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SOCIAL RESPONSIBILITY AMONG YOUNG FOOTBALLERS OF DIFFERENT MASTERSHIP

D. Juodsnukis

Lithuanian Sports University, Kaunas, Lithuania

Background. Much research deals with social responsibility in youth through physical education (Hellison & Walsh, 2002; Caballero-Blanco, Delgado-Noguera, & Escartí-Carbonell, 2013) but there is a lack of publications analysing social responsibility of sports school students. The aim of the present research was to analyse social responsibility among young footballers of different mastership. Objectives of the study were to compare social responsibility components of young footballers of different mastership; to reveal their social responsibility levels. **Methods.** The questionnaire was used to determine social responsibility among young (15–16 years) footballers. We interviewed 22 (15–16 years) students of higher level mastership and 14 (15–16 years) sports school students of lower mastership in Lithuanian National Football Academy. **Results.** The comparison of scores of the social responsibility component 'Respect for others' showed no significant difference between young (15–16 years) football players of the higher (5.10 ± 1.26) and lower mastership (4.94 ± 0.86): $t(34) = -0.19, p > .05$. The comparison of scores of the social responsibility component 'Caring for others' showed also no significant difference between young (15–16 years) football players of the higher (4.49 ± 0.95) and lower mastership (4.33 ± 0.92): $t(34) = -0.50, p > .05$. It was found that social responsibility among footballers of higher mastery level was slightly higher (4.75 ± 0.84) than this indicator among representatives of lower of mastery level (4.63 ± 0.81), but the difference was not significant ($p > .05$). **Conclusions.** No significant difference was established between young (15–16 years) football players of the higher and lower mastership by components of social responsibility. The evaluation of social responsibility levels among young (15–16 years) football players of different mastership showed no significant difference between young football players of the higher and lower mastership.

Keywords: social responsibility, football, mastership.

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DETERMINATION OF PRESERVICE PHYSICAL EDUCATION TEACHERS' ACADEMIC SELF-EFFICACY: A TURKISH SAMPLE

Y. Arslan

Nevşehir Hacı Bektaş Veli University, Nevşehir, Turkey

Background. According to Bandura (1997), self-efficacy is an effective quality for shaping the behaviours and it is defined as "self-consideration an individual shows such a performance that he/she can organize activities and achieve them successfully". Since Bandura clarified self-efficacy term in the literature in

1970s (1970), researchers have observed that this belief is effective for academic experience of each level in educational settings (Ekici, 2012). This study examined preservice physical education teachers' (PPETs') academic self-efficacy. **Methods.** The participants were 118 undergraduate students ($M_{Age} = 20.78$, $SD_{Age} = 1.52$) from a major university in Turkey. The Academic Self-Efficacy Scale originally developed by Owen and Froman (1988) and adapted to Turkish by Ekici (2012), was used to collect data. The scale is formed by the three sub-dimensions named as the social status ($\alpha = .79$), the cognitive applications ($\alpha = .80$) and the technical skills ($\alpha = .82$), and it includes 33 items. Descriptives (Mean-Standard Deviation) and *t*-test were used for analysing the data. **Results** indicated that the social status dimension ($M = 3.38$, $SD = .75$) and the cognitive applications dimension ($M = 3.28$, $SD = .51$) had the highest rates to some extent. The PPETs partly agreed with the technical skills dimension ($M = 3.01$, $SD = .76$). The findings for all dimensions yielded no significant differences for female and male PPETs ($p > .05$). **Conclusion.** Overall, this study offers some evidence that Turkish PPETs' academic self-efficacy levels are not high and the gender is not an important factor affecting PPETs' academic self-efficacy.

Keywords: physical education, preservice physical education teacher, academic self-efficacy.

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THE ASSESSMENT OF BASIC MOTOR COMPETENCIES IN LITHUANIAN PRIMARY SCHOOL: PILOT STUDY

A. Emeljanovas, B. Miežienė, V. Česnaitienė, I. Peterytė, L. Tumynaitė, J. Pagirskas,
D. Daugininkas, D. Liudžius

Lithuanian Sports University, Kaunas, Lithuania

Background. Motor skills or basic motor competencies play a central role in the process of the development of physically active lifestyle. Children and adolescents must have basic motor competencies in order to take part in sport and exercise. Motor performance is one of the central learning outcomes in physical education. Motor abilities are considered to be stable dispositions and describe context-free motor proficiency. It is important to have a reliable instrument to measure. We tried to validate newly developed and validated in Switzerland, Motor Basic Competencies (MOBAQ) instrument (Herrmann et al., 2015). **Methods.** Data from 129 first grade students were gathered. The eight tests were performed. The basic motor competency "object movement" involves the basic motor qualifications "throwing," "catching," "bouncing," and "dribbling". The basic motor competency "self-movement" involves the basic motor qualifications "balancing," "rolling," "jumping," and "moving sideways." Each formulates the educational standards as a can-do statement (e.g., "can throw," "can catch"). Confirmatory factor analysis was performed in order to confirm the original two-factor structure. **Results.** Confirmatory factor analysis confirmed original two-factor structure of basic motor competencies in the sample of Lithuanian first grade school children ($\chi^2/df = 1.083$, $CFI = .952$, $TLI = .967$, $RMSE = .026$ [.000–084], $SRMR = .060$). Factor loadings in each factor were in the range from

.36 to .57. The correlation between two factors was $r = .80$. Scores on the object movement were higher in boys than in girls (4.56 ± 1.72 vs 3.74 ± 1.45 , respectively, $p = .006$). Self-movement competencies did not differ between genders. Scores on object movement and self-movement were significantly correlated with physical fitness ($r = .563$ and $.335$, respectively). Also these two factors were significantly related to organized physical activity ($p < .05$). **Conclusion.** While the suitability of test battery should be further explored, its implementation in primary schools may help in monitoring and development of basic motor skills.

Keywords: motor skills, primary school students, confirmatory factor analysis.

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND PHYSICAL FITNESS IN LITHUANIAN 1ST GRADE STUDENTS

J. Pagirskas, B. Miežienė, A. Emeljanovas

Lithuanian Sports University, Kaunas, Lithuania

Background. The aim was to examine the relationship between physical activity and physical fitness in Lithuanian 1st grade students. Design: The study was carried out in 4 schools in Kaunas, Lithuania, applying physical fitness tests across the age groups 7 to 8 years. The study included 129 students, 61 (47.3%) girls and 68 (52.7%) boys. **Methods.** Physical fitness was measured by the 8-item test battery. The test battery was developed by Fjørtoft et al. (2011) and included the following tests: standing broad jump, jumping a distance of 7 m on 2 feet, jumping a distance of 7 m on one foot, throwing a tennis ball with one hand, pushing a medicine ball with 2 hands, performing a 10 x 5 m shuttle run, running 20 m as fast as possible, and performing a reduced Cooper test (6 minutes). Organized physical activity included sum of minutes spent in PE classes and sum of minutes spent in leisure time organized sports. **Results.** Boys were better in 7 tests (standing broad jump; jumping a distance of 7 m on 2 feet; throwing a tennis ball with one hand; pushing a medicine ball (1 kg) with 2 hands; shuttle run; running 20 m; reduced Cooper test) tests, girls were better in 1 test (jumping a distance of 7 m on one foot), from all 8 tests. Physical activity did not correlate with physical fitness in both gender groups. **Conclusion.** Physical activity is not related to physical fitness in either gender among 1st grade Lithuanian students.

Keywords: physical fitness, primary school children, physical activity.

CATHARSIS AND (NOT ONLY) SPORTS

M. Bednář

Charles University in Prague, Prague, Czech Republic

Background. The old concept of catharsis (purification, purgation) is known from Aristotle, who saw in it both *raison d'être* of arts, especially of theatre and music, and the special benefit for spectators. **Methods.** Our paper is an interdisciplinary attempt to determine the place of catharsis in the lives of individuals and societies in our time. A clear modern parallel is also found in the area of sports where catharsis can also be observed in both the audience and the athletes. Its natural bodily anchoring was the opportunity to look for relevant physical forms. **Results.** The model of radical catharsis is presented

as well, where the purification aims at “emptying” (kenosis). It can be the opportunity for decisions or even life restart leading to perfection/excellence (arete) or even up to “fullness” (pleroma). The methodological portion of our work is focused on phenomenological method, which proves to be the most advantageous instrument for the formulation such an enigmatic concept like catharsis. Firstly we follow manifestation of the cathartic phenomena in emotional sphere, later in ethical, pedagogical and bio-medical areas. Of course, other areas (especially artistic and religious) could be added, yet our focusing directs to kinesiology/kinanthropology, which influenced our selection. Because the effect of catharsis observed in the structure of human personality is mediated primarily by the emotions, this mediation area is more extensively analysed and in catharsis it is seen as a specific emotional “transformer”, for which a neologism *metapatheia* was created, forming an illustrative counterpart to the established concept of *metanoia*. The final section is a philosophical synthesis which illustrates the specific existential movement within catharsis which plays an important bio-hygienic role and complements to the concept of three movements of human existence according to Czech philosopher Jan Patočka.

Keywords: catharsis, existential movement, kinesiology, *metanoia*.

ASSESSMENT FOR LEARNING (AFL) IN PHYSICAL EDUCATION (PE)

A. Mjåtveit

University of Stavanger, Stavanger, Norway

Background. The aim of this paper is two-fold: 1. To identify the extent to which pre-service teachers use AFL as a strategy to improve pupils’ learning in PE 2. Explore how the mentor challenges pre-service teachers regarding AFL during internship. **Methods.** Both national and international research points to the need for improved quality and use of assessment for learning (AFL) among teachers (Askew & Lodge, 2000; Black & William, 2009; Butler & Winne, 1995). Recent research underlines the importance of AFL as a tool to enhance pupils’ learning and to develop PETE’s teaching practice (Chan, Hay, & Tinning, 2011; Georgakis & Wilson, 2012; MacPhail & Halbert, 2010; Ni Chroinin & Cosgrave, 2013). Using video recordings of various teaching sessions from pre-service teachers’ internship, we have mapped how these strategies are taken care of. This analysis is based on the Classroom Assessment Scoring System (CLASS) (Pianta, Hamre, & Mintz, 2012). In addition, mentoring sessions between students and mentor are recorded to explore how the mentor challenges pre-service teachers regarding AFL. **Results.** The main findings show that the pre-service teachers demonstrate lack of capability to identify critical elements in an exercise and the ability to improve learning through facilitating differentiated tasks. Characteristics of pre-service teachers’ feedback practices can be summarized as: 1) Little feedback on task level, process level and self-regulation level; 2) Majority of the feedback is at the individual level (self-level); 3) Appropriate error correction is absent; the focus is on the result. We did not find many traces of the professional focus in mentor sessions. **Conclusions.** The overall purpose of this paper was to examine how pre-service teachers conduct their AFL or how supervisors treat the subject in their guidance during internship. The pre-service teachers seem to have little attention to the extent to which pupils are engaged in higher-level thinking skills through the use of knowledge and skills to novel/or open-ended problems, tasks, and questions. Their focus is on implementation. Focus on analysis and inquiry is not prominent in guidance from the tutors. The tutors are most concerned with the efficient organization and high level of activity, while they show little attention to what pre-school teachers can do to give pupils mastery experiences and increased motor skills.

Keywords: physical education, assessment for learning, teacher education.

EFFECT OF NON-FORMAL PHYSICAL EDUCATION CURRICULUM ON INCREASES IN YOUNG ADOLESCENTS' PHYSICAL DEVELOPMENT

A. Šarkauskienė

Klaipėda University, Klaipėda, Lithuania

Background. The period of early adolescence is very complex and significant human development. The growth and development of young adolescent's bones, muscles, nerves, and organs largely dictate their physiological and performance capacities. As their size increases, so do almost all young adolescent's functional capacities. This study aims to formulate and implement curriculum of non-formal physical education and assess its effectiveness for physical development of young adolescents. **Methods.** The research was conducted in two stages. In the first stage 51 young adolescents participated in a quasi-experiment for two years. Students were organized into E and C groups. Both groups shared the duration (1 hour) and frequency (twice a week) of non-formal physical education, but their education curriculum was different. In the second stage 72 students (groups A and B) participated in the research from the same schools. The curriculum of group A was modified and the one of B - the same as in group C. In both stages the focus groups underwent anthropometric (height, weight, BMI) and physiometric (VC, right and left handgrip strength) measurements. **Results.** Dependent *t* test indicated that over the two years (school year 2007–2009) E and C group girls' and boys' height, weight, right and left handgrip strength indices increased significantly, $p < .05$. E group girls' and boys' BMI indices did not change significantly, $p > .05$, i.e. height and weight ratio of girls, who participated in NFPE in school, became more proportional. C group girls' VC indices did not differ significantly, $p > .05$. Independent *t* test indicated that in the first (school year 2007–2009) and second (school year 2012–2013) research stages, differences of anthropometric and physiometric measurements of the groups were not significant, $p > .05$. **Conclusion.** Formulated and implemented curriculum of non-formal education in school had the biggest positive influence on decreasing young adolescents' level of BMI and increasing the level of VC.

Keywords: non – formal physical education; physical development, young adolescents.

SOCIAL SKILLS EXPRESSION OF SENIOR HIGH SCHOOL AGE STUDENTS IN PHYSICAL EDUCATION CLASSES

A. Akelaitis

Lithuanian Sports University, Kaunas, Lithuania

Background. Social development during adolescence is considered to be one of the greatest challenges in today's education (Yurgelun-Todd, 2007). Physical education classes, where intense emotional situations take place and individuals' characters are tested, are the proper places for the development of students' social and emotional skills (Siskos et al., 2012). The main purpose of the present study was to reveal expression peculiarities of social skills for senior high school age students in physical education classes. **Methods.** The research was carried out during 2014/2015 academic years. The independent random sample consisted of 244 (15–16 years old) students and 258 (17–18 years old) students, of which

there were 224 boys and 278 girls. The social skills rating system, (SSRS-S) (Gresham & Elliot, 1990) for secondary level (grade 7–12) students was used to evaluate expression peculiarities of social skills for senior high school age students in physical education classes. The reliability of this scale in our study was adequate: Cronbach's alpha was .70 for social skills. The statistical hypotheses were tested by applying the Student's *t*-test. **Results.** It was found that 17–18-year-old students had higher rate of assertion skills in physical education classes than 15–16-year-old students ($p < .05$). The analysis of the assertion skills resulted in the following averages: 9.77 ± 3.05 in case of 15–16-year-old students and 10.44 ± 3.08 in case of 17–18-year-old students. It was found that 17–18-year-old students had higher rates of self-control skills in physical education classes than 15 – 16-year-old students ($p < .05$). The comparison of social skills among boys and girls revealed that girls had better cooperation skills in physical education classes than boys ($p < .05$). The analysis of the cooperation skills resulted in the following averages: boys – 11.69 ± 3.62 , and girls – 32.13 ± 3.72 . **Conclusions.** It was found that 17–18-year-old students had better assertion and self-control skills than those of 15–16-year-old students and girls had better cooperation skills in physical education classes than boys ($p < .05$).

Keywords: social skills expression, physical education classes, senior high school age.

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ENCOURAGEMENT TO BE PHYSICALLY ACTIVE BY APPLYING SOLUTION FOCUSED BRIEF COUNSELLING AMONG OVERWEIGHT ADOLESCENT

V. Indriūnienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Adolescent overweight is associated with significant immediate and long term health risks (Ogden, Carroll, Kit, & Flegal, 2014). Scholars note that physical activity of youth is insufficient in the whole world. The sudden decrease of physical activity during the period of adolescence, especially among senior students of secondary school, is becoming a major issue of the contemporary society, and its consequences are unarguably damaging, e.g. obesity (Krebs et al., 2007). Hence promotion of physical activity evolves into one of the most essential and topical objectives of healthcare and education systems (Story, Kaphingst, & French, 2006). The aim of the research was to establish the appropriateness of solution focused brief counselling among obese adolescent seeking promotion of their physical activity. **Methods.** From randomly selected students, two groups of research subjects were drafted. The impact group consisted of 34 students. A methodology based on SFBC was developed for the promotion of physical activity. Students were evaluated by employing the IPAQSF. **Results.** After brief solution focused counselling, 35.3% of students previously facing physical activity issues achieved prominent changes in the subjective evaluation of the issue, 38.2% of students showed medium changes and 26.5% of students - minor. The suggested methodology significantly impacts the physical activity of

adolescents, their physical activity significantly increased ($p < .05$); no gender differences were established. **Conclusions.** After solution focused brief counselling, the entirety of obese students of senior grades and the groups of males and females exhibited the increase of physical activity. Physical activity of obese students not taking part in counselling sessions did not alter.

Keywords: solution focused brief counselling, physical activity, obesity, adolescent.

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PERSONAL FACTORS RELATED TO CREATIVITY OF PHYSICAL EDUCATION TEACHERS

A. Dumčienė, D. Lapėnienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Physical education curriculum is a special sub domain of education where the teacher's creativity is related with the development of positive attitudes toward physical activity and formation of the need for physical self-development (Dumčienė & Lapėnienė, 2010). The aim was to evaluate physical education teachers' creativity in professional activities. **Methods.** The size of the sample was 261 teachers with different qualification degrees. The group of physical education teachers constituted 46% ($n = 120$), while the group of other subject teachers made up 54% ($n = 141$). In order to assess the creativity and other factors of the research participants, a questionnaire was employed. The diagnostic block constituted 13 scales. **Results.** It was established that creativity was only impacted by the qualification category of the participants: teachers and senior teachers were less creative (creativity scale means 4.08 ± 0.09 and 4.02 ± 0.04 correspondingly), while teachers methodologists were more creative with the scale mean of 4.14 ± 0.57), and teachers experts were most creative with the scale mean of 4.44 ± 0.16 . Years of work experience and the type of professional activity did not exhibit statistically significant impact on creativity in professional activity. Physical education teachers were more motivated to work than colleagues instructing other subjects. Extrinsic motivation scale mean in the sample of physical education teachers was 3.75 ± 0.08 , while in the sample of other discipline teachers it was 3.49 ± 0.05 . Goal internalization motivation and intrinsic process motivation as well as creative self-efficacy might be considered as key factors related with teacher's creativity independently from qualification category. The least important to creativity were emotions and socio demographical characteristics of the sample. Creativity among teachers of physical education was statistically significantly predicted by creative self-efficacy, creativity encouragement, intrinsic process and extrinsic motivation ($p < .05$). **Conclusions.** Teachers of physical education work creatively when they trust their skills and are process oriented. Creativity encouragement by principal also has an impact. Extrinsically motivated physical education teachers do not tend to work creatively. Other discipline teachers are goal-oriented: they are motivated to work creatively by goal internalization motivation. Physical

education teachers more often experience involvement, satisfaction, as well as positive emotion in their workplace compared to other discipline teachers.

