether this type of physical activity, which aims at engaging parents and children for joint physical play, is a worthwhile proposal of wider dissemination. In order to carry out the research, a model of recreational exercises for parents with children was developed by the research team. The classes were held once a week in the gym hall and lasted for 45 minutes. They consisted of three parts. In the first part, parents together with their children performed exercises presented by the teacher. The second part was a period of spontaneous play of parents with children in a designated area, using various props and equipment. The third part consisted of final play and setting some form of “homework”. The study used the observation method, using a specifically designed observation questionnaire (Piech and Bodasińska 2018). The observations were conducted before the classes, during the exercises conducted by the leader, and during the spontaneous play part. Both the positive and the

negative behaviours of 7 parents participating in the classes were examined. Among the 7 examined parents, 2 positive and 5 negative behaviours were recorded before the classes. During the part run by the leader, 3 positive and 4 negative behaviours were observed, and in the spontaneous part, there were 2 positive and 5 negative behaviours. The negative behaviours observed by the researchers were most often related to: the lack of or sporadic contact of a parent and their child; a parent not joining in—either sitting on a bench during play, or children playing on their own, without parental participation or only with the other children; parental conversations over the phone or with other parents, and losing contact with a child.

EFFECTS OF DANCE ON CIRCULATORY AND RESPIRATORY SYSTEMS OF 14–18 YEARS OLD DANCERS

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The aim of research work: To identify dance training effects on cardiorespiratory systems of 14–18 years old dancers during special training and competition periods. Materials and methods: The study involved 26 dancers. The study was carry out from December 2017 until February 2018. The first assessment took place before the special training period, the second – during the special training period, the third – during the competition period. The dancer's circulatory system was assessed by an orthostatic measure and Ruffe test. The respiratory system was assessed by measuring the thoracic excursion, respiratory rate in rest, and VO_2 max evaluated using indirect method. A measurement of the intensity during training and competition periods was taken using POLAR system. Data analysis was computed using the statistical analysis of MS Office Excel 2010 and R Commander programs. Results: During the competition period, the average dancer's VO_2 max reached 59.68 ± 3.0 ml/kg/min, the thoracic excursion was 9.5 ± 0.46 cm. During an orthostatic test, fatigue wasn't discovered. According to the results of the Ruffe test during competition period, the dancers are classified as moderate and highly trained. During competition, the average heart rate (HR) in standard dances was 174.5 bpm and Latin American – 168.5 bpm, which was 80–90 % of dancers HR max. It was noticed that during training periods dancers reached only 50–60 % of their HR max. Conclusions: It has been determined that dance has a positive effect on the physical fitness and training of 14-18-year-old dancers during special training and competition periods. The statistically significant decrease in the response to physical activity and its faster recovery

after exercise was observed in the HR. Statistically reliable changes in chest excursions and in VO_2 max were observed. The intensity achieved during the competition exceeds the intensity of the program during the training periods. It was determined that competition is predominated by the production of anaerobic energy zone, while during dance periods – aerobic zone.

PROFESSIONAL MOTIVATION OF PHYSICAL EDUCATION TEACHERS

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Teachers' motivation refers to their attitude or desire to work. It appears as a vital construct because of the teachers' role in classroom and school functioning (Jesus & Lens, 2005). The effectiveness and dedication of teachers' work depends on their motivation and job satisfaction (Ayele, 2014; Ololube, 2006). Motivated and satisfied teachers have better teaching quality and motivate their students (Hattie, 2009; Carson, Chase, 2009; Vieira, Jesus, 2007), therefore, teachers' motivation research is relevant. The aim of the research is to reveal what is characteristic of the professional motivation of physical education teachers. Method: Participants were 382 PE teachers (149 males and 233 females), ranging in age from 19 to 67 years old, and representing distribution of teaching experience from 1 to 45 years ($M=22.49$). Teachers' professional motivation was investigated using The Work Extrinsic and Intrinsic Motivation Scale (WEIMS) (Tremblay et. al., 2009). WEIMS consisted of 18 statements dealing with the measurement of 6 types of motivation: intrinsic, integrated, identified, introjected, external regulation and amotivation. 7-point Likert scale has been applied: 1 - does not correspond, 7 - corresponds exactly. The results of the study were analysed using descriptive statistics, Student's T tests were computed. Results. Results indicated that integrated work regulation (18.11 ± 3.07) and intrinsic work motivation (17.21 ± 3.28) were most characteristic of physical education teachers' work motivation. The lowest score was observed of external work regulation (12.89 ± 4.08). The analysis of the results in terms of gender revealed no statistically significant differences between the scores of all subscales. Conclusion. According to SDT, it can be said that, regardless of gender, teachers of physical education have autonomous regulation. This shows their determination to work as a teacher of physical education and increases the likelihood that they will meet their basic needs in their professional life and will not leave professional activity when faced with unfavorable factors. Also, the research results focus

on further investigation on professional motivation, revealing the impact of personal and environmental factors on the work motivation of physical education teachers, and how their motivation is related to teaching effectiveness and students' learning outcomes.

DIFFERENCES IN DUAL CAREER ACTIVITIES BETWEEN NATIONAL AND INTERNATIONAL LEVEL ESTONIAN STUDENT-ATHLETES

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Student-athletes have to combine university studies with high level sport. The sport career of national and international level student-athlete is relatively short, coinciding in most cases with the period of study, so as to be prepared for future challenges. The aim of this study was to investigate educational activities performed by the university concerning the dual career of national and international level student-athletes. Using the focus group method, a 36-question semi-structured questionnaire was created. Participants were required to respond online or fill in paper-based questionnaire with close-ended questions (5-point Likert-type agreement scale) and to provide additional open comments. The collected responses were statistically analyzed. The total of 26 male and female dual-career student-athletes, 12 competing on national and 14 on international level, representing different sports and studying in different faculties of the University of Tartu, Estonia, were generally satisfied with their university studies (3.77 pts), whereas the respective assessment was higher in international level student-athletes (4.14 pts) than in national level counterparts (3.33 pts). International level student-athletes were more satisfied with the development of their sport career since the beginning of the university studies (4.14 pts) compared with national level student-athletes (3.08 pts). The study revealed the differences in dual career activities depending on the level of student-athletes – national or international.

COMPARISON BETWEEN THE 20 - 29 AND 30 - 39 YEARS OLD WOMEN ANTHROPOMETRIC INDICES

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The Aim of the Study was to identify and evaluate the anthropometric indices of women of the different ages 20–29 and 30–39. The Subjects: 20–29 years old (n=50) and 30–39 years old (n=50) women. The Research methods: Anthropometry. Testing. Mathematical statistics. The Results. It was discovered that 20–29 year old women height is 168.3 ± 5.8 cm and 30–39 years old – 167.8 ± 5.8 cm. Body weight, respectively – 64.3 ± 9.0 kg and 64.3 ± 10.3 kg, body mass index – 27.9 ± 3.3 and 28.1 ± 3.6 kg/m², fat content – 26.5 ± 6.0 and $26.5\pm 6.4\%$, lean body mass 44.9 ± 4.3 and 44.8 ± 5.1 kg. Chest sizes respectively are 90.3 ± 6.8 and 90.8 ± 8.2 cm, forearm – 27.9 ± 3.3 and 28.1 ± 3.6 cm, waist – 74.4 ± 7.8 and 77.0 ± 8.7 cm, hips – 99.5 ± 6.8 and 99.7 ± 7.5 cm, thighs – 57.7 ± 6.0 and 56.7 ± 5.2 cm; calves – 36.7 ± 3.2 and 36.8 ± 2.5 cm. As per the straight leg raising test whilst lying, it was discovered, that flexibility was very good in cases with 84% of younger and 94% of older women, yet 16% of younger and 6% of older women flexibility got reduced. The 42% of younger and 42% of older women whilst stretching one arm over the head and the other behind the back achieved very good results (>5 cm), the 50% of younger and 44% of older women achieved good results (0–5 cm) and respectively 8% and 12% of younger and older participants did not reach the recommended shoulder mobility rates at all (<0 cm). The 74% of younger and 72% of older women achieved good plank on forearms results (>60 sec), respectively the 16% of younger and 12% of older women managed it on average basis (45–59 sec), yet the remaining 10% of younger and 16% of older women respectively managed it very low (<44 sec). The 48% of younger and 46% of older women managed well the side plank on forearm test (>45 sec), the 14% of younger and 22% of older women did it at an average (30–44 sec), and respectively the 38% of younger and 32% of older women achieved poor results (<29 sec). The Conclusion. It was determined that the anthropometric indices and physical abilities of women of the different ages 20–29 and 30–39 do not differ significantly. We may as well assume that women are keener to cherish their appearance, follow healthy lifestyle and keep fit.