Keywords: teacher, physical education, creativity.

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SOCIAL AND PERSONAL ATTRIBUTES OF PHYSICAL ACTIVITY AMONG UNIVERSITY STUDENTS

V. Juškelienė, J. Česnavičienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Exercising behaviour is influenced by environmental, social, personal, cognitive, and physiological factors. This study was developed to understand what motivates students to become physically active and help them develop ways to increase activity. The aim of the study was to reveal the social and personal characteristics of low, moderate and high physical activity (PA) among the first year university students. **Methods.** Study population consisted of 432 first year full-time students from Lithuanian University of Educational Sciences, mean age 19.3 ± 1.04 , 32.6% (141) males and 67.4% (291) females. All students were from 22 teachers' training study programs. Standardized Physical Activity Questionnaire – Short Form (IPAQ-SF) was used. Original questionnaire was developed to assess the social and individual determinants of PA. Statistical analysis of the data was performed using SPSS software package, version 16.0. To assess contingency tables, chi-square-test was used. Differences were considered to be statistically significant at $p < .05$. **Results.** 16.2% of the students had low, 29.9% – moderate, and 53.9% – high level of PA. Females were significantly less active than males: the male/female ratio in low PA group was 9.9%/19.2%, moderate PA group – 0.6%/34.4%, and in high PA group – 69.5%/46.4%, $p = .0001$. Some motives were noted significantly more often by the representatives of higher PA group compared to moderate and low PA groups, they were: "Physical activity is beneficial to my health", $p = .037$; "I strive to maintain good sport form", $p = .0001$; "Studies require good physical fitness", $p = .0001$. Some obstacles were mentioned significantly more often by the representatives of lower and moderate PA groups compared to high PA group, they were: "Hard work, lack of time", $p = .0001$; "Sloth, absence of will power, stubbornness", $p = .08$. **Conclusions.** Higher level of PA was associated with students' reasoning that physical activity had benefits to health, maintaining good sports form, studies required good physical fitness. Lack of time and sloth, absence of will power, stubbornness were characteristic of lower and moderate PA groups compared to high PA group.

Keywords: physical activity level, determinants of physical activity, university students.

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FACTORS MOTIVATING ATHLETES TO CHOOSE AND PRACTICE TRACK-AND-FIELD ATHLETICS

N. Žilinskienė, D. Radžiukynas, A. Četkauskas

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Self-determination of a person to start practicing sports is the first stage of one's value orientation, revealing possibility for an athlete to develop both sport-related and personal competences under various conditions of sport activity (MacLean & Hamm, 2008; Whitehead, Telfer, & Lambert, 2013). As an educational process, track-and-field athletics supports athletes in their striving to achieve the aims of socialization, occupation, health-enhancement, self-cognition, self-esteem, self-development, self-expression and communication (Žilinskienė, 2008). The aim of the research was to establish and compare the factors which motivate track-and-field athletes of different age to choose and practice this sport. **Methods.** 1. Questionnaire survey. 2. Mathematical statistics. The investigated were track-and-field athletes, aged 18–20, short distance runners ($n = 80$) and young track-and-field athletes, aged 13–14 ($n = 132$). **Results.** The main factors motivating track-and-field athletes, aged 18–20 and 13–14, to choose this sport were the following: wish to enrich their knowledge and to acquire new practical habits – respectively 55.6 and 51.5%; communication during training sessions and travels to competitions – 43.2 and 56.1%; willingness to become more self-confident – 42.0 and 31.1%; invitation by coach – 33.3 and 49.2%; recommendation by their teacher of Physical Education – 24.7 and 46.2%; their parents' advice – 11.1 and 31.1%. Decision of young athletes (aged 13–14) was more determined by coach's invitation, Physical Education teacher or parents' recommendation, this difference being statistically significant ($p < .05$). The main factors motivating track-and-field athletes, aged 18–20 and 13–14, to practice this sport were: wish to achieve good sport results – 81.3 and 84.1%; wish to be healthy and strong – 75 and 71.2%; to participate in competitions – 70 and 78%; to purposefully spend free time – 60 and 48.5%; interesting training sessions – 53.8 and 50.8%; desire to enter the national team – 51.3 and 65.2%; wish to have more friends – 23.8 and 38.6%. Younger athletes (aged 13–14) were more motivated for the involvement into training activity by their wish to enter the national team as well as to have more friends ($p < .05$). In **conclusion** it can be stated that athletes aged 13–14 and 18–20 choosing track-and-field athletics and practicing this sport have a clear sport-related aim and social orientation based on their own initiative and self-determination, enhanced by parents, coaches and teachers.

Keywords: track-and-field athletes, factors motivating to choose and practice track-and-field athletics.

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THE EFFECT OF TWO WEEKLY SESSIONS OF INTENSIVE INTERVAL-RUNNING ON AEROBIC CAPACITY AND RUNNING PERFORMANCE IN UNTRAINED SEDENTARY ADULTS

R. J. Alstveit, S. A. I. Shalfawi, G. L. Nordbotten, M. H. Helland, L. I. Tjelta

University of Stavanger, Stavanger, Norway

Background. The aim of the study was to examine the effect of intensive interval training in untrained sedentary adults' aerobic capacity and 3000 m running performance. A secondary purpose was to measure the relationship between maximum oxygen uptake (VO_2max), 3000 m running performance and time spent in different intensity zones. **Methods.** Eleven untrained sedentary adults consisting of seven women aged ($\pm$ SD) (43.6 ± 5.7 years), body mass (92.1 ± 15.6 kg) and height (165.3 ± 4.6 cm); and four men aged (51 ± 4.4 years), body mass (119.3 ± 6.6 kg) and height (187.3 ± 4.7 cm) volunteered to participate in this study. Training program consisted of 20 weeks, twice a week, intensive interval training. Each training session started with 10 min warm up, followed by 21 min of effective interval training. Heart rate (HR) during training sessions was registered using Polar team2 system. Three HR zones were used. Zone one was easy and moderate intensity (maximal heart rate (HRmax) 60–82%), zone two was threshold training (HRmax 82–92%) and zone three was intensive aerobic training (HRmax > 92%). VO_2max was measured following the modified Balke protocol using Vintus CPX, CareFusion gas analyser and Woodway treadmill. HRmax was defined as the highest HR achieved during the VO_2max test. The 3000 m running performance test was administrated outdoor. Measures were conducted before and after the intervention period. **Results.** Significant improvement in VO_2max (2.3 ± 2.34 ml·kg⁻¹·min⁻¹) was observed between pre- (31.72 ± 4.08 ml·kg⁻¹·min⁻¹) and post- (34.02 ± 5.7 ml·kg⁻¹·min⁻¹) tests ($p = .0087$). Furthermore, significant improvement in 3000 m performance test (-2.36 ± 2.22 min) was observed between pre- (22.75 ± 3.20 min) and post- (20.39 ± 4.06 min) tests ($p = .0054$). A strong and significant relationship were detected between VO_2max and 3000 m running performance ($r = -.7534$; $R^2 = 57\%$). Finally, no marked association was observed between training time in each training zones and improvement in VO_2max and 3000 m tests. **Conclusions.** This study indicates that twice a week, intensive interval training improves aerobic capacity and running performance in untrained sedentary adults, which would affect positively their health and everyday activities.

Keywords: maximum oxygen uptake, 3000 m running test, training effect.

TWO INTENSIVE INTERVAL SESSIONS PER WEEK CAN REDUCE BMI AND WAIST CIRCUMFERENCE IN SEDENTARY OVERWEIGHT ADULTS

G. L. Nordbotten, S. A. I. Shalfawi, M. H. Helland, R. J. Alstveit, L. I. Tjelta

University of Stavanger, Stavanger, Norway

Background. The aim of this study was to examine if sedentary, overweight adults reduced their body mass index (BMI) and waist circumference (WC) after 20 weeks with intensive interval training twice a week. It was also an aim to find out if there were differences between men and women. **Methods.** Thirty-five untrained sedentary adults consisting of 23 women aged ($\pm$ SD) (42.5 ± 8.8 years), body mass (92.6 ± 15.7 kg) and height (167.4 ± 5.9 cm); and 12 men aged (46.8 ± 10.0 years), body mass (117.8 ± 22.5 kg) and height (184.1 ± 9.7 cm) volunteered to participate in this study. The training program consisted of 20 weeks with intensive interval training twice a week. Each training session started with 10

min warm up, followed by 21 min of effective interval training. A coach supervised the sessions. The participants' BMI and WC were measured by start and end of the project. Bodyweight were measured using Seca-weight measurement system and WC was measured using a measuring tape. **Results.** A significant reductions in weight (-3.1 ± 4.1 kg, $p < .01$), WC (-8.7 ± 5.3 cm, $p < .01$) and BMI (-1.2 ± 1.5 , $p < .01$) were observed for all women in this study. Furthermore, significant reductions in weight (-7.6 ± 8.4 kg, $p < .01$), WC (-10.2 ± 6.9 cm, $p < 0.01$) and BMI (-2.2 ± 2.5 ; $P < 0.05$) were also observed for all men. No marked differences were observed between women and men in all measured variables. Further analyses of the results indicate that 89% of the weight reduction observed in men can be explained by a reduction in WC ($r = .9430$, $p < .01$) compared to women where 37% of the weight reduction can be explained by a reduction in WC ($r = .6095$, $p < .01$). **Conclusions.** This study found that intensive interval training twice a week reduces BMI and WC in untrained overweight adults. Weight reduction was closer related to reduction in WC in men compared to women, even though no marked reduction in weight was observed between men and women.

Keywords: BMI, waist circumference, training effect.

ASSESSMENT AND CHANGE IN PHYSICAL DEVELOPMENT AND PHYSICAL FITNESS AMONG KLAIPĖDA UNIVERSITY FIRST-YEAR STUDENTS OF 2009 AND 2014

Z. Birontienė

Klaipėda University, Klaipėda, Lithuania

Background. Health and fitness of students, admitted at higher education institutions, have been widely researched for a long time now, however, with changing economic and social situation of the country, study programs of higher education institutions, student attitude towards physical education, and declining physical activity, there is still a lack in longitudinal studies, analysing a change in physical development and physical fitness of the students recently enrolled at higher education institutions. Research aim was to analyse physical development and physical fitness of Klaipėda university (KU) first-year students, enrolled in 2009 and 2014 and measure their change. **Methods.** During the period of September – October, 2009 a total number of 524 KU first-year students were measured and tested, while in 2014 – 277 students. Physical development measurement, physical fitness testing was used. Data analysis was conducted using the mathematical methods of statistics. **Results.** Having compared results obtained from measuring physical development of the first-year students, enrolled in 2009 and 2014, it is evident that the height trends of females and males have changed. In 2014, KU had its first-year female students shorter; however, admitted males were taller than five years ago. Body mass index for both males and females have not changed statistically significantly. Mean value of the body mass index was within a healthy body weight interval (18.5–24.9) and has remained very similar. Forced vital capacity among females and males has decreased statistically significantly during the five-year period. Having compared the mean of the physical fitness testing results, conducted with females admitted in 2009 and 2014, it is evident that flexibility, explosive leg strength, running speed and agility, hand grip, strength and endurance of the abdominal muscles have a statistically significant decrease. Females' static muscular endurance of upper arm and shoulder girdle has remained almost unchanged. Balance has demonstrated a statistically significant improvement. Mean of the physical fitness testing results obtained from male students demonstrate that after a five-year period the mean results for more than half of the tests completed were similar, differences were not statistically significant. Very minor change has been recorded in a speed of limb movement, explosive leg strength, running speed and agility, strength and endurance of the abdominal muscles, static muscular endurance of upper arm and shoulder

girdle. Balance results of male students have demonstrated a statistically significant improvement, while flexibility and hand grip strength have declined significantly.

Keywords: physical development, physical fitness, students.

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PHYSICAL RECREATION TO IMPROVE THE WELL-BEING OF 45-55-YEAR-OLD PEOPLE

I. Kundziņa, J. Grants

Latvian Academy of Sport Education, Riga, Latvia

Background. Quality of life, physical activity and health are inter-related factors. Human health includes the promotion of well-being and the absence of illness. Physical activity plays a fundamental role not only in improving the physical health, but also in increasing well-being. **Methods.** • ELISA (determination of the beta-endorphin levels in blood plasma). • "FaceReader 3.0" (testing emotions). • Outdoor recreation (cycling, cross-country skiing, Nordic walking). • Mathematical – statistical methods. **Results.** The most explicit increase on beta-endorphin (β -EP) levels was experienced in cyclists (+ 15.3%, $p > .05$). The changes detected in Nordic walkers and skiers are similar (+ 5.9% and + 6%, $p > .05$). Also the obtained results demonstrate the following link: for the people with relatively low β -EP levels prior to performing physical recreation activities, it will be relatively lower also after such activity ($p < .05$). Before and after physical recreation activities, the testing of the emotional state was performed (by the program "Face Reader 3.0"). The results indicate statistically significant increase. Analysing the changes of beta-endorphin level and negative emotions affected by physical recreation, moderately strong correlation was found between the emotion of anger and the level of β -EP ($p < .05$). **Conclusions.** 1. Between the β -EP levels before and after recreational activities there is a strong correlation ($r = .850$). 2. The most significant increase of β -EP level (+ 15.3%) and positive emotions was observed in those participants who performed a ride on a bike. 3. For Nordic walkers increases of β -EP level was by +5.9%, but cross-country skiers by + 6% ($p > .05$). 4. People with higher levels of β -EP have lower level of anger and vice versa ($r = -.504$; $p < .05$).

Keywords: physical recreation, well-being, beta-endorphins, emotions.

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RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND EATING BEHAVIOURS AMONG UNIVERSITY STUDENTS IN LITHUANIA

R. Motiejūnaitė, J. Česnavičienė, A. Kalinkevičienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. In recent years, health-related behaviours have become the fundamental area of interest of practitioners and scientists of many disciplines. Physical activity (PA) and eating behaviour is an important factor influencing students' health. These health behaviours may not only occur during the years at university but may remain throughout adulthood as well (Crombie, Ilich, Dutton, Panton, & Abood, 2009; Ferrara, 2009; Ansari, Stock, & Mikolajczyk, 2012). The aim of the study was to identify the relation between physical activity level and eating behaviours among the students. **Methods:** The analysis and generalisation of scientific literature on the topic of the research, anonymous questionnaire survey. The questionnaire had three sections. The first section established the participant's basic demographic characteristics, such as age, sex. The second section examined eating behaviours of students and the third section determined PA level by International Physical Activity Questionnaire. The survey was conducted in 2013–2014. The sample consisted of 533 students (163 men and 370 women) from Lithuanian University of Educational Sciences, Vilnius University. Statistical analyses were completed by the SPSS software package (version 16.0). The following methods were applied to analyse the research data: descriptive analysis and Kruskal-Wallis tests; p -values less than .05 indicate a statistically significant. **Results.** The research data shows that only 69.2% of students (69.9% as having low level PA, 74.5% – as moderate level PA, 64.9% – as high level PA) compliance with dietary regimen. Also, 64.2% of them have breakfast, and 76.2% have lunch every day. However, less than half of the students eat cereal products, fresh vegetables, fruits and berries, cheese and dairy products. The daily recommended amount of water is drunk by 45.8% of the respondents. The findings of the present study showed that almost half of the students sometimes deliberately restrict the amount of food. Students with a high level of PA, more frequently indicated that they eat healthy food ($\chi^2 = 17.481$; $p < .0001$). **Conclusions.** Results revealed that young men who had low, moderate or high levels of physical activity had similar eating habits. The relationship between physical activity and eating behaviours among young women is statistically significant.

Keywords: eating behaviours, levels of physical activity, university students.

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POSTURAL RESPONSES EVOKED BY HEAD MOVEMENTS AND ALTERED SOMATOSENSORY INFORMATION

I. Liepina¹, A. Kaupuzs²

Latvian Academy of Sport Education¹, Riga, Latvia

Rezekne Academy of Technologies², Rezekne, Latvia

Background. Balance is one of the most important skills of the postural control and ability to move. The data of many studies have shown that postural sway was reduced while participants perform a balance task concurrently with a cognitive task. There are some evidences that postural sway decreases under threatening conditions. The aim of this study was to examine the immediate postural responses evoked by head movements standing on foam surface. **Methods.** The study subjects were 32 first year students. Participants ranged in ages from 18 to 20 years old (Mean – 19.5; SD – 1.07). The Sway Index (SI) was measured by Biodex Portable Balance System – BioSway. **Results.** Performing of head movements left to right 20 seconds with 3 repetitions with closed eyes evoked decreased postural sway in 18 participants ($SI - p = .001$; medial/lateral – $p = .004$, anterior/posterior – $p = 0.092$). **Conclusion.** This study provides evidence that specific changes in somatosensory environment could be related to changes in static postural control.

Keywords: balance, BioSway, dual task, proprioception, visual condition.

LIVED EXPERIENCES OF YOUNG OVERWEIGHT WOMEN IN SPORTS CLUB-BASED PHYSICAL ACTIVITY DOING SITUATIONS

V. Balčiūnienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Researchers noticed that marketing principles of many private sport centres are based on body cult promotion. Potential sport club attendees are invited to participate in exclusive training sessions, the aim of which is to “beautify one’s figure” (Jankauskiene, 2008). These days, under conditions of increasing range of services being rendered by private sports clubs, doing physical activity, actually, is not an integral part of healthy life style. It has become just an everyday tool for creating a certain image of a person’s body. Furthermore, there are grounds for belief that young overweight women doing physical activity at private sports clubs take a quite complicated approach to their body mass control. Therefore, the relevance of this research becomes evident after the problem to be investigated herein has been formulated: What are lived experiences of young overweight women in sports club-based physical activity doing situations? **Methods.** The hermeneutic-phenomenological inquiry has been chosen as a qualitative research methodology. **Results.** The hermeneutic phenomenological inquiry is a lived experience-oriented method, while analysis conducted during this type research has an interpretation character (hermeneutics) (Creswell, 2007). There was no objective to

link these experiences to any theoretical and social constructs, but, on the contrary, it has been sought to reveal lived experiences expressed through individual situations. This research reveals “lived experience”, a concept offered by Max van Manen (1990), of young overweight women doing physical activity, and looks into the problem holistically, addressing four dimensions: lived space, lived time, lived body and lived relations. The analysis of young women experiences shows that lived experiences of young women in the situations of doing physical activity at sports clubs confirm not only just the fact that we are always bodily in the world, but also leads to the relation between the body behaviour and appearance and type of someone’s gaze (critical or admiring). **Conclusions.** The interpretive insights concern four human situations, which may have a shape of the following statements: “I feel embarrassed under their gaze”, “I feel myself destined to be different”, “I feel myself estranged” and “What should I do hold my ground?”.

Keywords: sports club, young overweight women, lived experience.

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BEHAVIOUR STRATEGIES OF THE UNIVERSITY PHYSICAL EDUCATION PROGRAM STUDENTS HAVING EXPERIENCED FAILURE DURING THEIR PEDAGOGICAL PRACTICES

S. Poteliūnienė, R. Balevičiūtė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Pedagogical practices evoke various difficulties for students relating with professional, personal and environmental aspects (Hill & Brodin, 2004; Shoval, Erlich, & Fejgin, 2010). To fight the difficulties, students choose individual strategies. As the activity of Physical Education (PE) at school is specific and different from other subjects, it appears important to provide analysis on the behaviour strategies of students in this program aiming to foresee more effective support and self-assistance means in preparing them for pedagogical practice, as well as in improving the study process. The aim of the research was to provide analysis on the experiences of students enrolled in Physical Education program, disclosing behaviour strategies of those students who have experienced failure during their pedagogical practices. **Methods.** Semi structured interview method was applied to question 15 students enrolled in Physical Education program of Lithuanian University of Educational Sciences, 4th year of studies, after their conducted self-supervised pedagogical practice. For analysis of the research results, Content analysis method was applied. **Results.** Students tended to relate failure, experienced during their pedagogical practice, with unsuccessful PE lesson, the reasons of this being: poor management of the group; inability to get pupils interested in the subject; distrust in own competences; insufficient preparation for the lesson. Three quality categories were established, which define students’ behaviour

strategies in the failure-related situation: self-control, positive attitude towards criticism, change or choice of own behaviour strategies. Students' main decisions related with experienced failure and foreseeing the future steps to avoid similar situation, are defined by four established quality categories: recognition of their own mistakes and learning from them, positive attitude towards criticism, student's search and contemplation, choice of appropriate strategies, provision of student's proposals on the practice-related items. **Conclusions.** Students of Physical Education, having experienced failure during their pedagogical practice, choose various appropriate strategies to solve the problem situation and improve future professional activity. The results of this study suggest that improvement of study process should include more strategies and methods aimed at class management during PE lesson. They also manifest students' possibilities to make mistakes and correct them by accepting decisions by themselves.

Keywords: Physical Education studies, students, failure, behaviour strategies.

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EFFECT OF STRENGTH EXERCISES ON COGNITIVE FUNCTIONS (PILOT STUDY)

M. Drozdova-Statkevičienė, N. Masiulis

Lithuanian Sports University, Kaunas, Lithuania

Background. Many researchers have emphasized the role of physical exercise in minimizing decline in cognitive functions, because it diminishes risk for various chronic diseases, reduces anxiety and depression (Cassilhas et al., 2007). Some authors say that not only aerobic, but also resistance exercise can improve cognitive skills (Westcott, 2012). There are few ways to explain it. One of them is better blood flow in the brain which leads to hemodynamic changes facilitating nutrient and oxygen transport important CNS structures associated with learning and memory. These alterations may modify the functioning of central systems, hippocampus, amygdala, medial septum, and entorhinal cortex (Cassilhas et al., 2007). The aim was to identify the load of physical activity that has the greatest impact on cognitive functions. **Methods.** The inclusion criteria for subjects were: age up to 30 years, they should be physically inactive, free of neurologic, physical, psychiatric illness. The sample included seven participants (mean age 25.4 years). They performed squats with a barbell using Smith Weightlifting Machine. For cognitive assessment we used Automated Neuropsychological Assessment Metrics version 4, for motivation and thinking content assessment - questionnaires. Subjects were tested before and after training. For the analysis of cognitive tests, the throughput variable was selected. **Results.** In the learning and memory tasks, after the physical load of 10 sets x 10 rep., results improved by 56.6% and 38.4% respectively. In the mathematical processing task, after 8 and 10 sets x 10 rep., the results improved by 26.4% and 71.5% respectively. After exercises, participants became livelier, more energetic, active, and alert their somnolence disappeared. Task content was interesting, they wanted to perform the task better than others; they were very disappointed if they failed to perform the task; they wanted to be among the best; they were highly motivated to perform this task. The analysis of thinking content during the task showed that participants thought about: how others performed this task; about the level

of their skills. **Conclusions.** 1. We observed that applying exercise intensity of 10 sets x 10 repetitions the greatest impact was on the following cognitive functions: learning, memory and mathematical processing. 2. We observed that participants were motivated to perform the task and after physical load they became more energetic and disappeared somnolence.

Keywords: cognitive function, strength exercise, physical activity.

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PHYSICAL ACTIVITY AND HEALTH OF VILNIUS UNIVERSITY STUDENTS

J. Armonienė, T. Gritėnienė, R. Kniukšta, L. Samsonienė

Vilnius University, Vilnius, Lithuania

Background. Physical activity and capacity are directly attributable to the person's mental and physical health. Studies have found that depressed people are less mobile, but by means of aerobic and strength workouts symptoms of depression are greatly diminished (Paluska & Schwenk, 2000). Lithuanian scientific studies have provided evidence that students perceived their health as not good enough, but most of them complained of having a variety of ailments such as nervousness, insomnia, headaches, etc. (Kriauciūnienė, Barkauskienė, & Petkeviciene, 2013). The aim of the present study was to evaluate the students' daily physical activity in association with their physical capacity. **Methods.** The participants of the instantaneous research were students from Vilnius University. A random sample was formed in the following way: 100 respondents representing various faculties were taken including 50 girls and 50 boys. During the study, their physical fitness was measured on the basis of the Eurofit tests, while their physical activity was evaluated by means of the IPAQ questionnaire. **Results.** The results obtained during the Eurofit test provided the following data: the average index of physical capacity characterized as "very good" was observed after the assessment of the girls' static body balance that was 38 s, the isometric strength endurance was 85.5 seconds, while the static strength of the hand – 35.65 kg. The average male ratio characterized as "very good" was defined by their dexterity of 16.9 s. We found that physical activity of students who participated in our study ranged from 2591 ± 354 MET minutes per week. This is the average level of physical activity, defined as a half an hour of daily strenuous exercise. **Conclusions.** The average physical activity and insufficient flexibility of the respondents determine the dubious quality of stereotypical functional movement performance. Thus, while analysing human physical capacity and physical activity it is recommended to include the testing of stereotypical functional movement performance and motivation for physical activity.

Keywords: students, physical activity, physical fitness, health.

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ANXIETY PECULIARITIES BEFORE COMPETITIONS OF JUDO WRESTLERS AGED 15–16 AND 17–18

Š. Šniras, V. Gerdauskaitė

Lithuanian Sports University, Kaunas, Lithuania

Background. Results in sports depend on trained mental peculiarities of athletes and the forms they control, such emotional states as anxiety (Molina– Escobar, Ruiz-Rodriguez, Garcia-Gutierrez, & Franchini, 2015). Importance of competitions, strength of competitors, quality of competition organization, coach and other people's behaviours, individual peculiarities of athletes are decisive factors for young athletes' feeling of anxiety. Somatic anxiety is characterized as interpretation of self-excitement while cognitive anxiety is related to athlete's imagination (feeling of shame because of the lost competition). Anxiety experienced before competitions does not allow athletes to be well disposed for competitions, to concentrate and to achieve a desired result (Serhat & Yıldız, 2013). **Methods.** During the study CSAI questionnaire (Martens, Vealey, & Burton, 1990), was applied to evaluate cognitive and somatic anxiety as well as emotional state before competitions. Research participants were 96 cadets and junior judo wrestlers. According to age they were divided into two groups: 51 athletes were 15–16 years old judo wrestlers (cadets) and 45 athletes were 17–18-year-old judo wrestlers (juniors) from different towns of Lithuania participating in cadet and junior wrestling championships. **Results.** Student's *t* test results revealed that before competitions judo wrestlers aged 15–16 felt higher levels of cognitive anxiety than 17–18-year-old wrestlers. Judo wrestlers aged 15–16 evaluated the level of anxiety by 23.1 ± 5.13 points, while wrestlers aged 17–18 assessed it by 20.4 ± 5.04 points. The results showed that athletes aged 15–16 and athletes 17–18 statistically significantly differed according to the cognitive level of anxiety ($t = 2.86, p < .05$). The level of somatic anxiety of young judo wrestlers showed that 15-16-year-old wrestlers evaluated the level of somatic anxiety by 17.1 ± 4.06 points, 17–18 old wrestlers – 19.2 ± 6.32 points. The results showed that 15–16-year-old judo wrestlers experienced lower levels of somatic anxiety before competitions than 17–18-year-old athletes. The level of somatic anxiety of judo wrestlers aged 15–16 and 17–18 statistically significantly differed ($t = -1.93; p < .05$). **Conclusions.** The level of cognitive anxiety of judo wrestlers aged 15–16 was evaluated statistically more favourably than that of 17–18-year-old athletes, while the level of somatic anxiety of judo wrestlers aged 17–18 was evaluated statistically significantly ($p < .05$) better than that of 15–16-year-old athletes.

Keywords: cadets and juniors judo wrestler, somatic and cognitive anxiety.

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QUALITY OF LIFE AND SPECIAL NEEDS IN FAMILIES WITH PRESCHOOL- AND SCHOOL-AGED CHILDREN WITH AUTISTIC DISORDERS

M. Bencion Malkin¹, L. Samsonienė¹, D. Karanauskienė²

Vilnius University, Vilnius¹, Lithuania

Lithuanian Sports University², Kaunas, Lithuania

Background. Family quality of life can be perceived as follows: the family achieve high quality of life when all their needs are met, when they enjoy spending their time together and when they can engage in activities which are important to them (Van Beurden, 2011). Autistic disorder is considered to be one of most complicated disorders of child development which can significantly affect the child's mental, social and communication abilities (Dardas & Ahmad, 2014). Research aim was to investigate the special needs of families with children of preschool and school age with autistic disorders. **Methods.** The study was carried out in June – November, 2015. The sample included 100 respondents aged 36 ± 5.9 years; their work experience was 12.7 ± 6.5 years, they had 2.0 ± 0.9 children aged 6.9 ± 2.8 years. Family quality of life was investigated applying the questionnaire survey method, and the family needs were established using the semi-structured interview method. Research data were processed using Microsoft excel programme and SPSS package. **Results.** Research findings show that most favourable evaluations were given to interactions and education in the family, but emotional well-being was evaluated only moderately, by 2.9 points. This shows that the emotional well-being of the family was quite poor. In the families with preschool-aged children with autistic disorders, greater emotional well-being was associated with higher family interactions ($p < .05$); however, in the families with school-aged children with autistic disorders this relationship was not statistically significant ($p > .05$), i.e. greater emotional well-being was not associated with a higher family interactions. **Conclusion.** Parental education had an effect on family emotional well-being. Stronger emotional well-being was more experienced by parents with vocational education. Despite different social status of parents, the number of children and their age, respondents' quality of life did not differ and the family special needs were similar, but meeting those needs was insufficient.

Keywords: family quality of life, autistic disorder, special needs.

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FOREIGN LANGUAGE ANXIETY IN STUDENT LEARNING

A. Lileikienė, L. Danilevičienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Anxiety includes uncomfortable feelings when learning or using the new language. It continues to exist in the university foreign language classroom as well. A number of foreign language students report feeling anxious about language learning. There is a considerable amount of research indicating that foreign language anxiety (FLA) is a reality for many students. Horwitz, Horwitz and Cope (1986) were the first to conceptualize FLA as a unique type of anxiety specific to foreign language learning. Their theoretical model of FLA plays a vital role in language anxiety research. Other authors (Ghadirzadeh, Hashtroudi, & Shokri, 2012) also point out that in order to make an impact on motivation in EFL (English as a Foreign Language) learning it is important to recognize and remove anxiety which usually reinforces demotivation in foreign language learning and hence leads to undesired learning outcomes. Moreover, it was confirmed that the unwillingness to study a foreign language or even failure in meeting the requirements of the university programme was determined by anxiety as the most demotivating factor in learning a foreign language at the university level (Lileikienė & Danilevičienė, 2015). Research aim was to investigate the foreign language anxiety in the classroom context in relation to its effect on foreign language acquisition as well as to design recommendations of how to reduce or exclude foreign language anxiety from the university foreign language classroom. **Methods.** The research was conducted in January-February of 2016. The Foreign Language Classroom Anxiety Scale developed by Horwitz, Horwitz, and Cope (1986) was used. The questionnaire consisted of 5 statements about the respondents' general background and of 33 statements which were evaluated in the Likert scale from 1 to 5 by the research participants. The research sample involved 200 first and second year students of Lithuanian Sports University (60% females and 40% males). **Results.** The research analysis revealed that the respondents generally feel anxious speaking in the language class, making mistakes and being corrected by the teacher, worrying about the consequences of failing foreign language class and speaking with native speakers, thinking that other students speak better than they do, and being afraid of being laughed at, etc. The majority of the research participants (70%) panicked to speak without preparation and get nervous when asked questions without preparation (this does not depend on the level of their knowledge); 50% of the respondents thought about things that are not related to the course. Only 10% of the respondents felt at ease during tests. Here the correlation between the students' level of knowledge and their feeling of anxiety was established: students of lower level (A2 and B1) tended to feel higher levels of anxiety. However, 15% felt confident when speaking in the foreign language class and 40% were not afraid to be corrected by a teacher. Moreover, female participants of this study tended to exhibit higher levels of foreign language anxiety. They panicked to speak without preparation and got nervous when asked questions without preparation more often than male participants ($p = .025$), they were more nervous speaking with native speakers ($p = .004$), got upset when they did not understand what the teacher was correcting, ($p = .013$), felt tense and nervous in the language class than in other classes, and even experienced physiological reactions (heart pounding and trembling, ($p = .007$)). **Conclusions.** Foreign language anxiety proved to be a powerful predictor for demotivation in foreign language learning and aggravated acquisition of foreign languages. For the purpose of improving students' performance in English, it is necessary for language teachers as well as

learners to take measures to alleviate anxiety levels. Setting realistic and achievable goals, building a relaxing classroom environment, sharing language learning experiences and feelings, providing more chances to learners to use the language, encouraging and praising learners often, and so on, have been recommended to be effective in reducing anxiety levels. Therefore, these measures might help to reinforce self-esteem and promote intrinsic motivation of students to achieve better results in the foreign language classroom and, thus, in the overall goal of studies in the student learning process.

Keywords: foreign language anxiety, language acquisition, student learning.

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DYNAMIC BALANCE TESTS FOR ELDERLY PEOPLE

V. Ševčenko, V. Lāriņš

Latvian Academy of Sport Education, Riga, Latvia

Background. Balance is a characteristics involved in the basis of movement formation. Preserving balance for elderly people can contribute to correct adaptation and precise execution of exercises, support health preservation and prevent falling hazards. Instructors conducting practical activities for elderly people should choose appropriate tests to evaluate the dynamics of balance properly. The aim of the research was to determine middle-aged and elderly people's indicators of the dynamic balance.

Methods. The subjects of the research were 27 middle-aged and elderly (50-60 years old) people taking part in physical activities during a period of 12 weeks. To test the dynamic balance, such tests as "Star", "One leap in the distance on the left – right foot", "Jumps in 10 m distance on the left – right foot", as well as anthropometrical tests were used. **Results** of the dynamic balance for people who attended physical activities for 2 years and more were as follows: Twelve participants took part in the test "One leap in the distance on the left – right foot", three with above the norm BMI stating that they were physically fit. The mean of BMI in this subgroup was 27.3. The mean of the test result on the left foot was 63.5, on the right – 70.3. The mean of the results in the test "Jumps in 10 m distance on the left – right foot" on the left foot was 11.2 and on the right – 9.4. Fifteen people declined participation in the tests involving jumps on one foot stating that they were afraid of injuries. All 27 participants took part in the dynamic balance test "Star", and the mean of the result on the left foot in the second testing was 0.64 m $\pm$ 0.02 (0.01 m mean increase comparing with the first test); the mean of the result on the right foot in the second testing was 0.69 m $\pm$ 0.02 (0.02 m mean increase comparing with the first test). Assessing the body mass index (BMI) of 27 participants, nine (33.3% of the group) had normal (< 25) estimation, the mean of BMI for this group was 24.0; thirteen participants (48.1% of the group) had increased BMI (> 25 , the mean 27.1); 5 participants (18.5%) had the 1st and 2nd degree obesity (BMI > 30 , the mean 34). The

dynamic test results were better for the participants with normal body mass indices, but lower for the ones with higher BMI. **Conclusion.** Analysing body mass index of the group it was noticed that the biggest part of the group had increased BMI. Evaluating the test results of the participants, it can be concluded that most appropriate test for the dynamic balance for elderly people is "Star". Using this test coaches can follow elderly people's dynamic balance. The tests "One leap in the distance on the left – right foot", "Jumps in 10 m distance on the left – right foot" are not recommended for elderly people. The dynamic tests - jumps on one foot are physically more difficult, they may cause fear, and thus results will not be objective. Even in the case when the physical form of participants is good, results can be inaccurate due to the fear of injuries.