TECHNICAL-TACTICAL OPTIMIZATION IN YOUNG BASKETBALL PLAYERS

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Teaching the fundamentals of the game to young people so that they have a quality athletic experience affecting their integral development is a complex challenge. In order to achieve a rich technical-tactical optimization in young basketball players, the following training criteria are selected: (a) Create training situations combining a wide variety of offensive and defensive tactical intentions of 1-2-3-4-5 player plays in multiple game organizations and continually emphasizing the basketball basics. (b) Prioritize technical optimization with the basis of precision, variability and types of speed (start, execution, intervention, rhythm change, intermittent), and the coordination capacities focused on motor control (kinesthetic discrimination, segmentary differentiation, variability, combination, guided control, fluidity-relaxation and amplitude), spatial implementation (orientation, directionality, localization, situation, static-dynamic balance) and temporal adequacy (reaction-anticipation, rhythmical differentiation, rhythmical variability, rhythmical adaptation, rhythmical sense). (c) Prioritize tactical optimization focused on cognitive factors (spatial perception – distances, paths, orientations, organizations / temporal perception – duration, global and segmentary speeds, differentiation of players-ball speeds, anticipation-reaction / decision making / understanding-reasoning / designing programs / self-control-evaluation) and socio-affective factors (mainly non-verbal – gesture, look, spatial, temporal - assertive and empathic communications in mutual help and cooperation situations). (d) Interact technical and tactical optimizations. (e) Enriching technical-tactical optimizations with a great variety of conditioning (levels of specificity of strength and endurance), emotional-volitional (main emphasis on being in love with the game) and creativity prioritized situations. In summary, if young basketball players train and compete in conditions that allow a rich technical-tactical optimization they will be able to play naturally, instinctively, creatively and concentrated on loving the game; thus, when they are senior players they will easily perfect any game situation required by their coach.

COGNITIVE ABILITIES, HEALTH BEHAVIOUR AND CARDIORESPIRATORY FITNESS ACCORDING TO PARTICIPATION IN ORGANIZED SPORTS, PARENTAL EDUCATION AND GENDER IN 6-7-YEAR-OLD ESTONIAN CHILDREN

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Aim: Cognitive abilities, health behaviour and cardiorespiratory fitness in 6-7-year-old Estonian children according to their participation in organized sport, parental education and gender were investigated. **Methods:** Data were obtained from 256 6-7-year-old Estonian children. Cognitive abilities were assessed using modified Boehm-3 test. Objective physical activity (PA) intensity and sedentary levels were measured over 7 days by accelerometry. For assessing cardiorespiratory fitness, 20m shuttle run from PREFIT test battery was used. Parents reported their educational attainment, participation in sports club (SC), sleep duration and screen time of children. **Results:** The children from higher educated families had significantly better results in tests of conceptual skills, verbal abilities and cardiorespiratory fitness. PA level, cardiorespiratory fitness, the results of perception and conceptual skills test were better in children participating in SC. Higher cardiorespiratory fitness level, shorter screen time and sleep duration were associated with better results in test of conceptual skills.

Conclusion: Conceptual skills and verbal abilities were better in children of higher educated families and in SC participants as well. Better cardiorespiratory fitness together with reduced sedentary activity and screen time may be beneficial for cognitive abilities of children.

LITHUANIAN ADOLESCENTS HEALTH LITERACY ASSOCIATION TO PHYSICAL ACTIVITY AND BODY MASS INDEX

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The aim of the study: To identify health literacy and health information literacy association to physical activity and body mass index in Lithuanian adolescents.

Research methodology: The research was carried out with 167 14-18 years old students from Kaunas, Klaipeda and Vilnius (n=107 females, n=60 males). Participants were asked to fill in anonymous online questionnaire, which consisted of basic demographics, physical activity, health information literacy and health literacy. Adolescents' body mass index was calculated through ISO-BMI calculations. Physical activity was assessed by Petronyte's physical activity questionnaire. To determine adolescents' everyday health information literacy was used self-assessed 10-item screening tool (EHIL-10) and to determine health literacy was used Newest Vital Sign (NVS) questionnaire. Results: Health literacy did not have association with body mass index or level of physical activity. Health literacy scores gave important data of the level of health information. Scores indicated that 21.6% of Lithuanian adolescents had adequate level of health literacy. It was found, that age correlated positively with health literacy. Self-assessed everyday health information literacy was higher, since 85% of the students had medium high or high level of health information literacy. The data revealed that Lithuanian adolescents were insecure of where they can find health related information and who they can trust in health related issues. For males, finding health information and knowing who they can trust in health issues was easier than for females. Sufficient evaluation of health related information was higher among normally weighed adolescents. Physically active students had higher health information literacy and participation to sport club activities had positive relation with better health information literacy. Additionally, involvement to lead activities associated with superior understanding of terms and sentences of health information. Conclusions: Evaluation of health information was higher among those, who were actively involved to lead physical activities. Health information literacy did not have association with ISO-BMI. Key words: health literacy, health information literacy, physical activity, body mass index.

PHYSICAL ACTIVITY VERSUS SITTING BEHAVIOR AMONG CHILDREN: OBJECTIVE MEASUREMENT

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Aim of the study - to measure school aged children daily engagement in physical activity using objective methods and find factors which influences it. Methods: 66 9th grade students (19 boys and 47 girls) were recruited for the study (mean age 14.74) at Kaunas gymnasium. Students social support from

parents and friends, perceived level of stress and self-esteem were assessed using questionnaire. Anthropometric data (height, weight, BMI, body fat%) was assessed using Tanita BC-418MA. Amount of physical activity was assessed both, subjectively (in the questionnaire) and objectively by using ActiGraph GT3X model. Pupils were asked to wear it on non-dominant wrist for 7 consecutive days. Results: According to objective measurements 73.7% boys and 93.6% girls perform 60 or more minutes of moderate to vigorous physical activity daily. Boys spent more time in total sedentary time as well as in average sedentary time per day compared to girls. Girls spent more time in average moderate to vigorous physical activity. The more active students are during Physical Education class in school, the more time they spend performing MVPA during leisure time. In addition, students who are more active during PE lesson have significantly lower total body fat%. Subjectively measured PA identified that only 30.3% of participants are considered as active (52.6% boys and 21.3% girls). However, the only correlation found with objectively measured PA was between PA frequency h/week (subjective) and MVPA/day (objective) as those who identified to spend more h/week doing PA actually performed significantly less MVPA/day. Boys appeared to have significantly more support from friends regarding physical activity. Girls showed to have lower positive attitude towards self and overall satisfaction about themselves compared to boys. Total friend support and talking about physical activity in family showed to be a factor for more time spent in total and daily sedentary minutes. However, more time spent performing any intensity physical activity had no impact on stress level and total self-esteem. Conclusions: 87,9% of all participants have met 60 minutes/daily MVPA recommendation, however no students performed any vigorous activity during ActiGraph wear time. The more active students were during Physical Education class in school, the more time they spend performing MVPA during leisure time. No significant relation was found between more time spent in any intensity PA and stress level, parents support or self-esteem.

BETWEEN SPORT AND ARTS: SYSTEMATIC REVIEW OF THE CONTEXT IN AESTHETIC SPORTS

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Many sport philosophers in 1970s and 1980s have raised a question if sport can be considered as a form of art. Sport critics have exchanged arguments whether sport satisfies the criteria of traditionally accepted art forms such as

poetry, music, painting, etc. Despite the earlier philosophical debates, very little attention has been paid to the links between sport and art in the twenty first century. The aim of the study is to assess an educational aspect of coaching in “aesthetic sports” within the context of connection between art and sport. A Systematic Review was used to assess existing studies at this primary stage of the research. 259 articles were found by using keywords: art, sport and aesthetics. Qualitative research method was chosen for inclusion/exclusion criteria. One of the constructs that emerged from the systematic review is aesthetics in sport. Technical and well played sport creates an aesthetically satisfying view for spectators. In addition, literature stress the idea that athletes through sport express their emotions, experiences and real-life situations as well as the artists in traditionally accepted forms of art. The clear distinction between “non-purposive/aesthetic” and “purposive” sports appeared in analysed literature. Difference between “refereed games” and “judged performances” emphasized a significance of the manner in which the activity is performed.

Rhythmic gymnastics (RG) is chosen for the further study. RG is a sport that combines strength, coordination and flexibility with unique choreography accompanied by music. In recent years RG evolved from highly technical sport to theatrical, “a story telling” and choreographically matured performances. The hypothesis of the future study will be based on the results of a current systematic review.