Keywords: dynamic balance, anthropometry, middle-aged and elderly people.

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INFLUENCE OF DEVELOPMENT OF PHYSICAL FITNESS SELF-CONTROL (PFS) ABILITIES ENCOURAGED DURING PHYSICAL EDUCATION CLASSES ON JUNIOR SCHOOL-AGE BOYS' PHYSICAL ABILITIES

V. Kontautienė

Klaipėda University, Klaipėda, Lithuania

Background. Physical education is a means to improve physical fitness and health as systematically developed physical abilities of children profoundly affect bodily functions and systems. Still, conducted studies demonstrate that attitudes, promoting healthy lifestyle and exercising, do not become a part of children's value system and a superficial attitude of learners, especially boys, towards health and lack in self-control abilities is one of the key factors influencing many body and mental diseases. Current situation invites to search for effective ways to educate children during physical education classes. Only being aware of an internal need to grow physically and having physical fitness self-control (PFS) abilities, children will be able to become physically active, continue such activity individually and improve own health, thus making self-control one of the factors improving physical fitness. Research aim was to support the influence of development of self-control abilities on physical abilities among junior school-age boys (age 10 to 11) during physical education classes. **Methods:** analysis of scientific and methodological literature, pedagogical experiment, testing, analysis of mathematical statistics (data transformation function, Pearson's product-moment correlation coefficient), repeated measures *t*-test, independent samples *t*-test (Student's *t*-test), method of descriptive statistics: arithmetic mean, standard errors and deviations, growth rates. The pedagogical experiment was carried out with the 4th grades from the schools of general education in Klaipėda, Kaunas and Raseiniai and took one school year to complete (2011–2012). The research sample included 90 school-age boys: experiment group ($n = 45$) and control group ($n = 45$). Following the "Experimental program for development of self-control and physical abilities", the experimental group (E) was given additional activities, while the control group (C) only completed the tasks complying with the physical education program, developed for schools of general education. The experimental program consisted of theoretical knowledge pertaining to physical fitness self-control, its components, impact of self-control abilities on organizing a person's activities, development of physical abilities, monitoring of own behavior and actions and improvement during

physical education. Practical section presented specific exercises for development of self-control and physical abilities, integrated into physical education classes. The learners were provided with two types of practical activities: 1) exercises and games; 2) workbook, where the learners entered information on their self-control and completed homework assignments. The testing method was used to identify a change in physical abilities (flexibility, explosive strength, agility, speed, balance, abdominal muscle strength and endurance). The tests were developed based on Lithuanian population physical fitness testing and physical condition evaluation methodologies (2007) and Lithuanian physical culture programme 'To Grow and to Strengthen' (2004). Research participants were tested twice – prior to and after the experiment. **Results.** Positive influence of the program for development of PFS abilities were observed on physical abilities of the experimental group participants. Five out of six physical abilities improved statistically significantly among the boys: flexibility ($p < .001$), standing long jump ($p < .001$), agility ($p < .05$), speed ($p < .01$), abdominal muscle strength and endurance ($p < .001$). Weak, however statistically significant trend, was observed which supports the idea that learners with better-expressed PFS abilities also exhibit some more advanced physical abilities. Identified linear correlations demonstrate a connection between the following PFS abilities and physical abilities: flexibility, explosive leg strength, balance, abdominal muscle strength and endurance. Thus, development of self-control abilities influences improvement in physical abilities. Improvement in physical fitness self-control abilities encouraged learners to monitor their body's reaction (pulse, respiratory rate, weariness, efforts and etc.) to a physical load, critically judge the level of their physical activity during the classes, motivated the experiment's participants to exercise and become more physically active. **Conclusion.** The conducted research has supported the hypothesis that development of physical fitness self-control abilities during physical education classes positively influences development of physical abilities among junior school learners (age 10 to 11).

Keywords: physical fitness self-control (PFS), junior school-age boys, physical abilities.

INFLUENCE OF MUSIC ON SPORTS CLASSES

I. Dravniece, I. Upītis, A. Propošina

Latvian Academy of Sport Education, Riga, Latvia

Background. Many studies have shown the beneficial effects of music on people. It is proved that the music tune can stimulate the growth and development of all living beings. People's physical, emotional and social development can enhance diverse musical pursuits - games, dances and songs, listening to music, playing the musical instrument. Hypothesis: Using music in sports classes influences children's emotions improving exercise performance. The aim of research: Evaluation of the process in sports classes with music. Research subject: Children of Form 2. **Methods:** Analysis of scientific literature, pedagogical experiment, questionnaire of sports teachers. **Results.** The questionnaire reflects the Latvian sports teachers' use of music in sports classes. It shows: 85% of sports teachers consider that music is necessary in sports classes; 92% of respondents have used music in their sports classes, depending on the objective and the tasks, parts of the class, as well as of the given exercises; 8% of the respondents do not use music in general and believe that music is a nuisance for both the teachers and the children. During the experiment we created conspectus for Form 2 – without music and with music. We prepared theoretical background for music application and successfully conducted practical sports classes. After sports classes children expressed their opinions in an understandable way by drawing emotional symbols. Comparing children's emotions after sport classes with and without music, it was a visible

difference among them. After Class without music 73% of the children drew happy smiley, 18% – sad face and 9% – neutral. After Class with music 95% of the children rated happy smiley, 5% of children expressed a neutral attitude. **Conclusions.** Observing the research problem from the point of view of the teachers and children, in both cases we find a positive evaluation. Also, the theoretical analysis of literature tells about the positive effects of music on people. However, we must take into account the teachers' opinion that music in sports classes should be targeted and planned. Overall, musical selection is very important. Music creates positive emotions and thereby has an effect on physical performance.

Keywords: children, music, sports classes.

BEHAVIOUR STRATEGIES OF THE UNIVERSITY PHYSICAL EDUCATION PROGRAM STUDENTS HAVING EXPERIENCED FAILURE DURING THEIR PEDAGOGICAL PRACTICES

R. Balevičiūtė, S. Poteliūnienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Pedagogical practices evoke various difficulties for students, relating with professional, personal and environmental aspects (Hill & Brodin, 2004; Shoval, Erlich, & Feigin, 2010). To fight the difficulties, students choose individual strategies. As the activity of Physical Education (PE) at school is specific and different from other subjects, it appears important to provide analysis on the behaviour strategies of the students of this program, aiming to foresee more effective support and self-assistance means in preparing them for pedagogical practice, as well as in improving the study process. The aim of the research was to provide analysis on the experiences of students enrolled into Physical Education program, disclosing behaviour strategies of students who have experienced failure during their pedagogical practices. **Methods.** Semi-structured interview method was applied to study 15 students enrolled into Physical Education program of Lithuanian University of Educational Sciences, 4th year of studies, after their conducted self-supervised pedagogical practice. For analysis of the research results, Content analysis method was applied. **Results.** Failure experienced during their pedagogical practice is related with unsuccessful PE lesson, the reasons of this being: poor management of the group; inability to get pupils interested in the subject; distrust in own competences; insufficient preparation for the lesson. Three quality categories were established, which define students' behaviour strategies in the failure-related situation: self-control; positive attitude towards criticism; change or choice of own behaviour strategies. Students' main decisions, related with the experienced failure and foreseeing the future steps to avoid similar situation, are defined by established four quality categories: recognition of own mistakes and learning from them, positive attitude towards criticism, student's search and contemplation, and choice of appropriate strategies, provision of student's proposals on the practice-related items. **Conclusions.** Students of Physical Education, having experienced failure during their pedagogical practice, choose various appropriate strategies to solve the problem situation and improve future professional activity. The results of this study presume that improvement of study process should include more strategies and methods aimed at class management during PE lesson. They also suggest student possibilities to make mistakes and correct them by accepting decision by themselves.

Keywords: physical education studies, students, failure, behaviour strategies.

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EXPRESSION OF PERSONAL COMPETENCE IN YOUNG ATHLETES

A. Janauskas

Lithuanian Sports University, Kaunas, Lithuania

Background. The aim of the research: to discuss the features personal competence in young athletes. Personal competence in the present research is regarded as a combination of self-awareness and an ability to build proper self-image for others (Halász, Michel, 2011). This includes self-confidence, stress management, and ability to collaborate. **Methods.** The personal competence of young athletes – school learners actively involved in sports (involved in athletics by attending sport schools and clubs) was measured using the R. Voitkevič (2010) questionnaire. This method allows to measure three components of the personal competence: self-confidence, stress management, and collaboration. Cronbach's alpha was used as a measure of the questionnaire's scale internal consistency. It was identified that Cronbach's alpha values for individual scales were 0.71; 0.76; 0.69. Statistical hypotheses were tested using the Chi-square test. The research was conducted in 2014. The research (independent random) sample consisted of 129 school learners at the age of 17–18, attending athletics schools/clubs. **Results.** Results have demonstrated that high self-esteem is significantly dominant ($\chi^2(2) = 5.98$; $p < 0.05$) among children, attending athletics schools/clubs. Obtained results have also discovered that well-developed stress management abilities in school learners, actively involved in sports at the athletics schools/clubs, are statistically significant ($\chi^2(2) = 6.01$; $p < 0.05$). **Conclusion.** Positive influence of participation in sports has been revealed on a personal competence of children attending sport schools / sport clubs.

Keywords: personal competence, young athletes.

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GENDER DIFFERENCES IN PHYSICAL APPEARANCE PERCEPTION AMONG VIII GRADE PUPILS

S. Derkintienė, A. Lukoševičius

Klaipėda University, Klaipėda, Lithuania

Background. Previous studies have shown that dissatisfaction with the body image among girls often reflect a desire to be thinner, among boys – desire to be bigger, taller, become more muscular and have a nice body shape. It is known that adolescents have a very precise body image, which is related to their own perception. However, there is a gap in research, analyzing body image aspect, i.e. evaluation of specific body image parts. Hypothesis – there is a difference in satisfaction level of specific body image parts among 8th grade pupils; body image assessment of 8th grade pupils is different gender-wise. Research aim – to establish gender differences in body image perception among 8th grade pupils. **Methods.** The research has been conducted during the months of March-April-May of 2012. A random probabilistic sampling method was used with 8th grade pupils from 24 general education schools, located in various cities and towns around Lithuania. The research sample was comprised of 1347 (boys

n = 674, girls n = 673) 8th grade pupils. To perform the diagnostic analysis the author designed a body image perception questionnaire, composed based on V. Rittner (1986), R. Jankauskienė (2001), A. Zaborskis et al. (1996), A. Zaborskis, J. Makari (2001), R. Russell (2004), W. D. Brettschneider, T. Kleine, G. Klimek (2003), D. M. Garner (2004), A. Miškinytė (2011), questionnaires. **Results.** Results of the present research allows to conclude that respondents are more dissatisfied with their body image parts, which are influenced by adolescents' phenotype. i.e. stomach, shoulders, legs, thighs, hips, buttocks, waist, shin, breast ($p < 0.001$). Gender differences in body image perception revealed that girls tend to be more dissatisfied with their facial features ($p < 0.001$), nose ($p < 0.001$), cheeks ($p = 0.003$), facial skin ($p < 0.001$), hair ($p = 0.001$), breasts ($p = 0.004$), waist ($p = 0.001$), stomach ($p < 0.001$), legs ($p = 0.001$), hips ($p < 0.001$), thighs ($p < 0.001$), shin ($p < 0.001$), buttocks ($p < 0.001$), feet ($p < 0.001$), naked body ($p < 0.001$), body shape ($p < 0.001$), and body weight ($p < 0.001$). **Conclusion.** Differences in body image perception among 8th grade pupils depend on a gender. i.e., girls comparing to boys ($p < 0.001$), tend to be more dissatisfied with their body image.

Keywords: Physical appearance, adolescence, body weight, body build, body shape.

POSSIBILITIES OF EVALUATING THE CREATIVITY OF SPORTS CLASSES IN THE THIRD GRADE

A. Abele, I. Immere

Latvian Academy of Sport Education, Riga, Latvia

Background. In the EU's educational sphere it is emphasized that the school's responsibility is to provide pupils with an education which will improve their abilities to adapt to the ever growing global and competitive environments, where creativity, initiative and learning skills will play just as big a role as having the specific knowledge required in the particular matter. Sports classes in primary school open up possibilities for developing the child's personality, not only physically, but also intellectually, but a creative approach in implementing the contents of sports classes promotes motivation in students as well as interest and physical activity. Taking into account the age attributes of earlier classes, that their concentration abilities for a monotonous work is minimal, sports classes also needs to have variety and needs to be interesting, which can be achieved with the implementation of different nonstandard elements (Spuriņa, 2005). The aim of this research was to analyse creativity criteria of sports classes and to develop an evaluation system for the third grade according to these criteria. **Methods:** theoretical analysis of literature sources and documents. **Results.** A creative activity does not mean ignoring tradition, but rather the accumulation of positive experiences, searching for new solutions to improve the deductive ability (Dobrescu, Mihaila, & Rata, 2013). In a study about the different creative approaches that coaches take (Lapenienea & Dunciene, 2014), three creative activity types are described – live creativity, predictable creativity and stimulating creativity. In the year 2015 multiple creativity lessons were developed, 15 evaluation criteria were selected and a criteria self-evaluation was done, as well as a SVID analysis. In general it was concluded that teachers, who self-evaluated in correlation to the developed criteria, had a higher chance in reaching an accurate conclusion about what pupils receive from a creative sports lessons, what are the strong and weak suits of creative lessons. It is possible to accurately determine the risks, which make sports teachers avoid leading such creative sports lessons. **Conclusion.** The developed criteria allow to critically evaluating sports classes and their environment, thus allowing teachers to analyse specific inconsistencies in their work and in general improving the learning process of creative sports classes.

Keywords: Sports class, creativity, evaluation criteria of creativity.

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PSYCHOLOGICAL AND HEALTH BENEFITS OF CROSSFIT AND FITNESS

K. Budzyńska

University of Szczecin, Szczecin, Poland

Background. CrossFit is strength and stamina training program, which is based on the growth of the ten most important strength abilities recognized to strengthen the power of muscle movement in real life. Fitness is a kind of recreational gymnastics. It is not just physical exercise undertaken in free time. It is also conscious and deliberate movement impacts on the physical, mental, emotional health. The aim of the study is to find out: 1. what kind of psychological and health benefits are related to CrossFit and fitness participation in the opinion of participants? 2. Which sample group (fitness or CrossFit participants) will score higher in satisfaction of life? **Methods.** The study sample consisted of 30 CrossFit participants and 30 fitness participants. For the purpose of the study, we used Self Made Questionnaire of Psychological and Health Benefits and SWLS Satisfaction Life Scale. **Results.** In both kinds of activities there were some psychological and health benefits. Some differences between groups appeared. Life's satisfaction seemed to stay on quite the same level in both groups. No significant differences appeared ($p > .05$). **Conclusion.** Both kinds of participants- CrossFit and fitness knew quite a lot about psychological and health benefits connected with their physical activity. The most common psychological benefit was positive mood after exercise. Health benefits are, for example, strengthening of muscles, improvement of blood circulation of the body, etc. Any kind of physical activity seems to play big role in the psychological and mental health of participants, increasing their life satisfaction.

Keywords: CrossFit, fitness, health and psychological benefits.

SECURABILITY AND A HUMAN BEHAVIOUR IN STRESS SITUATIONS: LITERATURE OVERVIEW

J. Bulins, A. Fernate

Latvian Academy of Sport Education, Riga, Latvia

Background. Stress level can be stated according to several criteria, but most often researchers use the blood biochemical analysis to state stress hormone (adrenaline, noradrenaline, cortisol and prolactine)

level in definite stress situations (Ali & Pruessner, 2012). Different types of stressors had varying effects on the neuroendocrine indices. The degree of neuroendocrine changes observed may have significant implications for subsequent responses to stress (Ill, Wang, Mason, & Southwick, 2000). Physical activity plays a key role in the control of neuroendocrine, autonomic, and behavioural responses to physical and psychosocial stress. However, little is known about how the level of physical activity modulates stress responsiveness. Reduced reactivity of the autonomic nervous system to psychosocial stress is characteristic in trained individuals (Rimmele, Seiler, & Marti, 2009). Facilitation of securability can reduce stress level and manage a human behaviour in stress situations. **Methods.** We searched literature in databases ScienceDirect and Dawsonera. **Results.** We searched the information for keywords: cortisol concentration and human security (775 results in ScienceDirect and Dawsonera 223 results), stress management and cortisol concentration (10 352 results in ScienceDirect and 299 results in Dawsonera), neuroendocrine, autonomic, and behavioural responses to physical and psychosocial stress (1387 results in ScienceDirect and 747 results in Dawsonera). **Conclusion.** To evaluate a model for securability, improvement for people in stress situations is important to check changes in neuroendocrine indices during physical activities as models for stress situations.

Keywords: securability, stress situations, neuroendocrine indices.