PSYCHOMETRIC PROPERTIES OF THE TEACHER LEADERSHIP SCALE ADAPTED TO PHYSICAL EDUCATION

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Teacher leadership includes abilities demonstrated by teachers, influencing students outside the classroom (Danielson, 2006). Not only is leadership of PE teachers important in developing students' physical qualities and abilities, but also in shaping their understanding of the benefit and need of being physically active outside school and after graduating. The aim of the study is to evaluate adaptation of teacher leadership scale to physical education. Subjects and methods. The research is based on a teacher leadership scale that comprises 36 statements about primitive, paternal, modern, and wise leadership (Maščinskaitė, 2013). The participants of the reaserch had to evaluate every statement of TLS using a 5-point Likert scale ranging from „stongly disagree“ to „strongly agree“. Students (n-226 students/89 boys and 137 girls/

aged 12–18) of a 2017 „Top 5 best PE teachers“ contest winners participated in the research. An exploratory factor analysis was performed to find out the best solution for data analysis. In order to evaluate the internal consistency of TLS and its subscales, Cronbach's Alpha coefficient has been calculated. Varimax rotation has been applied to carry out an investigative factor analysis of the main components. The analysis of the research data has been carried out using SPSS 21.0. Results and conclusions. An investigative analysis has been applied to analyse the data, consequently a four and five-factor measurement models have been distinguished. A four-factor model (TLS4, 36 items) Cronbach's alpha is 0.940, TLS4 of subscales Cronbach's Alpha ranges from 0.715 to 0.889. KMO is 0.925, however, a factor analysis did not distinguish factors. A five-factor model (TLS5, 17 items) Cronbach's Alpha is 0.892, TLS5 of subscales Cronbach's Alpha ranges from 0.558 to 0.875. A factor analysis allowed to distinguish pure factors which define teacher behavior: i) related to encouraging students' independent activities; ii) organizing students' team activities; iii) encouraging goal achievement; iv) defining accurate tasks and following rules; v) creating an environment based on confidence. Adaptation of teacher leadership scale to physical education is important as being the first research of its kind. The research demonstrates that a five-factor model can be used to evaluate leadership of PE teachers, however, psychometric properties of some statements indicate that they could be corrected.

THE EFFECTS OF MENSTRUAL CYCLE PHASES ON STRENGTH AND AEROBIC EXERCISE PERFORMANCE IN FEMALE PHYSICAL EDUCATION STUDENTS

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Aim of the study: The aim of this study was to examine the effect of different menstrual cycle phases have on measures of maximum strength, local muscular endurance and aerobic capacity in female physical education students. **Subjects and methods:** Twelve female Physical Education students volunteered to participate in this study. The students were 19.8 ± 0.8 (\pm SD) years old with body mass of 61.4 ± 11.6 kg and height of 162.6 ± 5.1 cm. None of the students reported any current or ongoing neuromuscular diseases or musculoskeletal injuries and none of them were taking any dietary or performance supplements that could have affected testing results during this study. Finally, none of the students were taking prevention medication at the time

of the study. Informed consent was received from all students participated in this study after verbal and written explanation of the experimental design and potential risks. This study was carried out according to the Declaration of Helsinki and the study protocol was pre-approved by the local Ethics Committee of the University of Jordan. Height and weight were first assessed when the student was submitted to the testing laboratory using a wall mounted stadiometer and InBody 570 body composition analyzer, respectively. Prior to Maximum strength testing, a general warm-up consisting of 5 minutes of low intensity jogging aimed at increasing heart rate, blood flow and deep muscle temperature. Then a specific warm-up consisting of one sets of 10 repetition maximum (RM) followed by one set of 5 RM on the machine (the specific warm up procedure was followed for both upper and lower body strength). The following testing order was followed: (I) 1RM bench press using smith machine; (II) 1RM leg press using the leg press machine; (III) push-up to failure; (III) leg press to failure using 60% of 1RM; (V) 1600 m running. Students were tested on 4 occasions under the following cycles: (I) the menses phase; (II) the follicular phase; (III) The ovulation phase; and (III) the pre ministration phase. All tests were assessed at the Fitness First Gym laboratory. Results: The students showed a statistical significant in 1600 m running performance time by running faster in the follicular phase (579.2 ± 75.1 sec) compared to the ovulation phase (625.6 ± 93.7 sec). None of the strength testes showed any statistical differences between the different menstrual cycle phases. Conclusion: The results notably indicate that there are differences in aerobic performance between the follicular phase and ovulation phase with the follicular phase being the most optimal period performing 1600 m run. The data of this study could be useful in terms of periodization.

TECHNICAL AND TACTICAL TRAINING OF HIGH LEVEL FENCERS WITH THE USE OF MODERN MEANS OF REGISTRATION AND MODELING OF ACTIONS

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The aim of the research: To determine main directions of technical and tactical training of high level fencers and possibilities of increasing its efficiency with the use of information technologies. Subject of research: means of improving the technical and tactical actions of high qualified fencers. Research methods: analysis of data from special scientific and methodological literature, analysis

of competitive activity of athletes, biomechanical analysis using the Qualysis system for recording and analyzing movements in 3-D format, computer modeling, mathematical statistics methods, pedagogical experiment. The results of the study. The data obtained using the author's computer program for analyzing and modeling competitive activities allowed us to determine the main trends in the development of epee, foil and saber fencing. It has been established that attacking actions prevailed in the capacity of technical-tactical actions of fencers of all weapons. The capacity of attacks in foil – 53%, in epee – 55%; in saber – 63%. The most effective technique-tactical actions in epee and foil are remises, and in saber are attacks. Comparative analysis of more than 60 indicators of the kinematic structure of the most effective actions in foil revealed the differences in the biomechanical characteristics of the body positions of athletes of different qualifications in the process of technique performing and to determine the features of the weapon technique. The discriminative attributes of the technique for high level athletes during each combat action were established, and the average group statistical models of the kinematic structure of the foil technique of differently skilled athletes were built. Models of fencing fights with a specific rival allowing individualization of technical and tactical training of high level epee fencers have been developed with the help of a special computer program.

Conclusion. The results of the research allowed to develop the programs for improving the technique of competitive actions of high skilled foil and epee fencers, the effectiveness of which was confirmed during the experiment. Before the XXXII Olympic Games in Tokyo, the problem of improving the mastery of the Olympians is particularly relevant, an important component of which is technical and tactical training, which should be based on both traditional training tools and modern information technologies.

EFFECT OF TAPING AND ECCENTRIC – CONCENTRIC EXERCISES ON PAIN AND FUNCTIONAL CONDITION FOR ATHLETES AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION SURGERY

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Aim of the study: to determine effect of taping and eccentric- concentric exercises on lower limb pain, knee joint amplitudes and thigh quadriceps muscle strength for athletes, following knee joint anterior cruciate ligament

reconstruction surgery. Subjects and Methods: The study involved 16 athletes after knee joint anterior cruciate ligament reconstruction surgery. The subjects were randomly selected in two groups. The experimental group (EG) was enrolled in an exercise program and lower limb taping. The control group (CG) was only enrolled in an exercise program. The program lasted for 6 weeks, thus patients underwent a total of 12 exercise sessions. The exercise program was performed twice a week. Both groups were tested in: pain in VAS scores, thigh quadriceps muscle strength (Lovett) and knee joint amplitude. Results: After 6 weeks of study knee motion amplitude increased by ($p < 0.005$): flexion EG - 18.2% and CG - 18.3%; extension EG - 19.4% and CG - 18.5%. There was no statistically significant difference between the groups ($p > 0.05$). After the study the thigh quadriceps muscle strength increased by ($p < 0.005$): flexion EG - 12% and CG - 11%; extension EG - 11% and CG - 12%. There was no statistically significant difference between the groups ($p > 0.05$). After the study limb pain decreased by ($p < 0.005$): EG - 78% and CG - 61%. There was a statistically significant difference between the groups ($p < 0.05$). Conclusions: The program of eccentric - concentric exercises combined with taping reduced pain significantly compared with only exercise program, however knee movement amplitude and quadriceps muscle strength increased similarly.

QUANTIFICATION OF MONOTONY, WEEKLY LOAD AND STRAIN DURING PREPARATORY PERIOD IN SEMI- PROFESSIONAL FEMALE TEAM HANDBALL

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The aim of the research was to quantify monotony, weekly load and strain during 6 weeks of pre-season period in semi-professional female Team Handball (field players). Subjects and methods. Twelve female handball players (champions of Lithuania and winner of Lithuanian Cup) during preparatory period (duration 6 weeks) were monitored. During 42 days players had 39 training sessions and matches. Duration of every training session in minutes, rating of perceived exertion (RPE, scale 0–10) were checked (Foster et al., 2001). Monotony, weekly load, strain and relationship between them were calculated (McGuigan, 2017). Results and discussion. Players were involved in training process 3746 minutes in total, but week by week altered from 365 to 804 minutes.week–1. Registered indices varried in such a way

(arbitrary units – AU): weekly load (2551.3–6824.3), strain (2727.2–12004.4), monotony (1.07–1.96), RPEaverage (7.02–8.33). Total week training duration, weekly load and strain indices varied week by week adequate. Strong correlation was found between duration to weekly load ($r=0.964$), weekly load to strain ($r=0.856$) and strain to monotony ($r=0.820$). Moderate correlation was found between duration to monotony ($r=0.581$), weekly load to RPEaverage ($r=0.607$), weekly load to monotony ($r=0.418$), but not monotony to RPEaverage ($r=-0.186$). Latter might be partly explained because of players played quite different playing time in 4 matches during modeling microcycle (high monotony – 1.96 AU), nevertheless that RPEaverage was low (7.58 AU) in the same microcycle. Conclusions. To our knowledge this is the first research made in semi-professional female Team Handball. RPE is simple method to monitoring internal loads in team sports (Bourdon et al., 2017; Hamlin et al., 2019; Impelilizzeri et al., 2018). Such kind of monitoring allow to understand players' responses to their training program, assessing fatigue and associated need for recovery in order to minimize the risk of nonfunctional overreaching during preparatory period and avoid the risk of injuries.

PILGRIMAGE AND RECREATION

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Torkildsen (1999) has taken the historical approach to defining recreation and has therefore adopted it as an activity that restores people to work. There are several definitions of recreation, but most refer to recreation as a revival, putting an emphasis on active activity. Recreation is most often associated with physical activity, which is targeted and constructive participation in an event. (Meera, 2000) It isn't known how the tradition of going to sacred sites has arisen, but it is clear that it has already thrived in the ancient Greek civilization. Most often, the Greeks travelled to different places of service set up in other places to pray there, which was rather an act of practical consideration than of religious considerations. (Smilgevičius, 2016). Several religious routes have been discovered in recent years. Estimates have been made that every year between 300 and 330 million people travel for religious reasons, creating an economic impact of about \$18,000 million, which is a great opportunity for the development of many destinations. (durán-Sánchez; Álvarez-García, etc. 2018 Antonio Granero Gajegos and Francis Ruiz Huan (Antonio Granero Gallegos; Francisco Ruiz Juan), in their study "Santiago Road as a physical recreational activity and education for young people", writes that these days

this path is linked to leisure, recreation, tourism, cultural familiarity and art, which includes a large part of sport and components of nature and physical activities. Young people believe that internationalisation, personality development and the possibility of physical activity in nature are important during the pilgrimage. Researchers acknowledge that new cultural, physical and social trends are observed in the new millennium. Trends include a sense of freedom, risk and pilgrimage. (Granero Gallegos; Ruiz Juan, 2005) Objective of the study — Creating a collection of Baltic pilgrimage destinations. The study used the following methods: analysis of sources of literature on the physical and spiritual impact of pilgrimage; document content analysis and selection of destinations. The study sets up a summary of pilgrims' routes in the Baltic States (Latvia, Lithuania, Estonia). 5 pilgrims' destinations in Lithuania, 4 in Latvia and 2 in Estonia have been compiled and described. In total, 11 pilgrims' destinations in the Baltic have been described.

STANPOINT OF YOUNG BASKETBALL PLAYERS AND COACHES TO THE NECESSARY COMPETENCE AND ABILITIES FOR ACTIVITY OF THE COACH

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Recently the situation in the system of preparation of young athletes shows that coaches and athletes very often understand what competence and abilities coaches need in their activity in a different way. That is why the research in analyzing the standpoint of basketball players and coaches to the necessary competence and abilities for the coach work becomes an important problem especially in Lithuania where basketball is very popular and more and more is based on new sport science technologies. Aim of the study. The standpoint of basketball players and coaches to necessary competence and abilities for the work of the coach is different. 171 basketball players aged 15–16 and 41 basketball coaches took part in the study. Average age of the basketball players 15 ± 1.28 years old coaches 48 ± 11.4 years old. The participants were selected at random from the list of Lithuanian basketball schools. Young basketball players had to evaluate their coaches and coaches had to evaluate themselves according to the importance of the necessary competence and abilities in their work. Subjects and methods. J. Chanin "Coach – athlete" questionnaire was used to evaluate professional emotional and behavioral competence. Professional competence enabled to evaluate coach as a specialist, the level of

his professional mastership. Emotional competence shows how much the coach is exating communicating informally. While behavioral competence reveals peculiarities how coach behaves and associates with athletes. Modified T. Moser "Real and ideal coach" questionnaire was used in order to evaluate necessary abilities for the work of the coach. Conclusions. Applying J. Chanin "Coach – athlete" questionnaire it was defined that coaches evaluate their professional, emotional and behavior competence statistically reliably at a higher level than young basketball players do. That enables to state that basketball players evaluate their coaches at a lower level. Hey competencies their coaches to have more competence where the coaches think they are better. Coaches did not realize what exactly athletes expect from them. When applying T. Moser "Real and ideal coach" questionnaire the results revealed the following abilities of coaches: properly communication, keeping friendly contacts with sportspeople, revelation of advantages and disadvantages of pupils were more important to the young basketball players statistically reliably than to the coaches in their self-assessment. However, the coaches indicate in the self-assessment it is more important to them to prepare a good training and have good knowledge of their sport statistically reliably than to the basketball players assessing their coaches.

EFFECTS OF 2-DAY FASTING ON PERCEIVED STRESS, AND COGNITIVE AND MOTOR FUNCTIONS IN OVERWEIGHT YOUNG WOMEN

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Aims of the study. Although long-term intermittent and periodic fasting has been widely investigated and has consistently induced improvements in health and cognitive and motor functions, the responses to short-duration fasting are not completely understood. Thus, the primary aim of this study was to estimate the effect of 2-day total fasting on perceived stress, and cognitive and motor functions in overweight women. Recent studies have shown that regular physical activity and a greater aerobic fitness level may decrease stress levels. Therefore, the secondary aim of this study was to evaluate the relationship between the aerobic fitness level and fasting-evoked subjective stress response. Subjects and methods. Eleven young adult women aged 24.3 ± 3.3 years with a body mass index in the overweight range (from 25.0 to 29.9 kg/m²) were tested under two conditions allocated randomly: 2-day

zero-calorie diet with water provided ad libitum and 2-day usual diet. Subjective stress ratings in relation to the diet, and cognitive and motor performances were evaluated before and after each diet. One week before the experiment, aerobic fitness was evaluated. Results. The study demonstrated that the subjective stress rating in relation to the fasting was 48.6 ± 24.0 , and it was negatively correlated with the relative maximum oxygen uptake ($r = -0.661$, $p < 0.05$). Fasting had no effects on the cognition, grip strength, and psychomotor functions. Conclusions. Better aerobic endurance is likely to facilitate the capacity for dealing with 2-day total fasting in overweight young women. Regardless of the evoked moderate stress, cognitive state and motor behavior remained intact.

THREE NORWEGIAN BROTHERS ALL EUROPEAN 1500M CHAMPIONS. WHAT IS THE SECRET?

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Aim of the study: The aim of the study was to analyse the training of three Norwegian brothers who all are at international top level in distance running. Subjects and methods: The three Norwegian brothers Henrik – (HI), Filip – (FI) and Jakob Ingebrigsten (JI) are all European 1500m Champions. Their performance development and training structure from an age of 12 has been study by analysing their best time results from different age groups competitions, their training diaries, observation of training and through interviews and dialogue with their father and coach and their mother. Results: All three have been very physical active from a young age. HI competed in Cross Country (CC) skiing and running until an age of 17. At this age he became Norwegian junior Champion in CC skiing. HI is among all time ten best boys in Norway from an age of 15 to 18 years in 1500 m. FI played football in younger days. He started with serious distance training at an age of 16. He is not among the 10 best boys ever in Norway at an age from 12 to 18 years in any distance. JI has trained seriously for distance running from an age of 12. From this age he has lived like an elite athlete. JI is number one of all-times best listed in all age groups in 800 m and 1500 m from an age of 12 to 18 years in Norway. He has gradually increased his weekly training volume, and at an age of 18 years, his average running volume was 160–170 km · week⁻¹. During the preparation period these athletes run an average of 160–170 km · week⁻¹, 35 % of this distance is training at and above the anaerobic threshold (AT) pace. Their training are controlled by

lactate measurements on all interval sessions. They have through childhood and adolescent been extremely motivated for sport and training. They have been strongly motivated from their near family, and all three are coached by their father. Conclusions. These three runners have had a completely different performance development through childhood and adolescent. However, despite the differences in performance development, active childhood, gradually increased training volume, strong family support, mental toughness and much training at and above AT and conscious intensity control of the training have brought these brothers to international level in distance running.