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THE RESULTS OF PILOT STUDY OF THE POTENTIAL TOURISTS' ATTITUDE TO SPORTS ANIMATION: CASE STUDY FOR BELARUS, LITHUANIA, LATVIA

A. Gatattullin

Belarusian State University of Physical Culture, Minsk, Belarus

Background. Tourism is one of the rapidly developing areas of economic activity in the modern world. Its success not least depends on the well-organized animation, which represents a wide range of programs carried out by corresponding specialists and aimed at organizing people's leisure time outside their work and home activities [1]. Depending on the location – at a hotel, convalescent and health centres, on excursion trips, at a healthcare facility, at “non-organized” leisure in the countryside or in the park, etc., – animation activities can pursue various targets including advertising, sports, entertainment, recreation, healthcare, introduction to culture, relaxation, education, compensation, and adaptation; they can be daytime and night-time, for adults and children; they can be carried out in various forms [2]. The effectiveness of a particular animation activity depends not only on the skill of the animator, but also on how such an activity corresponds to customer's requests and capabilities. This primarily relates to

sporting animation. In this context, obtaining feedforward information from potential customers on their preferences in sporting animation is quite topical. The analysis of specialized literature gives reason to identify several approaches to the classification of sporting animation types, yet almost all types of sporting animation have the following features [6; 7]: combine well-thought-out plot and improvisation; are of game nature; suggest adaptation of already known games to specific needs bearing in mind the age of customers, their physical condition, the number of players; depend on the technical capabilities of a particular hotel and its focus – family hotel, hotel for extreme tourism, youth hostel, a hotel for the “third-age” persons; take into account national peculiarities of customers and their religious beliefs. The purpose of this article is to present the results of a sociological pilot case study aimed at investigating the level of interest among potential tourists from Belarus, Lithuania and Latvia in types and forms of sporting animation offered in domestic and foreign hotels today. The object of study is sporting leisure tourism support; the subject of study is the role of sporting animation in the process of organized leisure for travellers. This study had the following tasks: to find the level of potential tourists’ awareness of the forms and types of sporting animation; to determine the importance of physical perfection among other purposes of tourist trips pursued by Belarusians, Lithuanians and Latvians; to evaluate the extent of tourists’ enthusiasm about the most popular kinds of sporting animation. **Methods.** Pilot study using questionnaires was held from November 2015 to February 2016. The contingent of respondents included: visitors of travel industry exhibitions; potential customers of travel agencies; actual customers of travel agencies who have bought travel packages; students of the Institute of Tourism at the Belarusian State University of Physical Culture. The study involved 218 respondents from Belarus, 102 respondents from Lithuania, and 96 respondents from Latvia. **Results.** The survey results showed the following. A notable majority of tourism service consumers is formed by young and middle-aged males, who are economically active, i.e., earning money by their own labour or having extra income in their spare time. All respondents are socially responsible and mature, which is why the representatives of vulnerable social groups – the retired and unemployed – are rare among the consumers of tourism services. **Conclusions.** The results of the pilot study questionnaire data processing allow us to make some preliminary conclusions. 1. The survey respondents are socially active, able-bodied people who are able to estimate their own physical capabilities and risks to their health when having sports loads of varying complexity. 2. Potential tourists are most greatly interested in vacations in Europe and holidays in their own country, and in the latter position, Belarusian respondents are behind those from the Baltic countries, which proves that there is the need to develop domestic tourism more rapidly. 3. The respondents’ expectations of future tourist trips are very diverse and vary from exploring the sights to gaining new friends and good physical shape. In this regard, sporting animation must be harmoniously incorporated into other forms of tourism. 4. Respondents tend to pay attention to the available animation programmes within the tour and take part in them in the greater or lesser extent. It is therefore desirable to provide sporting animation with varying degrees of physical activity, as well as various forms of payment for the events – animation programmes are included in the original tour price, customers pay extra in the travel agency in case they wish to participate in them, or pay directly at their vacation cite. 5. Respondents are familiar with such forms of sporting and recreational animation as beach volleyball, fitness, aerobics, table tennis. At the same time, such activities as bocce, darts and golf need further promotion and development. 6. The respondents perceived modern sporting animation as a means of health improvement, emotional discharge, and entertainment. That is why they would be happy to take part in sports shows and contests. 7. The respondents prefer collective practices, pay attention to the personality of the animator – age, appearance, physical fitness; in addition, depending on the purpose of leisure trip, they are ready to take part in sporting animation in varying extent. This fact imposes special requirements on the animator, who should be attractive both as a person and a professional; he or she should be ready to offer a wide variety of forms and types of sporting animation activities.

Keywords: sports animation, tourism and recreation.

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PECULIARITIES OF YOUNG SPORTSMEN'S PHYSICAL DEVELOPMENT AND PHYSICAL READINESS IN DIFFERENT SPORTS EVENTS

R. Mėlinis, A. Vilkas

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. When trained consistently, physical abilities of children and adolescents enhance the function of movement, improve the coordination of movements, and facilitate expanding the range of newly-learned movements (Ivaškienė, 2004; Mikalauskas, 2002; Skurvydas & Gedvilas, 2000). However, if the training load of general physical development for children and adolescents is too heavy and does not meet the requirements for future physical training specialization, the inborn abilities in young sportsmen may become weakened, which results in lower sport achievements in the future (Платонов, 2013). Thus it is of vital importance to observe and study, on a regular basis, the situation of physical readiness and dynamics of the processes of adaptation in young sportsmen of different sport events with the aim of guaranteeing smooth development in their physical training. The aim of the present study is to establish and compare the level of physical development and physical readiness of young sportsmen in different sport events (wrestling, boxing, judo). **Methods.** The participants of the research were male adolescents of 15 to 18 years of age: 15 boxers, 16 judo sportsmen, and 14 wrestlers. In the course of the research, the following indicators of physical readiness were measured: height, weight, hand power, time of psychomotor reaction (PRT) and movement frequency (MF) per 10 s. These indicators were also measured: single muscular contraction power (SMCP) (Bosco et al.) and the anaerobic alactatic muscle power (AAMP) (Margarita, Aghemo, & Rovelli). The 10 second test (Quebec test) (Bouchard et al.) was carried out to measure anaerobic alactatic muscle power. The calculations were done with the help of statistical programme SPSS, version 19. **Results.** The analysis of the results revealed that the judo adolescent sportsmen were the tallest ones (180.69 cm), but only the study in the boxers, who turned out to be the shortest in height (173.03 cm), demonstrated statistically significant difference ($p < .05$). In

terms of weight, boxers came at the bottom in the three categories (60.96 kg), and judo sportsmen were the heaviest (88.28 kg), and their mass index was established as statistically reliable ($p < .05$) and bigger than the one of boxers and wrestlers. The hand power of judo adolescent sportsmen was the highest (56.44 kg) and it demonstrated statistically reliable data ($p < .05$) in comparison to the one of boxers. Other tests within the three categories of the tested sportsmen did not give statistically significant differences ($p < .05$). The boxers demonstrated the highest anaerobic alactatic muscle power (AAMP) (14.2 W/kg), and their anaerobic alactatic muscle power 10 s. test (11.88 w/kg) was about the average; their psychomotor reaction time (PRT) (177.33 ms) was the best, but their movement frequency was the poorest. The young judo sportsmen demonstrated the highest single muscular contraction power (SMCP) (23.88 W/kg), but their AAMP was the poorest (13.46 W/kg); their results of Quebec test and psychomotor reaction time (PRT) (182.06 ms) were average. The wrestlers demonstrated the highest maximum power in Quebec test, their movement frequency was the best (82.71 k/10s), but their SMCP (21.87W/kg) was the lowest among the three categories of young sportsmen under study. The investigation revealed that the indicators of physical development in young judo sportsmen were statistically reliably higher than the respective ones in boxers and wrestlers, but the analysis of indicators of physical readiness revealed that boxers and wrestlers demonstrated higher results in physical readiness in comparison with judo sportsmen. **Conclusion.** As statistically significant differences were not established among the indicators, it is possible to assert that the specificity of the sport event does not have much impact on the indicators of physical readiness of young sportsmen of 15 to 18 years of age.

Keywords: physical development, physical readiness, young sportsmen, wrestling, boxing, judo.

OBJECTIVELY MEASURED PHYSICAL ACTIVITY LEVELS, SEDENTARY TIME AND SLEEP DURATION IN 10–12-YEAR-OLD ESTONIAN SCHOOLCHILDREN: INDEPENDENT ASSOCIATIONS WITH BODY COMPOSITION PARAMETERS

E. M. Riso, M. Kull, K. Mooses, A. Hannus, J. Jürimäe

University of Tartu, Tartu, Estonia

Background. Insufficient levels of moderate-to-vigorous intensity physical activity (MVPA), high levels of sedentary time, and short sleep duration have all been associated with higher levels of adiposity among children in recent investigations (1, 2). The contemporary trend is increasing towards insufficient sleep duration among children, which may be connected with sleep-mediated outcomes such as being overweight or obese (3). Sleepiness may result in reduced PA and increased sedentary time (4). The purpose of the present study was to examine relationships between the amount of objectively determined daily physical activity (PA), sedentary time, sleep duration and body composition indices in 10-12-year-old children. **Methods.** 211 children (96 boys and 115 girls) participated in this study. PA intensity and sedentary levels were measured for seven days by accelerometry. Sleep duration was self-reported. Percentage of body fat (body fat %), waist-to-height ratio (WHtR) and fat free mass (FFM) were calculated from measured anthropometric parameters. **Results.** The boys exceeded girls ($p < .05$) in time spent in moderate-to-vigorous (MVPA) and vigorous (VPA) levels, while no differences were seen in sedentary time and sleep duration between genders. Sleep duration, MVPA and VPA had independent negative relation with body fat %, whereas MVPA and VPA had negative relation with WHtR. VPA had positive association with FFM. Sedentary time had positive association with body fat % and negative relation with FFM. **Conclusions.** The present

study suggests that both sleep duration and MVPA are independently associated with body composition parameters. Higher levels of MVPA are associated with lower body fat % and WHtR regardless of sleep duration. Sedentary time is associated with higher values of body fat % and lower FFM independently of sleep duration.

Keywords: physical activity, sedentary time, sleep duration, body composition.

SPORTS INJURIES AND PREVENTIVE MEASURES FOR PHYSICALLY ACTIVE STUDENTS

R. Mikalonytė, E. Kemerytė-Riaubienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. The most common injuries are knee, ankle, hands, muscle, bone fractures, head contusion, back, spinal damage. It is very important to know about preventive measures as they help avoid and / or reduce the risk of injuries. It can be observed that athletes use orthoses, taping bands, protections for face, teeth, special clothing and footwear during the sport. The protection against injuries includes: technical, strengthening, stabilization, stretching, coordination exercises and other means deemed necessary. As indicated in literature, women are at a higher risk of injuries, but in general, injuries are frequent and suffered by many persons engaged in sport. The study intended to find out whether the students athletes suffer many injuries, what kind are they, and what are the steps taken to reduce them. The aim of analysis is to define the injuries inheritance in various sports and their risk factors of Lithuanian University of Educational Sciences students. **Methods:** literature analysis, questionnaire survey, quantitative data analysis. The research objectives are: 1. to find out what sports injuries are suffered by students of Physical Education speciality; 2. to review the students suffered injuries, depending on sports; 3. to discuss what preventive measures and physical therapy programs that are applied during training and competition. The results were calculated on the SPSS program. **Results.** The results showed that students mostly are injured when engaging in amateur sports and playing in team sports and boxing. In most cases their injuries: ligament, muscle lesions, bones fractures. It was found that in most cases athletes, both men and women use mandrels (29% of women and 32% of men) as a preventive measure. Women (12%) more often use supinators and men (18%) – special outfit; 29% of women and 24% men respondents noted that the most effective way to reduce injuries is adequate warm up; 29% of men believe that stretching exercises and 4% of women the better physical preparation can help prevent injuries.

Keywords: injuries, preventive measures, physical education, students.

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THE EVALUATION OF PROGRESS AND ACHIEVEMENT IN PHYSICAL EDUCATION LESSONS FROM STUDENTS' VIEWPOINT

G. Daugmaudienė, L. Trinkūnienė, D. Dunauskaitė, B. Šimokaitis

Lithuanian Sports University, Kaunas, Lithuania

Background. Under the influence of globalization and due to formation of new technological society, education all over the world is experiencing fundamental renovation. Together with new education objectives, new ways of teaching and learning, evaluation of learning results also changes – from learning to be evaluated to assessment helping to learn successfully. In this work we discuss the criteria of assessment in PE lessons in different countries according to student's demands, teachers' experiences, parents' and school community opinion. **Method.** This review examines the research literature concerning causes of assessment of students of physical education from the year 2010 to 2016 applying computer-aided literature search. The keywords used for the electronics search were "assessment" or "students" or "physical education". The main method of our research was logical deductive research literature analysis. **Results.** The analysis gives us opportunity to state, that most countries evaluate students at PE lessons by mark which depends on different aspects, such as, preparation for the lesson, clothing, behavior, efforts, work in the lesson, physical fitness, attendance and others. Some of the counties have credit tests to evaluate PE - they do not have great influence on the average mark, but there are rules which must be obeyed to get the credit test. Countries which do not assess PE – name PE as minor subject, as extra after school activity. **Conclusions.** According to the analysis we can say that no precise and clear criteria exist in evaluating students at PE lessons. Students wish to be assessed by marks for their efforts but not physical fitness. Teachers' opinion is that students should also be assessed by marks, but not for their efforts, but the results of physical fitness at the beginning and the end of every school year.

Keywords: students, physical education, assessment.

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EVIDENCE THAT PROCESS SIMULATIONS IN A PHYSICAL EDUCATION SETTING PROMOTE HEALTH-RELATED PHYSICAL FITNESS AMONG ADOLESCENTS

A. Koka

University of Tartu, Tartu, Estonia

Background. Although higher level of health-related physical fitness during childhood and adolescence is related to healthier physical profile in adulthood, the population data from 27 countries from five continents shows decreasing trend in health-related physical fitness among youth

(Tomkinson & Olds, 2007). The aim of the present study was to examine the effectiveness of a brief theory-based intervention on self-reported frequency of practicing for and actual levels of health-related physical fitness among adolescents in a physical education setting. **Methods.** The intervention adopted a process-based mental simulation technique introduced by Pham and Taylor (1999) and targeted the adolescents' abdominal muscular strength/endurance as one of the components of health-related physical fitness. Adolescents aged 16–19 years ($N = 105$) from nine classes were cluster-randomly assigned to an experimental group, mere-measurement control group, and no-measurement control group. In their regular physical education lessons all participants performed the 1-minute sit-up test at baseline and four weeks later to assess their abdominal muscular strength/endurance. In the middle of the four-week period, participants assigned to the experimental group mentally simulated the process for doing better on the follow-up test relative to the baseline. **Results.** Results revealed a significant effect of the process mental simulation on actual test performance at follow-up, but no effect on self-reported frequency of practicing for the follow-up test. Specifically, adolescents in the experimental group scored significantly higher on the 1-minute sit-up test at follow-up than adolescents in the mere-measurement control group and no-measurement control group. There was no evidence for the mediation of the effect of process mental simulation on actual test performance by psychological measures such as planning, motivation or anxiety. **Conclusions.** Results supported the effectiveness of the process-based mental simulation intervention in enhancing the adolescents' abdominal muscular strength/endurance in a physical education setting, but not in promoting frequency of practicing for the follow-up test. The later may be due to the process mental simulation not increasing the frequency but rather the quality of practicing. This knowledge could help physical education teachers to facilitate adolescents' endeavor in improving their health-related physical fitness.

Keywords: adolescent, cluster-randomized controlled trial, muscular fitness, process mental simulation, school physical education.

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MAIN CHALLENGES IN THE ASPECT OF PARENTAL COMPETENCE IN 2–12 MONTHS AGED INFANT FLOATING

A. Kurmeleva, A. Fernate

Latvian Academy of Sport Education, Riga, Latvia

Background. Nowadays infant floating is becoming very popular because of its beneficial effect on infants' health. Infant floating is an essential part of rehabilitation. It is very important to involve parents in this process; their appropriate actions and knowledge significantly enhance the effectiveness of swimming lessons (Ahrendt, 2002). The main task of swimming professional is to evaluate parental skills and potential to participate in swimming lessons that provide feedback

between children and parents (Fedulova, 2011). Despite all research done in this field, parental competence in infant floating is still not defined. The aim of this work is to evaluate and analyze key challenges related to parental competence in infant floating. **Methods.** This work presents a survey carried out for 15 swimming professionals (physical therapists and coaches), who have daily contact with children aged from 2 to 12 months. **Results.** Problems can be divided into different groups: difficulties with exercise accuracy and correction of mistakes; sense of insecurity in specific environment (swimming pool); disregard of recommendations and difficulties in exercise performing in home conditions; lack of reaction and knowledge of safety regulations according to circumstances. This paper demonstrates main difficulties with infants' parents faced by professionals. Specialists have concluded that actions of parents are very individual and different. There are challenges and obstacles faced by swimming professionals. **Conclusions.** Important conclusion is that professional's task is to find appropriate approach not only for infants, but for parents as well. Development of infant will be more effective if parents understand their actions and are able to perform exercise independently according recommendations of the professional. Work which is done at home with infant is crucial. Parental behavior, knowledge and skills to work independently create parental competence in infant floating.

Keywords: infant floating, parental competence.

THE EFFECTIVENESS OF INTERVENTION PROGRAM TO INCREASE PHYSICAL ACTIVITY AND ITS MOTIVATION AMONG COMMUNITY MEMBERS

A. Emeljanovas¹, L. Dilys², B. Miežienė¹, V. J. Česnaitienė¹

Lithuanian Sports University¹, Kaunas, Lithuania

Kaunas Region Public Health Office², Kaunas, Lithuania

Background. Promotion of physical activity is a priority for health agencies. Behavioural and social approaches are effective, introducing social support for physical activity within communities and worksites. Thus, many approaches lead to acceptable increases in physical activity among people of various ages, and from different social groups, countries, and communities (Heath et al., 2012). **Methods.** The sample included 295 participants from the community of Lithuanian Kaunas region who participated in physical activity program. The video training was broadcasted from Lithuanian Sports University one time per week. The program included 9 training sessions for 1 hour each. The exercising was performed in moderate intensity, most of activities were aerobics. The physical activity level was measured by Godin and Shephard (2011) leisure time physical activity questionnaire and motives to be physically active were measured by MPAM-R questionnaire (Ryan et al., 1997), both before and after intervention program. **Results.** The study results revealed that nine training sessions did not increase physical activity levels for participants. Nevertheless, the motives to exercise increased significantly. The social motives to be physically active increased the most. **Conclusion.** The community based physical activity intervention program had positive effect on physical activity promotion. Study results showed that exercising with other community members could strengthen community relatedness.