A CRITICAL ANALYSIS OF ATHLETE RETIREMENT FROM SPORT

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Athletes' retirement from sport activities and their life after the end of their sports career is relevant in scientific, practical and social terms. The purpose of this study is to provide overview of scientific studies on athletes' retirement from sport and how it relates to their life after carrier in sports. The analysis of scientific literature has revealed that the main reasons for athletes to finish their careers in sports are trauma, health-related problems or age. Retirement can also be associated with family or family planning. Sport career termination is discussed in two ways, when one retires from sport voluntarily and when one is forced to do so. Voluntarily retirement for athletes is usually a planned event and thus most often does not have negative impact on their future life. These athletes tend to choose a family over their sport carriers, continue their education or go to work in sport related jobs. Another important factor is athletic identity. Athletes with strong athletic identity during their sports careers tend to have better social life after their retirement. These athletes also tend to have strong athletic identity after their careers, thus are less likely to experience stress or depressive symptoms due to their sport career termination. Forced retirement from sports career is usually career-ending injuries. Such career outcome is associated with greater short-term and long-term problems in the post-sport transition period. Since athletic careers are strongly controlled by others, the unforeseen outcomes of an unexpected sport career termination results in negative consequences that are related to increased personal responsibility for their further actions. This becomes a greater problem for those athletes that have a higher level of athletic identity as it results in anxiety and depression. Therefore, forced retirement from

sport career is considered to be the most troublesome and worrying problem in the field. An examination of the literature focused on athlete's retirement suggest, that termination of sports career is an important event, consequences of which depend on whether it ends by own choice or not. Since the planned retirement from sport's career is less challenging, it is important to help athletes prepare for this stage of their lives. Additionally, it is crucial to focus all efforts on creating a support system for athletes who were forced to end their athletic careers.

EFFECTS OF SLOW AND FAST YOGIC BREATHING TECHNIQUES ON CENTRAL AND PERIPHERAL CARDIOVASCULAR CHANGES AND MUSCULAR OXYGEN SATURATION

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Background. Various types of breathing exercises have various effects on autonomic nervous system like fast breathing increases sympathetic tone and slow breathing increases parasympathetic tone. Aim of our study was to examine central and peripheral cardiovascular changes during slow and fast yogic breathing techniques in healthy adults. Methods. Ten healthy male subjects practiced yogic breathing techniques – slow (nadi shuddhi) for 15 minutes and fast (Kapalabhati) for 3 minutes. Heart rate (HR) was recorded by POLAR FT1 heart rate monitor, sports watch and chest strap – Polar T31 Transmitter. Arterial blood pressure (ABP) was measured using the auscultatory method based on the korotkov-sound. A non-invasive system for relative oxygen saturation (StO₂) measurements (InSpectra Standard System, Hutchinson Technology Inc., Model 325). The sensor was placed on the one-third of the gastrocnemius medial muscle. The “Spirobank” spirometer was used to register: forced vital capacity, volume expired in the 1st second of the test, peak expiratory flow. Power Spectral Analysis of heart rate variability (HRV) from registered EGG was used for evaluation of features autonomic control of the cardiovascular system. Results. Power Spectral Analysis of HRV revealed the relative tendency for parasympathetic suppression and sympathetic predominance during the fast breathing (Kapalabhati) and contrariwise tendency during the slow breathing (nadi shuddhi). No significant changes were observed during both breathing exercises for spirometry variables. Measured oxygen saturation values

were higher 10–12% while performing both breathing exercises. The basal (pre-Kapalbhati) mean HR were 72.5 ± 2.6 beats/min. which increased up to 99.5 ± 5.3 beats/min., respectively during exercise while the basal (pre-nadi shuddhi) mean HR were 75.5 ± 3.4 beats/min., which increased up to 83.9 ± 1.6 beats/min. Conclusions. The results suggest that fast (Kapalbhati) breathing immediately modifies the autonomic status by increasing sympathetic activity, leading to decreased vagal tone, while slow (nadi shuddhi) breathing slightly increases parasympathetic activity but not significantly. Also, both breathing techniques increases peripheral oxygen saturation immediately in novices, exercises the diaphragm vigorously and enhances the better oxygenation.

DEVICE AND METHOD FOR TEACHING OF BREATHING

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The aim of this invention is to help beginners achieve a specific breathing rhythm for swimming. This invention is made of a tube that is connected to a manometer and a chronometer. A swimming breathing rhythm is completely different from a day to day breathing rhythm. While swimming freestyle, breaststroke and butterfly your head is periodically being submerged. As you swim these strokes swimmers need to achieve pressure in their nasal and mouth region so that water does not get through it. This is a substantial reason why many swimmers can not fully learn to breathe freely while swimming. So that swimmers can stay buoyant for a longer period of time they need to keep at least some air in their lungs. During freestyle, breaststroke, and butterfly swimmers need to take a deep breath in a short period of time when their head is out of water. Taking into account the above mentioned text these are the stages that swimmers can learn a way of improved breathing techniques:

- The student holds one end of the tube in their mouth in which he breathes in, which creates pressure in the nasal region (around 0.01 atm) the student controls this pressure by looking into the manometer.
- After holding their breath for about 3 seconds the student breathes out, and breathes in for 2 seconds, and then breathes out again for 2–3 times longer than taking the breath.

There are no breaks between breathing in and out. These actions are done with a wide opened mouth.– After taking a breath without a pause in the middle pressure is again formed in the nasal and mouth region which can be controlled with the manometer. The length of the breaths is controlled with the chronometer which shows how long the student holds their breath for.

EFFECT OF PHYSICAL THERAPY AND ELECTRICAL MUSCLE STIMULATION ON PAIN AND FUNCTION CONDITION FOR PERSONS WITH CHRONIC NON-SPECIFIC LOW BACK PAIN

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The aim of the study: to determine the effect of physical therapy and electrical muscle stimulation on pain and function condition for persons with chronic non-specific low back pain. Subjects and Methods: 22 volunteers suffering non-specific low back (LBP) pain were randomized to either the experimental group (EG) – exercise program and electrical muscle stimulation or the control group (CG) – exercise program. All subjects had been suffering from LBP for at least 12 weeks. The program lasted for 8 weeks, thus patients underwent a total of 16 exercise sessions. The exercise program was performed twice a week. All subjects were enrolled in an exercise program to increase lumbar stability and muscle strength. Electrical muscle stimulation was applied by “StimaWELL EMS” device and lasted for 20 minutes. Both groups were tested in: back, abdominal and lateral muscular endurance tests (McGill), pain in VAS scores, function condition (ODI). Results: After 8 weeks study muscular endurance improved by ($p < 0.05$): EG–32% and CG–25%; ODI improved by ($p < 0.05$): EG–39% and CG–31%. VAS decreased by ($p < 0.05$): EG–77%, CG–60%. A statistically significant difference was found between the groups ($p < 0.05$). Conclusions: Physical therapy and electrical muscle stimulation reduced pain, increased lumbar muscular endurance and function condition for persons with chronic non-specific low back pain significantly compared with only physical therapy.

DOES HIGH-INTENSITY PRE-LOAD HAVE AN EFFECT ON LACTATE ELIMINATION RATE AFTER CROSS-COUNTRY SKIING SPRINT PERFORMANCE?

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Lactate (La) production is an essential process of anaerobic work and body energy distribution. The heart and oxidative muscle fibers are to remove and combust La as an extra energy source travelling from areas of high glycolytic rate to areas of high cellular respiration (Brooks G.A., 1986). The purpose of this study was to investigate the buffer mechanism efficiency and lactate elimination rate starting from different baselines. 13 well-trained college level male cross-country skiers (age: 18.3 ± 2.9 yrs.; body height: 180.8 ± 4.6 cm; body mass: 70.8 ± 7.3 kg; body fat: 15.5 ± 3.5 %) performed two maximal 1000 m performances with and without pre-load in a randomized order. Both bouts were preceded by low intensity 20 minute warm-up and 14 minute recovery. Additionally, to low intensity warm-up 30 seconds of all-out pre-load was performed during MPT_{high} bouts. La concentration was determined for both conditions at rest, after the warm-up, after the anaerobic-preload, and during recovery. MPT_{low} completed 1000m maximal bout in 225.1 ± 17.6 sec compared to MPT_{high} condition 226.1 ± 15.7 sec ($p > 0.05$). La concentrations were not statistically different between two groups after low intensity warm-up. High-intensity pre-load elevated MPT_{high} La to 8.2 ± 2.2 mmol.l⁻¹ compared to MPT_{low} 1.4 ± 0.3 mmol.l⁻¹ ($p < 0.05$). However, net La production during 1000 m maximal performance in MPT_{high} group remained lower ($p < 0.05$) than MPT_{low} La_{net} 10.5 ± 2.2 mmol.l⁻¹. La elimination tendency was statistically similar/homogeneous between groups ($p > 0.05$) during recovery phase after maximal skiing performance. Despite significantly different La values after 1000 m maximal cross-country skiing performance, the elimination curve remained identical between MPT_{high} and MPT_{low} groups. La elimination speed remain unchanged ($p < 0.05$) with all buffer mechanisms working on maximal capacity when La levels are above 9.6 ± 0.3 mmol.l⁻¹ values. Further research is needed to establish La elimination rate up to body's fully recovered state.