Keywords: physical activity promotion, communities, motives to be physically active.

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THE ASSOCIATION OF HEALTH LITERACY WITH PHYSICAL ACTIVITY: A SURVEY OF YOUNG ADULTS FROM LITHUANIA

A. Raslanas, J. Česnavičienė, S. Ustilaitė, A. Kalinkevičienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Regular physical activity and health literacy is an important determinant of health outcomes and major factor for life quality in the 21st century (Warburton, Nicol, & Bredin, 2006; Berkman et al., 2011; Sørensen et al., 2012). The aim of the study was to identify the associations between self-reported physical activity and health literacy among young adults. **Methods.** The methods of the research included the analysis, interpretation and generalisation of scientific literature on the topic of the research, and anonymous questionnaire survey. Self-reported health literacy of young adults was measured using an HLS-EU-Q-47 questionnaire (HLS-EU consortium, 2012). Self-reported physical activity determined by single question “How often during the last month did you exercise for 30 minutes or longer, e.g. running, walking, cycling?” This question has four responses categories (almost every day, a few times a week, a few times this month and never). The survey was carried out in 2014. The sample consisted of 798 young adults aged 18–29 (399 males and 399 females). Statistical analyses were completed by the SPSS software package (version 16.0). The following methods were applied to analyse the research data: descriptive analysis, Kruskal-Wallis tests; p-values less than 0.05 indicate a statistically significant. **Results.** According to the data of our empirical research, only 31.8% of young adults (38.8% men and 24.8% women) were active enough to meet the WHO guidelines. Having calculating the index of general health literacy, it was determined that 16.4% respondents (17.5% men and 15.3% women) had inadequate, 41% respondents (40.6% men and 41.4% women) – problematic, 35.1% respondents (34.8% men and 35.3% women) – sufficient and 7.5% respondents (7% men and 8% women) had excellent general health literacy. The research data showed that the number of young adults, who had inadequate or excellent general health literacy and which were almost every day physically active, was also greater than the number of those, whose had general health literacy problematic or sufficient ($\chi^2 = 12.783$; $p < 0.01$). **Conclusions.** The results of the present study showed a statistically significant association between the level of general health literacy and the self-reported physical activity.

Keywords: physical activity, health literacy, young adults.

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HEART RATE VARIABILITY BIOFEEDBACK (HRVBF) IN PHYSICAL ACTIVITY AND SPORTS PERFORMANCE

I. Nikonovs, J. Grants

Latvian Academy of Sport Education, Riga, Latvia

Background. Latest research in the field of medical sciences shows promising results when HRVBF method is used to reduce symptoms of asthma, anxiety and stress related disorders (Lehrer&Gevirtz, 2014). Although the method shows promising results in medicine, the use of HRVBF in field of sports performance enhancement is used rarely and the working mechanisms how such method improves performance is not fully clear. The purpose of this study was to compare the efficiency of HRVBF in sports performance enhancement in scientific articles. **Methods.** To collect the data different articles were collected and analyzed. Only those articles where HRVBF was used as intervention were selected for analysis. **Conclusion.** Although there is small count with publications and unclear evidence on how such a method works in sports performance enhancement, current results in field of sports science shows promising data in sports performance enhancement and as well as recovery method in athletes.

Keywords: heart rate variability biofeedback, sports performance, recovery

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HEALTH INDICATORS OF PARTICIPATION IN PHYSICAL ACTIVITIES FOR CHILDREN WITH AUTISM SPECTRUM DISORDER

A. Alifanova, M. Champa, A. Klavina, K. Rodionova

Latvian Academy of Sport Education, Riga, Latvia

Background. Researchers develop and implement innovative interdisciplinary education approach addressing challenges of health related participation in physical activities for children with disabilities. While the advances in medicine enable more children with disabilities to participate in the inclusive learning environment, there is evidence that these children have limitations in daily physical activities. It increases the risk to develop secondary health conditions including heart

disease, respiratory problems and emotional disorders that result in deterioration of health status, functional capacity and quality of life. To implement meaningful and safe APA programs, the first step is to assess the present level of body functions and activity potential of children with disabilities. This study aimed to present multicomponent assessment battery to assess physical and movement development skills of children with different functional impairments. The innovative interdisciplinary assessment model was used based on theoretical framework of the International Classification of Functioning, Disability and Health (ICF) containing the three domains of human function: 1) body functions and structures, 2) activities, and 3) participation. **Methods.** The movement development and physical skill assessment was done for 111 children (aged 7–12 years); 40 of them were with intellectual impairments, 10 with visual, 44 with hearing and 27 with physical impairments. The TGMD-2 (Ulrich, 2000) and 5 physical skill tests were selected after the extensive review of the evidence based research literature. **Conclusions.** The study outcomes will provide significant contribution to knowledge on functional assessment of children with disabilities. Also, the project will increase competence level of human resources which will raise the potential for high added value product development leading to scientific evidence based knowledge. The outcomes and conclusions of pilot study will be presented comparing with evidence-based research during the presentation. This study is part of the Norway grant project “Health and social indicators of participation in physical activities for children with disabilities” (No. NFI/R/2014/070).

Keywords: children with disabilities, physical activity, functional assessment.

SELF-DETERMINATION THEORY APPLIED IN EDUCATIONAL ENVIRONMENT: PHYSICAL EDUCATION CURRICULUM

V. Putriūtė

Lithuanian Sports University, Kaunas, Lithuania

Background. In order to determine the student’s motivation for learning, much research has been carried out, but there are still unanswered questions: how often and how much is required to control students (Stipek, 2002), which strategies promoting students’ motivation are more important, how to implement them in teaching for them to be effective (Brophy, 1998). Moreover, self-motivated students manifest themselves both in academic as well as in developmental environment. In terms of the application of self-determination theory in physical education context, it might encourage students to play sports for leisure, and to be physically active throughout entire life. Research in motivation contributes to a consistent lifelong learning, which has to become a key subject in the student’s life (Memorandum on Lifelong Learning, Lisbon, 2000). Psychologists Deci and Ryan (2000) argue that intrinsic motivation is essential for human social development. That is the importance of intrinsic motivation in learning, exercising or engaging in any other activity that self-determination theory emphasizes. Self-determination theory forms one big theory, which combines all of the most important motivation studies and formal theories and summarizes all the typical inner and different (less important) extrinsic motivation of a person (Deci, Ryan, 2000). This theory proves that social and cultural factors greatly influence human activities (e.g. sports activities), its quality, as well as human feelings, initiative. The aim of the research was to reveal which motivation, intrinsic (self) or extrinsic (controlling), when applied by teachers, provides more benefits for students. **Methods.** In this work research by other scientists was analysed and discussed. This was a critical review. **Conclusions.** In order to apply self-determination theory in educational environments, first and foremost, we need to

know what the goals are, what is written in the strategic development documents. In particular, one needs to adapt the curriculum so that each student, according to their needs and resources, would mature as a person, develop civic and national consciousness, acquire competencies necessary for further learning and meaningful, active life in modern society.

Keywords: self-determination, physical education, intrinsic motivation.

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PHYSICALLY ACTIVE SENIOR PUPILS' STRESS REASONS AND APPLIED WAYS OF COPING WITH STRESS: COMPARATIVE ANALYSIS OF GENDER AND CLASS ISSUES

V. Ivaškienė

Lithuanian Sports University, Kaunas, Lithuania

Background. About three-quarters of pupils' stress reasons are linked to school, and adolescent girls claim that they experience stress more often than boys (Thawabieh & Qaisy, 2012). Reasons of stress and coping with it in the last three decades have become especially relevant, requiring quick and effective coping and measures. In order to find effective coping techniques of stress, first of all, it is necessary to determine the exact cause of pupils stress and apply coping techniques. **Methods.** Questionnaire survey and statistical analysis were applied using Stressors Scale approved in Dharvardo University (2009), Cohen and Williamson's (1988) Perceived Stress Scale, Endler and Parker (1990), and Szczepaniak et al.'s (1996) Stress Coping Questionnaire. The research was carried out in X schools of Kaunas in January 2012. Even 360 physically active senior pupils (207 girls and 153 boys, 176 eleventh-formers and 184 twelfth-formers) took part in the study. **Results.** Comparing different gender physically active pupils it was found that girls were experiencing stress more often than boys ($p < .01$) and by personal stressors ($p < .05$). Our study confirmed the Shahmohammadi (2011), Thawabieh and Qaisy's (2012) study results. Our results also showed that girls experienced stress more often than boys. From class aspect to overcome stress eleventh-former physically active pupils more frequently ($p < .01$) felt sorry for themselves, got angry with people who caused them problems and tried to control their emotions, twelfth-formers physically active pupils more frequently ($p < .01$), try to imagine other possible solutions of the situation and take more comfort to friends. **Conclusions.** Adolescent girls experience stress more often than boys and are more exposed to stressors at home ($p < .01$) and personal stressors ($p < .05$). Twelfth-form physically active pupils are more exposed to personal stressors than eleventh-form physically active pupils ($p < .01$): they feel stronger tension of exams, worry about grades. Physically active senior pupils apply stress coping techniques differing in the gender and class aspects.

Keywords: physically active senior pupils, stress reasons, ways of coping with stress.

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PHYSICAL EDUCATION PRE-SERVICE AND IN-SERVICE TEACHERS' PROFESSIONAL IDENTITY AND UNDERSTANDING OF DEMOCRACY

A. Fernate

Latvian Academy of Sport Education, Riga, Latvia

Background. Teacher's quality should be an overall concept that comprises not only knowledge and skills, but also personal qualities – such as respect, care, courage, empathy, and personal values, attitudes, identity, beliefs, etc. – making quite evident the tight link between quality and teacher professional identity (Tateo, 2012). Identity is a socially and culturally constructed self that is formed during the life course by lived experiences and by talking about these experiences with oneself (inner speech) and with others (Swennen, Volman & Essen, 2008). Professional identity as social identity is one of the aspects of individual self-concept that is constructed in the social context through dialogue between self and external reality (Hermans & Dimaggio, 2007). Physical education teachers' education underlines the important role of Quality Physical Education in promoting individuals' rounded development, particularly in terms of inclusive practices, current societal changes related to health, and the importance of encouraging participation in a healthy, active lifestyle (UNESCO, 2015). The aim of the study is to explore differences in the metaphors chosen by physical education pre-service and in-service teachers' and in the understanding of democracy in the physical education lessons within the Council of Europe values context. **Methods.** The research sample: 81 pre-service and 50 in-service physical education teachers - voluntary participants. The methodology of the research was used applying questionnaire "Your school's temperature" (adapted from Shiman & Rudelius-Palmer, 1999), an interpretative phenomenological semi-structured interview (Giorgi, 2009), metaphors were used as the techniques for identifying concepts of PE teachers professional identity (Buchanan, 2015). Data were axial coded (applying AQUAD7 software). **Results.** The ongoing research preliminary results show that the findings revealed that majority of in-service physical education teachers' work as learner-centered. Majority of pre-service physical education teachers' metaphors showed openness for deeper knowledge and experiences, feeling as fish in water and also learner-centered elements. Majority of in-service physical education teachers believe that school environment is more democratic than pre-service teachers. The values, which school should promote in the context of the European Union, are not still comprehensible and acceptable for all pre-service and in-service PE teachers, who are significantly influenced by the ideological heritage or own negative experience in the school.

Keywords: PE teachers' professional identity, in-service teachers, pre-service teachers, democracy.

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HEALTH INDICATORS OF PARTICIPATION IN PHYSICAL ACTIVITIES FOR CHILDREN WITH CEREBRAL PLASY

M. Champa, A. Alifanova, A. Klavina, K. Rodionova

Latvian Academy of Sport Education, Riga, Latvia

Background. The researchers develop and implement innovative interdisciplinary education approach addressing challenges of health related participation in physical activities for children with disabilities. While the advances in medicine enable more children with disabilities to participate in the inclusive learning environment, there is evidence that these children have limitations in daily physical activities. It increases the risk to develop secondary health conditions including heart disease, respiratory problems and emotional disorders that result in deterioration of health status, functional capacity and quality of life. To implement meaningful and safe APA programs, the first step is to assess the present level of body functions and activity potential of children with disabilities. Objective: This study aimed to present multicomponent assessment battery to assess physical and movement development skills of children with different functional impairments. The innovative interdisciplinary assessment model was used based on theoretical framework of the International Classification of Functioning, Disability and Health (ICF) containing the three domains of human function: 1) body functions and structures, 2) activities, and 3) participation. **Methods.** The movement development and physical skill assessment was done for 34 children with physical impairments (age 7–12 years) from those 20 were children with Cerebral Palsy within Gross Motor Classification System (GMFCS by Palisano 1997) level I to III. The TGMD-2 (Ulrich, 2000) and 5 physical skill tests were selected after the extensive review of the evidence based research literature. ActiGraph GT3XPlus used to measure everyday activities level. Results: Data were obtained November, 2015 through March, 2016. The collected data are still under analyses of the project group. The presentation will include correlation of data between physical and movement development variables. After data analysis project group will show percentage of developmental and chronological age and correlation with everyday activities level. **Conclusions.** The study outcomes will provide significant contribution to knowledge on functional assessment of children with disabilities. Also, the project will increase competence level of human resources which will raise the potential for high added value product development leading to scientific evidence based knowledge. The outcomes and conclusions of pilot study will be presented comparing with evidence-based research during the presentation. This study is part of the Norway grant project “Health and social indicators of participation in physical activities for children with disabilities” (No. NFI/R/2014/070).

Keywords: children with disabilities, physical activity, functional assessment, cerebral palsy.

BODY COMPOSITION INFLUENCE ON FUNCTIONAL CAPACITY INDICES IN TRIATHLETES

E. Kemerytė-Riaubienė¹, R. Sakalauskaitė¹, N. Jaščaninienė¹, J. De Dios Beas Jiménez², M. L. Estriga³

Lithuanian University of Educational Sciences¹, Vilnius, Lithuania

Andalusian Center of Sports Medicine², Seville, Spain

Background. At present children are becoming involved in athletic programs at a young age. However, in children sport even small differences in maturation or body composition may affect performance level. The aim of this study was to investigate body composition influence on functional capacity indices in 9–12 years old Lithuanian and Spanish triathletes. **Methods.** The study involved 29 girls (10 from Lithuania (Lg) and 19 from Spain (Sg)) and 43 boys (22 from Lithuania (Lb) and 21 from Spain (Sb)) triathletes. Lithuanian girls were 10.50 ± 0.97 years old, height – 1.57 ± 6.22 m; weight – 44.04 ± 3.14 kg on average and Spanish girls were 10.21 ± 1.32 years, 1.45 ± 10.54 m and 36.90 ± 8.41 kg respectively. Lithuanian boys were: 10.59 ± 1.18 years old, 1.53 ± 7.24 m height and 41.30 ± 9.43 kg weight on average and Spanish boys were 10.0 ± 1.41 years, 1.49 ± 10.64 m and 41.07 ± 10.39 kg respectively. In order to evaluate young athletes' body composition and functional capacity we used the ARISTO protocol. According the protocol we evaluated athletes antropometrical data, and athletes performed long jump, 4x10 m shuttle run, 20 m Shuttle run test, 200 m running and 100 m and 400 m swimming tests. The data were calculated using SPSS 20 package. Athletes' maturity was assessed by Tanner scale and in Lg group it was – 1.64 ± 0.83 ; Sg – 1.92 ± 0.83 on average. **Results.** The girls' training experience and the stage of maturation between the two groups was not statistically significant. Training experience in Lb group was 2.14 ± 1.02 years, and Sb – 2.53 ± 1.84 years on average. Lb group trained 6.48 ± 2.76 and Sb – 5.35 ± 2.04 hours per week. The stage of maturation in Lb group was 1.33 ± 0.48 and Sb – 1.87 ± 0.81 . **Conclusions.** The study reveals that body composition has an influence on young triathlete functional tests. We can assume that the higher athletes in the age group 9–12 years (Tanner stages 1 and 2 of sexual maturation) could have an advantage in anaerobic performance. Aerobic endurance requires greater oxygen uptake and it might be that smaller athletes have better opportunities for developing endurance.

Keywords: body composition, maturation, functional capacity.

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

N. Al Wattar-Manhal, Kh. Sultan

Mosul University, Erbil, Iraq

Background. The research aimed at revealing the degree of Emotional Intelligence of pupils of The Olympic Champion School Project in Nineveh Province and preparing a program to develop the emotional intelligence by using Emotions Regulation Strategies of pupils of The Olympic Champion School Project in Nineveh Province. The Researcher followed the empirical design known as Equivalent

Groups Design which has the pre and post accurate tests. **Methods.** The sample of study was a group of the pupils of The Olympic Champion School Project in Nineveh Province – 40 pupils at the age of 13–18 years who practiced track and field athletics, wrestling, and boxing. During the haphazard test the sample of study was divided according to the toss system into two equal groups – ten pupils in each one, the first group was experimental on which the Emotion arrangement Strategies programmer was applied, whereas the second one was on which the programmer was not applied. The criterion (Bar – on E Q i: YV , 2000) was trans located after doing some changes according to the views of some experts and those specialists in psychology, education, and sport psychology. The criterion consisted of 60 expressions distributed among six axes (individual efficiency, social efficiency, adaptation, dealing with pressures, positive change, and natural temper). The program of Emotion arrangement Strategies was used on the empirical group for 7 weeks, two sessions weekly, 35 minutes for each session starting from February 8, 2014 until March 24, 2014. **Conclusions.** The player (pupils) of The Olympic Champion School Project in Nineveh Province had an acceptable degree of Emotional Intelligence. There was an effect of the psychological training program using Emotions regulation Strategies in Emotional Intelligence Developing of the players (pupils) of The Olympic Champion School Project in Nineveh Province prepared by the researchers.

Keywords: emotions regulation, emotional intelligence, school project.