EFFECT OF DIFFERENT LYMPH DRAINAGE TECHNIQUES ON LOWER LIMB FUNCTION

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The aim: to evaluate and compare effect of different lymph drainage techniques on lower limb function. Subjects and Methods: 20 healthy subjects (age 35–50 years) voluntary participated in the study and were randomly assigned into two groups (TG, CG). The outcomes were measured before and after the trial. The volume of the lower limb of the subjects was measured with a centimeter strip (below patella and every 5 cm below to ankle); Health-related quality of life was evaluated by the SF-36 questionnaire (short form); Peripheral circulatory condition was evaluated by Ankle Brachial Pressure Index; The soft tissue of the lower limb was evaluated by palpation, skin compression, rolling, lifting, slippage; To evaluate muscle strength was used Muscle Strength Grading Scale (Oxford Scale). TG subjects wore a light pressure (25 mmHg) compression calf sleeves and the kinesiotape was applied on the legs of CG subjects during long standing work. The trial lasted 7 days. Results: The results of the study showed tendency that kinesiotaping and compression calf sleeves had a positive effect on the reduction of the right and left lower extremities volume, lower limb function as well as overall health. However, no statistically significant difference was found when comparing variables between groups. The results of the study also showed positive effects of compression socks and kinesiotaping techniques on soft tissue condition. Conclusions: The light pressure compression calf sleeves and kinesiotape were effective for lower limb volume decline, improvement of health-related quality of life, soft tissue mobility and limb function.

COMPARISON THE EFFECTS OF INTERVAL TRAINING AND TRADITIONAL ENDURANCE TRAINING ON CARDIOVASCULAR SYSTEM

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The aim of this study was to compare the cardiovascular changes while the interval or traditional continuous endurance training methods applied in exercising for health promotion. Methods: 11 healthy males take part in two

training sessions performed on bicycle ergometer. The first session was the 20 minutes traditional endurance training performed in continuous mood, and the second session was performed in interval training method, i.e. the five intensive bouts of exercising. Arterial blood pressure (ABP) was measured before each bout of workload and after the bouts while the interval method was applied and each two minutes while the continuous method was applied. Continuous 12-lead ECG was registered 5 minutes before training workloads, during training session and during the first 6 minutes of recovery after training workload. The second-order matrix analysis (algebraic data cointegration approach) was used for assessment the dynamics of concatenation between parameters of ECG (RR interval and QRS complex duration). Results obtained during the study showed that averaged heart rate (HR) during the interval training was 40% lower than during the session of traditional endurance training. ABP were normal during traditional training, but at the end of training dynamic interaction between ECG RR and QRS started weak. During interval, training systolic ABP changed a little, but diastolic ABP has the significant change. After 6 minutes of rest after both training sessions there was residual physical occurrence in ECG, but after interval training it was significantly higher ($p < 0,05$). Significant changes in ST-segment depression was observed in some participants during the interval training session. The greater fluctuation in dynamic interaction between RR interval and QRS complex duration of ECG was observed during the interval training session. Conclusions: Significant changes in ST-segment depression of some participants at the end of the last bouts of intensive exercising (in interval training session) indicate about serious ischemic episodes in the myocardium that could be treated as non-physiological response. Thus, the careful medical check-up should be recommended before to prescribe this type of exercising for health exercising. Significant higher mobilization during training and bigger residual effects after training could explain the advantages of interval training in comparison to traditional continuous training.

INVESTIGATION OF COL1A1 AND COL3A1 GENE VARIANTS IN LITHUANIAN ENDURANCE AND SPRINT/POWER ORIENTED ATHLETES

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Collagens are one of the most important structural proteins in human. Genetic variants within the alpha chains of the collagens type I (COL1A1) and

type III (COL3A1) genes have been associated with physical performance and risk of musculoskeletal injuries. The aim of this case-control association study was to investigate COL1A1 c.104-441C>A (rs1800012) and c.-2116G>T (rs1107946), and COL3A1 c.2092G>A (p.Ala698Thr, rs1800255) in Lithuanian professional athletes. Subjects and methods. A total of 146 elite athletes (endurance-oriented (n=66) and sprint/power-oriented (n=80) groups) and 203 non-athlete controls (healthy unrelated Lithuanian citizens) were genotyped for COL1A1 (C>A, rs1800012; G>T, rs1107946) and COL3A1 (G>A, rs1800255) variants. Genotyping was performed by Real-time PCR. Statistical analysis was performed using Rv3.2. Results. The genotype frequencies of collagen variants were conformed to the Hardy-Weinberg equilibrium. Significant COL3A1 genotype distribution were determined between the athletes and controls (GG/GA/AA: 63/34.9/2.1% vs 60.6/30/9.4%; p=0.019). The proportion of COL3A1 risk genotype AA, observed in controls (9.4%) was larger than in all athletes (2.1%), especially in power athletes group (1.3%) (p<0.05). The odds ratio (OR) of athlete harboring COL3A1 AA genotypes compared to control was 0.2 (95%CI: 0.05-0.61, p=0.012). The distribution of genotype frequencies of COL1A1 (C>A, rs1800012) polymorphism in endurance group significantly differed from the controls (CC/CA/AA: 71.2/16.7/12.1% vs 71.9/24.1/3.9%; p=0.032). The proportion of COL1A1 risk AA genotype observed in endurance athletes (12.1%) was larger than in controls (3.9%) (OR=3.36; 95%CI:1.2-9.3, p=0.02). There were no differences in genotype/alleles frequency for COL1A1 (G>T, rs1107946) between the athletes and control groups. Conclusions. Our findings provide support for an association between COL3A1 (rs1800255), COL1A1 (rs1800012) and athletic status. The AA genotype of COL3A1 is significantly underrepresented in the athletes group compared with controls, suggesting that harboring this genotype may have a protective effect against sport-related injury. Endurance-oriented athletes are more likely to have AA genotype of COL1A1 (rs1800012) compared to controls. The COL1A1 AA genotypes may influence increased risk of injury. These results suggest that some collagen variants across the human genome may predispose athletes to increased or reduced risk of injury.

SCHOOLYARD AFFORDANCES FOR PHYSICAL ACTIVITY DURING RECESS AND PHYSICAL EDUCATION: A PILOT STUDY IN NORDIC-BALTIC COUNTRIES

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Introduction: Physical activity is recognized to be an important factor preventing life-style risks at an early age and can be related to the quality of life and subjective experience in early ages. Environmental settings seem to influence the activity patterns of children in neighbourhoods and schoolyard, the latter being an important arena to promote PA particularly in schoolchildren. There is increasing interest in research aiming to promote young people's health by ensuring that the school environment supports healthy behaviours. Schoolyards are designed for practicing PA, PE and sports in lessons and during recess throughout the school day and seem to be universal in design. This study aimed at investigating the functional role of schoolyards across countries describing their design and functionalities to promote PA and healthy lifestyle in schoolchildren. Research organisation: The study focused on environmental facilitation of schoolyards describing how environments promote physical activity in schoolyards across 6 Nordic-Baltic countries. Schoolyards and facilities for PA were described and identified through Orto-Photo maps and standard registration forms, observations and interviews with children. The study synthesis revealed dominating specific activity settings, type and location, and intramural sport opportunities for students. Results: Preliminary results revealed a surprisingly common design of schoolyards: mostly flat topography with sparse vegetation and green areas dominated by large sport arenas. Total area of schoolyards varied from 38670 m²- 13000 m² leaving space of 96-29 m² per child. Dominating facilities were traditional sports arenas: Soccer fields, Track-and field areas, different ball-game areas. Some schoolyards also facilitated areas for BMX and orienteering, winter activities like skiing and skating. The Nordic schoolyards were typically more designed with varied topography and more vegetation also allowing winter activities

in PE and during breaks. Most of the schools had equipment and materials for different recess activities. Across nationalities, the response from students were surprisingly similar: they liked their schoolyards even if they wanted more variety of activities and things to do during recess. Conclusions: This study identified the need for future research on schoolyard affordances and suggests potential intervention approaches to investigate common interests for modern schoolyard design and affordances for PA across countries.

PARALLELS BETWEEN SPORT AND SUSTAINABLE DEVELOPMENT: HOW TO ENSURE WELLBEING FOR PRESENT AND FUTURE GENERATIONS?

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Currently there are present clear parallels between sport and sustainable development – of sophisticated and complex process, the aim of which is to ensure wellbeing for present and future generations. Sport, providing with common space for everybody to participate, educates a healthy and physically healthy society, enriches human beings' life and conditions the disclosure of their talents, and “has the power to make ‘society’ more equal, and socially cohesive and peaceful” (Spaaij, 2009, p. 1109). However, there are quite few theoretic and empirical insights into the issues of sustainability in the sport context, although, they are broadly analysed in other economic sectors. However, the key attention is also paid to their economic and environmental aspects in the studies (Barker et al., 2014), and the social component is most frequently eliminated or it is mentioned as a contiguous abstraction (Kellison, McCullough, 2017). Nevertheless, striving for such a social phenomenon as qualitative development of sport, it is requested to take into consideration all three fundamental components of sustainable development - economic, environmental and social, and to implement them. In the latter decade, the scientific discussions, involving sustainability, more broadly analyse the following components of sustainability (Eizenberg, Jabareen, 2017), and the concept of social sustainability in parallel to traditional ‘hard’ concepts, such as basic needs, equity and employment, involve more broadly used concepts, called new ‘soft’ themes, such as happiness, wellbeing, and social capital (Colantonio, 2008). Having in mind social sustainability, there are presented a wide range of non-physical factors, such as education and training; inter- and intra-generational social justice; participation and local democracy; health, quality of life and wellbeing; social inclusion; social capital; community; safety; mixed tenure; fair

distribution of income; social order; social cohesion; community cohesion; social networks; social interaction; sense of community and belonging; employment; residential stability; active community organizations; and cultural traditions (Dempsey et al., 2012). The great part of the studies, related to the sport context, is likely to be directed towards an individual level. Here sport, as a phenomenon, is related to people's, involved in sports wellbeing, quality of life or health (Collins, 2014; Moon, Heo, 2011; Steptoe, Butler, 1996), and in this way there is disclosed their belonging to the society (Rudansky-Klopers, Strydom, 2015). Thus, it is possible to foresee that such dimensions as wellbeing, ensured for all, involved in sport activities, will contribute to the implementation of social sustainability in sport.

Aim of the study: to present parallels between sport and sustainable development, in order to ensure wellbeing for present and future generations. Research methods: the analysis and synthesis of scientific literature was conducted, the methods of analogy, chronology and comparison were also applied. The analysis of the scientific literature disclosed that even in the presence of clear parallels between sport and sustainable development in the sport context, there are no many theoretical or practical insights into sustainability issues. There are most frequently analysed economic and environmental aspects, meanwhile social component is eliminated or it is mentioned as a contiguous abstraction. However, each individual' participation in qualitatively organized sport performance should be comprehended as an implementation factor of social sustainability in sport. It is tightly related to the emergence of the belonging sense to the society and social identity creation, what in its turn determines the assurance of wellbeing. Nevertheless, the following requires particularly safe and qualitative relationship among all participants in sport performance. Keywords: sport, sustainability, sustainable development, wellbeing.

Acknowledgement. This research is funded by the European Social Fund according to the activity 'Improvement of researchers' qualification by implementing world-class R&D projects of Measure No. 09.3.3-LMT-K-712.

THE SOMATIC BUILD VERSUS THE SPORTS RESULT OF BOYS AGED 12 TRAINING TENNIS IN SPORT CLUB

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The somatic build of tennis players is a supporting factor so that competitors can achieve the highest sports results. The rectangular shape, the size of the tennis court, the height of net cause that tall, strong and well – build tennis

players possess an advantage in mastering an effective serve, smash and often volley. The aim of the research was the diagnose of the somatic build and defining its dependence with the sports result of male tennis players aged 12 who are training in sports clubs of Podlaskie Voivodeship. The research was carried out in a group of 19 male tennis players aged 12 training in sports clubs. To estimate the somatic build of tennis players the basic parameters were used: the height, the bodyweight, the water content and the body fat index. In the research the results of the tennis tournament (a group system), which was performed according to the Polish Tennis Union, were analysed. In the final classification the tested players were ranked according to their achieved result from 1 to 16. Among the tested tennis male players the substantial diversification of the tested indicators of the somatic build was noted. There are no unambiguous proposals of the type of the somatic build for players training tennis in the Student Sports Club "Return" Łomża. The correlation research between the percentage dependences of the adipose tissue in the organism and the tennis tournament results showed that there are statistically significant dependences at the level 0,642 (low body fat index make players achieve better results in tennis tournaments). The results of research demonstrate the need to conduct current, operational and phased controls taking into account a bigger group of training, which allows to define dependence between the style of playing and the sports results in searching for directions to optimise the training process.

THE EFFECTS OF TAICHI AND QIGONG PRACTICE ON BODY AWARENESS AND PSYCHOLOGICAL WELL-BEING: A PILOT STUDY

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Background: Taichi and Qigong are traditional Chinese exercises which coordinate movements, breathing, and mindfulness. Previous studies showed Taichi and Qigong had positive impacts on psychological health, but most of them did not focus on body awareness and psychological well-being. Therefore, this study aimed to explore the efficacy of Taichi and Qigong on body awareness and psychological well-being. Methods: 25 participants who never experienced Taichi and Qigong took part in this study (12 male and

13 female). They practiced Taichi for 60 minutes and Qigong for 30 minutes once a week for 12 weeks. Participants were evaluated by Body Awareness Questionnaire (Shields, Mallory & Simon, 1989) (Cronbach alfa – 0.87) and Lithuanian Psychological Well-being Scale (LPGS – J, Kairys, Bagdonas, Liniauskaitė, Pakalniškienė, 2013) (Cronbach alfa – 0.88) respectively at the beginning and the end of the study.

Results: There wasn't any significant changes of body awareness ($p = 0.152$) and general psychological well-being ($p = 0,233$) after practicing Taichi and Qigong ($p > 0.05$). Although at the end of the study, the Satisfaction with close relationship was improved obviously, there wasn't any significant difference between before and after practice ($P > 0.05$). Meanwhile, the correlation between body awareness and a number of psychological well-being aspects (satisfaction with life and oneself ($r=0.45$; $p = 0.002$), negative emotionality ($r=0.44$; $p=0.003$), satisfaction with close relationship ($r=0.41$; $p = 0.005$), control ($r= 0.29$; $p=0.046$)) was significantly positive. Conclusions: This pilot study showed some promising results. Even though there weren't any significant differences in body awareness and psychological well-being after Taichi and Qigong practice. We can expect further study because of the tendency of positive change and the correlation between body awareness and various aspects of psychological well-being. The bigger samples and longer-term practice are necessary to clarify the effects of Taichi and Qigong on body awareness and psychological well-being in the future study.

THE PROCESS OF IMPLEMENTATION OF TRANSVERSAL KEY COMPETENCES IN VOCATIONAL EDUCATION AND TRAINING

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The importance of developing transversal key competences (TKC) within vocational education and training (VET) indicate a lot of Europe Union and national strategic documents (Europe 2020, ET 2020, New Skills Agenda for Europe). This is expressed also in reports and statistics of Cedefop, Eurymdice, OECD and other international organizations. In 2018 Council of Europe repeals and replaces the 2006 Recommendation with new document - Reference Framework of Key Competences for Lifelong Learning. Competence needs are not static, they change throughout human's life. The aim of this research is to analyze the process of implementation of TKC: learning to

learn, social and civic competences, initiative-taking and entrepreneurship, and cultural awareness and expression in VET curriculum. It is part of wider study of the National Centre for Education of Latvia and Erasmus + Strategic Partnership project Developing, assessing and validating transversal key competences in the formal initial and continuing vocational education and training (TRACK-VET), (2017–2020). The TRACK-VET project produce detailed analysis of the systemic solutions, practices, and techniques in six countries regarding development and assessment of TKC. Subject and methodology: VET experts from eight Latvia schools, involved in designing curricula and assessment (deputy heads, heads of the methodological groups of teachers, methodologists) took part in focus group interview. Results: experts concluded, e.g.: TKC are highly demanded by the labour market, therefore TKC will be utilised in the professional careers of VET graduates contributing to increased employment-rates; 30% of VET modules aimed at acquisition of lifelong learning competencies are included in education programmes - either separately or integrated in the content of general education subjects or VET module; TKC are assessed using formative assessment (using existing criteria); TKC are included in the centralized examinations as an underlying aspect/indirectly (e.g. appear when performing the practical work). Conclusions. All key competences are equally important; they overlap and are linked. Besides the 4 TKC, also critical thinking, problem solving, team work skills, communication skills, analytical skills, creativity and intercultural competence are apparent throughout any module/subject and also is part of key competences. Schools should think more how to efficiently design the process of implementation of TKC.