COMPONENTIAL AND STRUCTURAL CONTENT OF INTEGRAL DIDACTIC ACTIVITY OF THE PHYSICAL EDUCATION TEACHER

O. Aftimichuk

State University of Physical Education and Sport Republic of Moldova, Kishinev, Moldova

Background. The effectiveness of the professional training in the field of physical training presupposes a constant improvement of the didactic system. In addition, the didactic activity of the physical education teacher is a symbiosis of verbal, kinesthetic and movement activity during the realization of which is synthesized the coordination structure of adequate sub structural elements. The present statement raises the question of componential content of teacher activity and the level of its formation. **Methods.** In the present research, a physical education teacher with a 10 year experience was followed up, 25 stereotyped lessons were registered; and also 4th year internship practice-students gave lessons to pupils from upper secondary classes. We used the following methods of scientific research: analysis, synthesis, lesson observation, record, project, and modeling. **Results.** Taking into consideration the specific character of the professional activity of the specialist, which consists of a symbiosis of verbal and motor activity, in this work we presented the elaboration of the componential content of integral didactic activity of the physical education teacher in the pedagogical system “Preparatory part of the lesson”; we explained the dominant project of the study process; analyzed the structural content of macro-didactic situation “Preparatory part of the lesson”. The author presented the registration protocols of indicators of integral didactic activity with the structure of complex coordination of physical education teachers and practice-students during the realization of the preparatory part of the lesson by means of rhythmic gymnastics. **Conclusion.** The analysis of the structure characteristics of integral didactic activity shows that the level of these indicators of didactic technology depends, first of all, on the complex coordination: acoustic-verbal-visual + acoustic-verbal-visual-motor.

Keywords: professional training, teacher of physical education.

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THE EFFECT OF ONE MONTH PILATES EXERCISES ON THE YOUNG AGE WOMEN’S PULMONARY SYSTEM

K. Zaičėnkoviėnė, A. Stasiulis

Lithuanian Sports University, Kaunas, Lithuania

Background. Pilates method is growing in both the area of fitness and rehabilitation, but there is scarcely any scientific research on the subject, particularly in the area related to respiration (Yamaguti, 2012). The Pilates breathing (PB) method is a frequently used type of respiration. PB requires deep breathing while keeping the abdomen pulled in by means of active contraction of the transverse abdominal (TrA) and pelvic floor muscles (Keays et al., 2008) and promoted a breathing pattern with greater thoracic expansibility (Karina et al., 2014). Thus, better knowledge of the specific breathing technique of Pilates method effect on respiratory system is required. The aim of this study was to evaluate changes in young women’s respiratory function after one month of Pilates training. **Methods.** Respiratory function was measured by means of the gas analyser “Oxycon Mobile” (Germany) before and after one month of Pilates training in women ($n = 7$) (age – $28(\pm 8)$ (6.86), weight – $74.6 (\pm 14.1)$ and height – $175.8 (\pm 13.4)$ cm). Measurements included forced vital capacity (FVC), forced expiration volume in one second (FEV(1)), forced inspiratory volume in one second FIV1, vital capacity (VC), peak expiratory flow (PEF), forced expiratory flow rate (FEF (25-75)%), forced inspiratory flow at 50% of the vital capacity (FIF50%), maximum voluntary ventilation (MVV), vital capacity (VC MAX), peak inspiratory flow (PIF) and etc. **Results.** One month of Pilates exercise showed no significant changes, but small changes in pulmonary function. **Conclusions.** One month Pilates exercise appeared to have minor influence on respiratory function at rest in women of age studied. Additional studies examining various Pilates practices are warranted to gain a more comprehensive understanding of the effects of Pilates techniques on pulmonary functions.

Keywords: Pilates, pulmonary function, pulmonary ventilation.

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RELATIONSHIP BETWEEN ENDURANCE TRAINING AND ACTIVITY OF THE RECTUS FEMORIS MUSCLE IN WOMEN WITH LOW BONE MASS

Z. Ossowski¹, V. J. Česnaitienė², W. Skrobot¹, A. Bartczak³, M. T. Tomás⁴,
M. B. Fernandes⁴, E. A. Carnero⁵

Gdansk University of Physical Education and Sport¹, Gdansk, Poland

Lithuanian Sports University², Kaunas, Lithuania

Medical University of Gdansk³, Gdansk, Poland

Escola Superior de Tecnologia da Saúde de Lisboa⁴, Lisboa, Portugal

University of Malaga⁵, Malaga, Spain

Background. Changes in muscle strength and electromyographic activity of the lower limbs are pronounced with the aging process (Amaral et al., 2014). Such changes are especially dangerous for women with low bone mass. (Nelson et al., 2002). So far there has been no conclusive evidence that Nordic walking (NW) offers biomechanical benefit for the lower extremities (Sugiyama et al., 2013). Therefore, the purpose of the study was to evaluate the impact of NW training on the activity of the rectus femoris (RF) muscle in women with low bone mass. **Methods.** The sample was composed of 27 woman aged 65–75 with low bone mass defined by a T-score ≤ -1 (Nelson et al., 2002). The participants were randomly divided into two groups. The first group – control group (CG) consisted of 14 women. Women from the second group, called the experimental group (EG), participated in regular NW training. Surface - electromyography (EMG) was measured using a TELEmyo Direct Transmission System with the software application for registration and analyzing data – MyoResearch Master Edition (Noraxon U.S.A. Inc.). The electrodes were placed on the skin over the bellies of the RF in lower limbs. EMG was measured during 30-second chair stand test from Senior Fitness Test battery (Rikli & Jones, 1999). Two phases: first phase – rise from a chair and second phase – sit down on a chair were analyzed separately. **Results.** The analysis of the data shows improving trend in results of change of activity of RF after 3-month NW training with the following data: in first phase 52.28% and in second phase 47.62%. However, because of large dispersion of women results from EG (standard deviation fluctuated between 5.05 and 43.36), these changes in results were not statistically significant. Average changes of activity of the RF in participants from CG were 2.63% in the first phase and –9.62% in the second phase. **Conclusions.** Nordic walking training may in part contribute in clinical improvement in muscle activities of the rectus femoris in women with osteopenia and osteoporosis. The study was conducted within the framework of the EU project entitled “Active lifestyles and predictors of risk for incapacity on senior population: RISINC2013-FRAILTY and RISINC2013-FALLS”.

Keywords: Nordic walking, muscle rectus femoris, women with low bone mass.

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THE EVALUATION OF SCHOOL EDUCATIONAL ENVIRONMENT AND ACADEMICAL SELF-ESTEEM OF ATHLETES AND NON-ATHLETES ADOLESCENTS

I. Tilindienė, S. Kavaliauskas

Lithuanian Sports University, Kaunas, Lithuania

Background. All socialization stages (kindergarten, school) influence changes in children's bodies, actions and behavior (Lengvinienė, 2004; Sinead et al., 2011). Self-perception starts developing in childhood and rapidly evolves in adolescence. During this period the child's self-esteem is directly exposed to identity development. Adolescents' self-confidence and trust of environment (especially the "significant other" – parents, teachers, and friends) influence their identity development. Han and Kemple (2006) argue that regarding the fast physical development, adolescents fail to improve skills of social life. For this reason, internal and external conflicts arise, influencing the development of the adolescent's personality and relationships with themselves and other people. However, as shown by studies (Kremer-Sadlik & Kim, 2007; Ream & Rumberger, 2008) – athletes adolescents' relationships influence the development of the circle of friends, and according to Moreno & Cervello (2005), athletes adolescents have a higher perception of their competence for social recognition and it provides positive influence on their perception about themselves and the world around them. The aim of the research was to estimate the evaluation of school educational environment and academical self-evaluation of adolescents according to gender, age and sports aspects. **Methods.** The research was performed in 2015 involving 196 adolescents from Kaunas schools aged 11–15 who were interviewed (99 – 11–12 years old; 97 13–15 years old); 97 of them were girls and 99 – boys. The questionnaire consisted of 6 questionnaires (Teacher Assistance Questionnaire (Harter, 1985); Classmate Support Questionnaire (Harter, 1985); Positive Children and School Communication Questionnaire (Goodenow, 1993), The Approach to the School Environment Questionnaire (Anderson, 1999); Loneliness in School Questionnaire (Kocheenderfer-Ladd, Wardrop, 2001), Academical Self-Esteem Questionnaire (McCoach, 2002)). **Results.** Girls felt getting more support from teachers than boys ($p < .05$), boys more positively evaluated school environment, including teachers, homework, grades and learning itself, than girls ($p < .05$); 11–12-year-old adolescents got more support from teachers than 13–15-year-old adolescents ($p < .05$). Younger adolescents felt more lonely at school than the older ones ($p < .05$); 11–12 year-old adolescents more positively evaluated themselves than 13–15-year-old adolescents ($p < .05$) and 11–12-year-old adolescents were more interested in school, learning and their attitude to school was more positive than that of the 13–15-year-old adolescents ($p < .05$). Athletes were more involved in school than non-athletes ($p < .05$), non-athletes adolescents were more interested in school and learning than athletes ($p < .05$). Athlete's adolescents tended to have more positive attitudes to school than non-athletes students ($p < .05$).

Keywords: students, education, significant others, sport activity.

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CONTEMPORARY SPORTS LESSON IN STUDENT OPINION

I. Bula-Biteniece, R. Jansone, I. Dzelzs

Latvian Academy of Sport Education, Riga, Latvia

Background. Sports lesson is complicated – every child needs an individual approach: to assess the dynamics of each pupil's individual development, knowledge and skills. Sports pedagogue himself/herself should work out such study programs which provide general knowledge and develop skills in a variety of sports. However, the subject of the problems is the pupil! Up to now neither at state nor at school administration level a study has been carried out to find out the attitudes of pupils – the subject of the research, trying to reveal what indeed is happening in sports lessons. Research question: Does public opinion about sports lessons differ from that of the pupils themselves? Subject: The pupil's poll involved 336 subjects, Classes 1–12 in 3 different schools across the country. **Methods:** Questionnaires – polls among pupils of Classes 1–12; Content analysis – public and social media articles and commentaries. **Conclusions.** Within the research of the pupil's perspective on the implementation of the sports lesson within the General secondary education system the following conclusions were made: 1. The pupils of today do not ponder or moreover – are not interested in whether the education standard is higher or lower or what it really is about. What the children crave for is an in-depth evaluation of their physical fitness that is explained thoroughly and thus can be used to develop and work on the aspects that are challenging. Another aspect is the way the evaluation is carried out – it can be derived from the polls that the children need a personal approach, one that sees each and every one of them as an independent case. 2. The public opinion that can be derived from editorial and social media differs from that of the pupil's themselves largely to the fact that adults tend to draw from their own childhood experience which still holds a somewhat grudge against the cruel standards of the Soviet and then the newly independent Latvia, so they do not see that both the system and the approach of the educators has changed and developed and that the challenges their children face are no longer the same.

Keywords: student opinion, sport classes.

REHABILITATION FOR WOMEN AFTER BREAST CANCER SURGERY BY APPLYING NORDIC WALKING

E. Kalvaitienė, L. Samsonienė

Vilnius University, Vilnius, Lithuania

Background. One of the fastest-growing forms of physical activity is Nordic walking. This form of exercise activates the whole body muscles as special sticks that make muscles of shoulders, arms and torso work are used (Hagner-Derengowska et al., 2015). Nordic walking improves the person's mobility, reduces sensitivity to pain, improves lymph drainage and can be recommended to breast cancer patients as a safe form of physical activity (Fischer et al., 2015; Malicka, Stefańska, & Rudziak, 2011; Sprod, Drum, Bentz, Carter, & Schneider, 2005; Tschentscher, Niederseer, & Niebauer, 2013). According to the provisions of "Fully functioning self theory", human-centred therapy helps the person realistically assess their capabilities, activate their personal activities and direct them to behavioural rehabilitation and

educational aims, but the means of distortion and rejection forces the person to detach from reality and leads to bad adjustment in the community. Thus, the aims of this study were to assess the effect of Nordic walking on the psychomotor parameters of women after breast cancer surgery during radiation therapy. **Methods.** Forty respondents (age = 55 ± 19) took part in this study. The following psychomotor parameters were evaluated: hand muscle strength (using dynamometer), the degree of lymphoedema (arm volume was measured using a centimetre tape), pain (using visual pain scale (VAS)) and tolerance to physical exertion (a 6-minute walk test). The measurements were performed twice, before physical activity and after it. **Results.** Nordic walking was held 12 times; the duration of each session was 60 minutes. After each physical activity, the following psychomotor parameter changes were found: the range of motion of the upper arms improved moderately– bending of the hand reached 17° (51.5 %), pulling back – 18° (56.75%), stretching – 5° (11.5 %); the hand grip strength of the operated hand increased by about 1 kg (2.9%) on average; the results of the 6 min walk test improved by about 36 m (84.3%). After physical activity the pain for the patients decreased by 0.5 points (32.3%) on average. **Conclusions.** As a form of physical activity, adapted Nordic Walking affected the patients' psychomotor parameters: improved shoulder function, increased the strength of the operated arm, improved tolerance to physical activity, decreased pain and reduced risk of complications during radiotherapy treatment.

Keywords: physical activity, Nordic walking, rehabilitation, psychomotor parameters, breast cancer.

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PECULIARITIES OF WORKING TIME ORGANIZATION IN THE PUBLIC SECTOR

O. Oguz¹, D. Perkūmienė^{2,3}, B. Švagzdienė⁴

Anadolu University¹, Turkey

Aleksandras Stulginskis University², Kaunas, Lithuania

Kauno kolegija³, Kaunas, Lithuania

Lithuanian Sports University⁴, Kaunas, Lithuania

Background. In the times of industrial growth, the work is carried out by joint effort of several or even more people. From the perspective of management, organisation is the design and development of homogenous systems from people, equipment and material, as well as the implementation of such systems by applying other management functions. The organisation of heads and employees working time begins with the determination of goals. Company's goals determine its further activity. **Conclusion.** Emotional tension is one of the main factors that make the process of work organisation difficult. However, the ability to manage this tension is considered to be a significantly important personal feature of a good employee.

Keywords: management approach and features, managers and employees of the organization of working time.

ELITE ATHLETES' MOTIVATION TO CREATE PERSONAL BRAND

D. Mujkic¹, I. Staškevičiūtė-Butienė², I. Valantinė²

University of Sarajevo¹, Sarajevo, Bosnia and Herzegovina

Lithuanian Sports University², Kaunas, Lithuania

Background. In recent years the concept of brand personality has received considerable attention in marketing and sport management research (Braunstein & Ross, 2010; Carlson et al., 2009; Heere, 2010). As professional sport becomes more commercialized industry segment, elite athletes are considered as popular cultural products (Gilchrist, 2005; Summer et. al, 2008) and draw attention from media and corporate sponsors. Sport personal brand is based on managing the brand image providing it with the athlete's personal values, projected to the future so that it can be used by the athlete even after professional career. The aim of this paper is to analyze athlete's understanding of personal brand, its benefits and motivation to create own personal brand. **Methods.** The sample comprised 37.2% men and 62.8% women, 84.5% of respondents till 30 years old. The original scale was used for the analysis of motivation to create personal brand consisted of 24 items with an alternative five-point response ranging from strongly disagree (1) to strongly agree (5). Statistical analysis of data was performed using the SPSS 20 package. **Results.** Using a sample of 148 elite athletes from Lithuania results indicate that athletes see benefits from personal brand in attracting attention from sponsors (73.6%) and fans (73.6%) and in creating career after finishing professional sport (64.2%). Mostly, athletes agree that they need personal brand (83.6%) and that they should be known for results reached (98.6%), personality (61.5%) and public behavior (56.8%). **Conclusions.** Regarding the objective of the research, the results indicate that personal brand provides the following benefits: allows for person to distinguish himself or herself from competitors; increase individual earnings as being a leader in professional career, grants the right to demand a higher remuneration; attracts useful people; acquires the recognition that comes from personal achievement and gives additional value for person's activities. The current sport personal brand management is mainly focused on the relationship between the media and the achievement of economic benefits in short term. But the problem exist that current elite athletes do not take into account the concept of the athlete's identity or image making benefit of it in the long term.

Keywords: personal brand, athlete, motivation.

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LOSING GROUND: EXODUS OF WOMEN BODYBUILDERS TO WOMEN'S PHYSIQUE

A. Abarra

Université Paris-Est Marne-la-Vallée (Incoming Student) Marne-la-Vallée, France

Background. In the recent years, women's bodybuilding has been subjected to different changes in categories. One of them is the introduction of women's physique both in amateur and professional bodybuilding organizations. On the author's observation, based on different accounts in social media, many former amateur and professional women's bodybuilding competitors are shifting their competition career to women's physique category which is according to the International Federation of Bodybuilders (IFBB) is "aimed at women who prefer to develop a less muscular, yet athletic and aesthetically pleasing physique, unlike today's current bodybuilders." With this category, competitors are bound to choose a new path and prefer to compete in the women's physique category and making contests solely for women bodybuilders to dwindle making the latter getting not much attention as seen with the removal of the 2014 Ms. International competition as well as reduction of women's bodybuilding competitions as compared to women's physique. That is why the purpose of the study is to identify the reasons of competitors why they prefer to compete in women's physique or stay as female bodybuilder. **Methods.** Through case studies both of women's bodybuilding and physique competitors which include journal accounts, immersion, and interviews in a contest season, the study will try to find out what are their reasons in staying or moving in a bodybuilding or physique competition category which may cite personal and economic reasons. The researcher will also use autoethnographic process by training and possibly competing in a bodybuilding competition in order to closely interact and experience the most of the aspects of life with women bodybuilders and physique athletes in order to fully understand their situations. The research will also assess how market forces in the discipline of bodybuilding affects the career path of women competitors. **Conclusion.** This study is of significance as it will help to further understand how women's bodybuilding are subjected to changes which will enable academicians and bodybuilding community to discuss issues for women in the sport as well provide better conditions and positive image of women bodybuilders as a whole.

Keywords: women's bodybuilding, women's physique, market forces, economics of sport, gender.