PARENTAL INVOLVEMENT IN SPORT AND ATTITUDE TOWARDS CHILDREN'S PHYSICAL ACTIVITY DURING THE ESA PROGRAM

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Family variables are considered one of the most important factors because parents and siblings widely influence the choice of social and PAs and stimulate children's participation in PA by acting as barrier at the same time. Parental beliefs concerning PA benefits in children health linked to emotional support

determine the role of family to decrease or limit their children participation to sport activities. Moreover, crucial factors are linked to environmental and social factors such as their lack of time in everyday life, the difficulties of transportation or their economical situation. These factors are reinforced by poor and low socioeconomic status measured by education, income, occupational status, family size. Research shows that it is essential to teach, encourage and improve parental abilities and strategies in the parent-child relationship able to stimulate motivation to PA in their children. Project „Enriched Sport Activities Program (ESA)” is cofounded by the Erasmus+ Programme of the EU. The Parent’s Educational Program was implemented during ESA. The aim of this study – to reveal parental involvement in sport and attitude towards children’s physical activity during the ESA program period. Together with activities for children, it was carried out „Parent Education Program“ (5 educational sessions) aimed to: 1) train parents on cognitive, motivational and social benefits deriving from regular PA; 2) get a positive emotional involvement in issues concerning the enhancement of PA in children; 3) improve relationship and communication between parents and their children; 4) use adequate resources such as creativity, motivation for PA, the organization of the family routine with the aim of motivating them adequately to the path. After 5 lessons, 101 parents (85.1% mothers; mean age 39.4 (6.4) years) filled out the survey consisted of Questionnaire On Sport Benefits (Alesi et al., 2017) and Parental Involvement In Sport (Teques et al., 2016). 79.6% of parents and 86% children reported being involved in different sport activities. Higher parental education was related with better children’s sport behavior ($P < 0.03$). Majority of parents encourage, motivate and instruct their child how to be active, improve new skills, work hard to achieve things and do not give up in face of difficulties. In future, necessary to define more clearly criteria useful to enhance children’s participation and motivation in sport activities.

PPARA AND PPARGC1A GENETIC VARIANTS IN LITHUANIAN ENDURANCE AND SPRINT/POWER ATHLETES

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The peroxisome proliferator-activated receptors (PPARs) genes family and PPAR γ coactivator-1 (encoded by PPARGC1A gene) are key regulators of energy homeostasis, adaptive thermogenesis and metabolism (fatty acid, carbohydrate and glucose metabolism). This case:control study aims to examine

the association between PPARA (G>C, rs4253778) and PPARGC1A (G>A, p.Gly482Ser, rs8192678) genetic variants, and physical performance in Lithuanian elite athletes. Method. A total of 222 elite athletes (endurance-oriented (n=134) and power-oriented (n=88) groups) and 289 non-athlete controls (healthy unrelated Lithuanian citizens) were genotyped for PPARGC1A A/G and PPARA G/C gene variants. Genotyping was performed by restriction fragment length polymorphism method. Statistical analysis was performed using Rv3.2. Results. The proportion of PPARGC1A genotype AA, observed in sprint/power group (11.4%) was larger than in endurance athletes (2.9%; p=0.01) and controls (6.9%). The odds ratio (OR) of sprint/power athletes harboring PPARGC1A AA genotype was 4.2 (95%CI:1.3-13.7, p=0.014) compared to endurance. The proportion of PPARGC1A GG genotype observed in female athletes (66.7%) was larger than in male athletes group (47.4%) OR=2.2 (95%CI: 1.2-3.9, p=0.015). Regarding the PPARA (rs4253778) variant, significant different were determined for alleles distribution between the female and male (CG: 13.6/86.4% vs 26.6/73.4%; p=0.037) in combined athletes groups. Significant differences in genotype distribution of PPARA was observed between male athletes and male in controls (GG/GC/CC: 52.6/41.7/5.7% vs 68/28.4/3.6%; p=0.01). Moreover, the OR of female harboring PPARA GG genotype was 2.8 (95%CI:1.5-5.4, p=0.0009) compared to male athletes. Conclusions. Findings provide support for an association PPARGC1A (rs8192678) A allele with sprint and power ability in Lithuanian athletes. PPARA (rs4253778) have different influence on physical capacity of males and females athletes (the male was less likely to harbour the GG genotype compared to female). Additional research is needed to fully understand the relationship between PPARs encoding genes polymorphisms and metabolic adaptation in elite athletes.

AMOTIVATION OF STUDENTS PHYSICAL EDUCATION ACTIVITIES AND SOCIAL SUPPORT OF TEACHERS OF PHYSICAL EDUCATION

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The Aim of the Study was to determine link between amotivation of students' physical activities and comprehensible social support of teachers during classes of physical education. The Subjects: there were 180 high school students (93 boys and 87 girls) in age from 14 to 19 years old (M=16.38, SD=1.32)

selected from two different high schools in Lithuania. The Research Methods. Questionnaire Survey. The Mathematical Statistics. The Amotivation Inventory-Physical Education (AI-PE) (Shen et al., 2010) was used to explore reasons why students do not want to participate in physical education. The AI-PE consist of 16 items and measured the four proposed dimensions of amotivation: deficient ability beliefs, deficient effort beliefs, insufficient values, unappealing characteristics of the tasks. The Interpersonal Behavior Scale (IBS) (Pelletier et al., 2008) was used to evaluate teachers' social support. The IBS consist of 12 items divided into three subscales evaluating: autonomy support versus control, competence support versus incompetence and relatedness support. The Results. It was discovered that amotivation of students to participate in classes of physical activities are determined by variable reasons. As per descriptive statistics analysis unappealing characteristics of the tasks averaged to subscale 2.66 ± 1.32 , then the deficient effort beliefs - 2.64 ± 1.35 , insufficient values - 2.60 ± 1.37 and deficient ability beliefs - 2.56 ± 1.25 . As concern the teachers' social support the average was 3.26 ± 0.83 . After correlation analysis was made, it was determined that a significant negative correlation does exist among teachers' social support subscales (competence, relatedness and autonomy support) and all four types of amotivation. The value of these correlations ranged from -0.82 to -0.93. The study results revealed, that teachers' social support is considerably important, in order to minimize unwillingness of students to participate in physical education activities. Conclusion. It can be stated that the decreased teachers' social support may impact amotivation of students.

COMBINATION OF AEROBIC EXERCISE AND CALORIE RESTRICTION IMPROVES MOOD AND COGNITION IN OVERWEIGHT AND OBESE WOMEN

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Obesity may be linked to a wide range of psychological problems and cognitive functioning decline. However, the potential cognitive benefits of weight reduction programs are still unclear and largely limited to those associated with weight loss from physical activity alone. The aim of the study was to estimate the effect of a 6-month combination of aerobic exercise and calorie restriction (CR) on mood state and cognitive behavior in overweight and obese women. Twenty-six women aged 44.2 ± 7.2 years with a body

mass index range from 25.0 to 37.5 kg/m² were randomly assigned to one of two groups: (1) control (weight maintenance) group or (2) experimental group. Intervention consisted of aerobic exercise training sessions on cycle ergometers (50-minutes, 3 times per week at an intensity 60–70 % of heart rate maximum) plus 12.5% CR. Mood was assessed using the Brunel Mood Scale and cognition was assessed using the Automated Neuropsychological Assessment Metrics (ANAM4). Measurements were conducted at baseline and after 6 months. Results showed a significant effect of time and group interaction on confusion, depression and tension ($p < 0.05$). The increase in confusion and depression was observed in control group whereas tension decreased in experimental group after aerobic exercise and CR program ($p < 0.001$). Significant time and group interaction only on visual scanning and associative learning was observed, whereas other cognitive domains remained unchanged. To conclude with, the combination of aerobic exercise and CR improves psychosocial mental state and cognition in overweight and obese women.

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SPORT SCIENCE FOR SPORTS PRACTICE, TEACHER TRAINING
AND HEALTH PROMOTION

ABSTRACTS

Authors assume full responsibility for the correctness of their abstract's language

Prepared for publication by

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Graphic designer

Marijus Auruškevičius

Cover Designer

Dalia Raicevičiūtė

2019 04 08. Užsakymo Nr. K19-024.

Published by

Vytautas Magnus University

K. Donelaičio g. 58, LT-44248, Kaunas

www.vdu.lt | leidyba@vdu.lt