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CRISTIANO RONALDO AS AN ATHLETE BRAND: A QUALITATIVE STUDY

A. Hasaan

Estonian Business School, Tallin, Estonia

Background. Globalization in the field of sport benefits star athletes and teams (Ker & Gladden, 2008) and athletes can be seen as a brand entity by themselves and surpass the image of their own team (Cashmore & Parker, 2003). One fine example is Cristiano Ronaldo. Ronaldo is a phenomenal athlete and a top celebrity from last few years. He has never been out of the list of top three FIFA Ballon d'Or candidates since 2011. Along with on field achievements he also able to establish himself as an off field brand. With the most popular social media celebrity and a top endorser, he is a role model for young athletes. The purpose of this study is to identify fans' perception about the factors that distinguish Ronaldo from remaining stars. **Methods.** This is a qualitative study, based on athlete brand framework proposed by Hasaan et al. (2015). Semi structured interviewed conducted with Ronaldo's fans in two different countries, Estonia and Pakistan. This study discussed antecedents, athlete brand attributes and implication of branding in the light of foreign fans responses about Cristiano Ronaldo. **Results.** The current study found that fans living in Estonia and Pakistan having two different cultures, have different motives for liking Ronaldo. Among Pakistani fans of Ronaldo, social agents are major antecedent, achievements and lifestyle are major attributes while athlete and its teams are beneficiaries of branding while in Estonian context, media and impression management are major antecedents, style of play, skills and entertainment are top brand attributes and athlete and its sponsors are top beneficiaries of Ronaldo brand. This study not only delivers the picture of two different cultures about same brand but also provide future prospect for athletes and their managers to make branding strategies more precise for different areas and cultures of the world.

Keywords: athlete brand, foreign fans, fan loyalty, athlete marketing, sport marketing.

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DEVELOPING COUNTRIES. SPRINT TOWARDS A BETTER ECONOMY THROUGH SPORTS (SPORTSNOMICS)

S. Ravi

Latvian Academy of Sport Education, Riga, Latvia

Background. The sports sector is estimated to be valued at USD 500 - 600 billion worldwide. It is also projected that the developing economies will be major contributors to the business of sport in the following years. There is an estimation that about 1/5th of the sports population will be from economies that do not have well developed sports ecosystems. The aim of this study is to understand the role of Sports leagues in developing economies (countries). Sports Leagues are interesting business models with revenue sharing as one the important aspects. Globalization has expanded opportunities for sports and allied industries. Alongside boosting world economy, sports leagues have significant impact on socio-cultural integration. **Methods.** This research is a secondary study of information about sports leagues in select countries and analysis of the role of sports leagues in socio-economic development. A combination of new and matured leagues is considered to illustrate the sustainability of leagues. **Results.** The research findings provide an input that successful sports leagues have significant positive impact on the economies of developing countries. Sport generates employment, business opportunities and is also a harbinger of innovations. The leagues that have a partnership of Government and Private entrepreneurs / Businessmen / Corporate are more successful. Uniqueness: There are studies with reference to sports development in developing countries. There are studies about Leagues in individual nations. This study explores the role of sports leagues specifically amongst developing countries and is probably one of the initial studies in the area. **Conclusions.** Sports Leagues have business gain and space for all stakeholders. Trade and commerce, education, media & tourism thrive with sports leagues. Leagues for many local sports can be created among nations. League clusters can be formed among countries to leverage geographical proximity. For example, Rafting league or a Kayaking league can be conducted for a cluster of neighboring islands.

Keywords: sports leagues, developing countries, business, and economies.

PRIVATE INVESTMENT MANAGEMENT IN SPORTS IN LATVIA

L. Martins, U. Grāv'tis

Latvian Academy of Sport Education, Riga, Latvia

Background. In Latvia, the system of sport schools successfully develops young athletes of individual sports, as well as those coming from various team sports, and they have good results in global youth competitions. A financing model aiming to promote the development of athletes has been created in the country, though it can be relied on only by the athletes of individual sports. Athletic development of those coming from team sports is left in their own hands. Problem: Considering the degree of competition in modern sports, it is not possible to develop world-class athletes in team sports without financing that is adequate to ensure considerable athletic achievement and the quality of the respective training process from the age of 14. However, considering the objective limitations of the state budget, state financing for the development of youth achievement programmes in sports to arrive at world-class professionals in adult sports is highly unlikely. This is the main reason why young Latvian athletes from

team sports demonstrate excellent results until the age of 18 or 20, whereas afterwards, when they become or try to become a part of the adult sports, they fall behind in terms of their skill if compared to other athletes, irrespective of the fact that they had superior skills at the age of 18. Solution: The lack of state financing may be rectified by private financing. It is possible to ensure efficient improvement in the development of athletes and the overall development of national sports by creating successful athletic development centres. Private participation may help athletes overcome one of the most difficult stages in their career – transition from the youth to the adult sports. Successful cooperation between athletes and private investors requires adequate evidence that investment in the development of athletes can have a positive return. Such investment is like any other investment in risk capital. Development of good investment options by private investors, i.e. an athlete selection system, may ensure the success of investment. **Conclusions.** The study demonstrated that investment in the development of athletes and strict investment management policies may secure a positive return on investment. The study also demonstrated that private investors would be directly interested in the development of athletes that would, in turn, enable successful return on their investment. Development of a successful cooperation system will improve the sports in general, attracting more and more children willing to become athletes.

Keywords: athletic development, state financing, private financing, successful cooperation.

A HOLISTIC APPROACH TO LEISURE INDUSTRY

R. Mikalauskas¹, J. Kasparienė²

Lithuanian Sports University¹, Kaunas, Lithuania

Klaipėda State University of Applied Science², Klaipėda, Lithuania

Background. Leisure can be thought of as a multi-dimensional construct. Perceptions of leisure are wide and varied, influenced by one's culture. Leisure contributes to the social, cultural and economic development of individuals, communities, cities and countries and enhances the human condition while contributing to a variety of human experiences. For many, compared to the most basic of needs, leisure is merely an aspiration. For example in our spare/leisure time we like to listen to music, play computer games, socialize with people/friends and go out with friends e.g. to the cinema, clubs, parties etc. Leisure is applied in many different situations or topics. There are different components of leisure: Heritage (Visitor Attraction's), Countryside Recreation, Arts and Entertainment, Home-Based Leisure, Sport and Physical Activity (Recreation), Catering and Shopping (Clothes etc.), Education (Night School). For many, however, leisure contributes to quality of life. Its benefits are usually defined under five main headings: Health, Social, Community, Environmental and Economics. Among policy makers there is a growing acceptance and consensus that the twin pillars of strategy formulation, whether at national, regional or local level, are economic growth and improvement to the quality of life. Within this context, there is a need for greater clarity about the relevance of leisure and its contribution to strategy formulation, development and implementation. These are divisions in the leisure industry. Therefore there is an interaction between the public, private and voluntary sectors. The main reason for these interactions is because of the sports facilities and opportunities. However they are not the same, each sector provide different services. There are lots of interactions within sectors and components. In the leisure industry there are different types of leisure. The first one is called active leisure. Active leisure activities involve the exertion of physical or mental energy. Active leisure and recreation overlap significantly. Passive leisure activities are those in which a person does not exert any significant physical or mental energy, such as going to the cinema, watching TV, or gambling on slot machines. Leisure can be thought of as a

multi-dimensional construct. **Conclusions.** Perceptions of leisure are wide and varied, influenced by one's culture. Although there are many different types of leisure activities and experiences, one of the key elements is that of leisure and its relationship to health and fitness, especially physical activity. Leisure then, according to the holistic notion is regarded as any experience which brings satisfaction to the individual. Leisure is something that can take place during any part of one's daily patterns.

Keywords: leisure, components, types, holistic approach.

SPECIALISTS' JOB SATISFACTION IN WELLNESS INDUSTRY

I. Labanauskaitė, V. B. Fominienė

Lithuanian Sports University, Kaunas, Lithuania

Background. The objective of this study was to show employee job satisfaction importance of the organization and employee himself and investigate wellness industry specialists job satisfaction level.

Methods. A survey design was used. The survey sample involved 133 respondents (66 men and 73 women – physiotherapists, working in Lithuanian wellness centres and medical SPAs. The Job Satisfaction Questionnaire was used as measuring instrument. The questionnaire was developed by PMW Associates. Total 15 questions are measured job satisfaction. These 15 questions are based on Likert's scales like 1 – poor, 2 – average, 3 – good, 4 – very Good, 5 – excellent. The data were calculated usage of statistical application of correlation matrix. **Results.** The results revealed a higher than the average ($M = 49$) level of job satisfaction between male and female, also that there is no correlation between job satisfaction and gender.

Keywords: human resources, management, job satisfaction, physiotherapists.

SUSTAINABLE TOURISM IN LITHUANIA: ACTIVE LEISURE REALIZATION POSSIBILITIES

D. Misevičius

Vilnius University, Vilnius, Lithuania

Background. The idea of sustainable development has become an important research and implementation object because of exchanging national economic structure, depletion of natural resources. Sustainable tourism ensures economical use of natural resources, environment protection and satisfaction of people needs. Also it is one of the social welfare securities of the local communities. The aim of this article is to analyze active leisure as a part of sustainable tourism realization possibilities in Lithuania. **Methods.** A literature review and data analysis covers the issues concerning how sustainable tourism can be implemented in the Lithuanian tourism industry and what kind of active leisure could be proposed to tourists. **Results.** This article discovers sustainable tourism development and implementation benefits for the business, state economy and local communities. Analysis of aspects providing detailed today's Lithuanian tourism situation, how it can affect environment, natural resources and local community's economy. Sustainable tourism is one of the key elements ensuring economic growth. Development of sustainable tourism depends on tourism agencies, local communities, environmentalists and tourists. Tourism activities embrace state transport, services and accommodation

sectors in national and regional levels. Active leisure becomes more popular between tourists and it is one of the sustainable tourism elements. Countries with rich natural resources encourage and promote active leisure projects introducing tourists with local communities and national traditions.

Keywords: sustainable development, sustainable tourism, active leisure, natural resources.

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OLYMPIC EDUCATION AND THE YOUTH OLYMPIC GAMES

A. Gulbe

Latvian Academy of Sport Education, Riga, Latvia

Background. The Youth Olympic Games (YOG) is not simply mini-Olympic Games. They are the ultimate multi-sporting event, inviting athletes from around the world to compete, learn and share. In addition to the sports competitions, the athletes take part in a number of Learn & Share activities (known previously as Culture and Education Programme (CEP)). Along with several innovations in the competition formats, these are what make the YOG different from other sports events. There is a summer and a winter edition, like for the Olympic Games. The Summer YOG is staged in the years of the Olympic Winter Games and vice versa. The period of the Games is adapted to the climate and sports calendar of the host city (region). The two first editions were staged in Singapore in 2010 (Summer) and in Innsbruck 2012 (Winter). The Chinese city of Nanjing organised the second edition of the YOG in 2014 and in February 2016, Lillehammer organised the second edition of the Winter YOG. Buenos Aires (2018) and Lausanne (2020) are next editions host cities of the YOG. Aim: evaluate the role of the Youth Olympic Games in the context of Olympic education. Research methods: analysis of literature and survey. The Youth Olympic Games (YOG) vision is to inspire young people around the world to participate in sport, and to adopt and live by the Olympic values. The mission of this event is to educate, engage and influence young athletes and other young participants, inspiring them to play an active role in their communities. **Conclusion.** In short, the YOG are about “Compete, Learn and Share”. They combine sport, culture and education.

Keywords: Olympic Education, Youth Olympic Games, “Compete, Learn and Share”.

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DETERMINING THE RELATION BETWEEN INDIVIDUAL/ORGANIZATIONAL FACTORS AND PARTICIPATION IN SPORT ACTIVITIES DURING LEISURE TIME AMONG EMPLOYEES OF MAZANDARAN BROADCASTING ORGANIZATION

M. Hami, R. Davarpanah

Islamic Azad University, Sari Branch, Iran

Background. The present study was carried out to identify the relation between individual/organizational factors and participation in sport activities during leisure time among employees of Mazandaran Broadcasting organization. **Methods.** Regarding the objective, this is an applied study and considering data collection method, this is a descriptive survey conducted by correlation method. Regarding data collection procedure, this is a questionnaire-based field study. Statistical population includes all the employees ($n = 126$) of Islamic Republic of Iran Broadcasting organization, Mazandaran station. Sample size was determined by census. Each variable was measured by questionnaire. A validated socio-ecologic leisure time questionnaire which is composed of 65 questions was used in following fields: physical activity during leisure time and self-efficacy measured by Likert 6-point scale, political belief, social support, self-regulation, perception of physical environment and importance of expected results. Face validity was used to evaluate validity of the questionnaire. Reliability was measured by Cronbach's alpha coefficient. Data analysis was performed using descriptive statistics such as central tendency measures and inferential statistics such as one way analysis of variance and coefficient of correlation. Data were analyzed by SPSS 18 statistical software. **Results** indicated that there was no significant relation between social support and participation, between participation and physical environment via mediator variables self-efficacy, self-regulation-expected results, between political belief and participation, and between expected results via self-regulation mediator and participation in physical activities during leisure time. The relations in the other cases were significant.

Keywords: leisure time activities, sport activities, individual organizational factors.

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PRELIMINARY REPORT OF „LIFELONG LEARNING PROGRAMME FACILITATING HIGHER EDUCATION FOR ATHLETES-WINNER EDUCATION MODEL” PROJECT: FINDINGS ON ESTONIAN STUDENT-ATHLETES DUAL CAREER ACTIVITIES

R. Puhke, A. Pehme, P. Kaasik

University of Tartu, Tartu, Estonia

Background. Student-athletes must combine high level sport and university studies. Dual career (i.e., combination of sport and education) has become a very important issue in the European Commission (EC) strategies for Sport (EC, 2012). Athlete's career is relatively short, and mostly coincides with the period of study, to prepare for future challenges. The LLP WINNER EDUCATIONAL MODEL is focused on finding new pedagogical solutions and recommendations for developing dual-career educational model. The aim of this study was to investigate dual-career student-athletes opinions regarding their

sports and educational activities. **Methods.** Using the focus group method, a 36-question semi-structured questionnaire was created during a project meeting. Participants were required to respond online or paper-based questionnaire with close-ended questions (5-point Likert-type agreement scale) and to provide additional open comments. Statistical analysis was used to analyse collected responses. **Results.** 26 dual-career student-athletes (gender: 18 males, 8 females; age: 21.6 ± 32.8 years; type of sport: 16 individual, 8 team; competition level: 12 national, 14 international) from different sport branches and different faculties at the University of Tartu, Estonia, were found to be satisfied with their university studies (3.77 ± 0.7 pts), be able to meet the academic requirements (3.8 ± 0.7 pts), perceiving that the university provides them with good education for their future professional opportunities (3.58 ± 1.1 pts). Nevertheless, the dual career was adequately considered at university (3.0 ± 1.3 pts), the university staff adapted university schedule match less with sport schedule (2.27 ± 0.9 pts) than sports staff with university schedule (3.38 ± 1.4 pts). However, student-athletes were able to manage both academic (3.12 ± 1.0 pts) and sport (4.16 ± 0.9 pts) careers. Then sport staff support in combining sport and education was more sensible (3.85 ± 1.2 pts) compared to educational system (2.96 ± 1.2 pts), whereas family and peers were considered highly supportive (4.69 ± 0.54 pts). Finally, the need for a flexible academic path (i.e., class attendance and exam schedule), the recognition of the student-athlete status, e-learning provisions, an effective dialogue with teachers, and a higher cooperation between sport and academic organizations emerged. **Conclusion.** Preliminary findings demonstrate the need to develop a systematic approach to sports and educational activities to support Estonian dual career student-athletes.

Keywords: student-athletes, dual-career.

Reference

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MAIN EDUCATIONAL FACTORS OF A LONG-TERM ATHLETE DEVELOPMENT

A. Ūsas, A. Lazauskas

Lithuanian Sports University, Kaunas, Lithuania

Background. Nowadays professional sport faces more and more problems. Transformation from a young child into a top athlete becomes a more challenging, responsible and irregular process. Youth sport is where children entertain and learn important social and life skills (MacNamara et al., 2010). The principle of preparation of elite athlete holds that 10,000 hours of "deliberate practice" are needed to become world-class in any field (Hambrick et al., 2014). However, simply participating in sport does not ensure enjoyment and positive experiences for all athletes. The environment has an important effect on enjoyment. Closest persons who affect the environment are coaches and the family (Stambulova, 2014). The aim of the study was to discover the main educational factors in the process of a long-term athlete development. **Methods:** literature review and interview. **Results.** Subjects of the research were elite 11 athletes. Athletes were selected by two rules: they must spend more than 10,000 hours of practice and be on the top international level in current sport field. Interviewed athletes mentioned that factors behind the sports arena, which were very important to achieve best results at the international level. All interviewed athletes said that family support played a significant role in the sport career process. Others factors like birthplace, financial status of a

family and sport policy were indicated. Education and schooling made a contribution in the primary process of a long-term athlete development. In many cases, combination of sport and education was mentioned as a decreasing reason of dropout in many sports. **Conclusions.** Preparation of elite athletes takes a lot of time. Non athletic factors become more important for athletes and coaches. In many cases athletes dropout or even burnout was said to be because of non-athletic reasons. All interviewed athletes mentioned that family played a significant role in a process of a long term athlete development. As a second factor in the personal environmental siblings and friends were mentioned. Coaches and training supporting staff always played a critical role; they provided training programs and the tasks for the best performance.

Keywords: long-term athlete development, elite athletes, educational factors.

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STRESS COPING TECHNIQUES ANALYSIS OF THE LITHUANIAN ELITE SWIMMERS AND RUNNERS

E. Kačinskas, V. Skyrienė, V. Ivaškienė

Lithuanian Sports University, Kaunas, Lithuania

Background. The contention of high-level sports activities requires careful, responsible, step- by-step preparation and knowledge of how to cope with stress. Athletes must have a special psychological stability and resistance to stressors, apply various methods of introspection and control their behaviour. In order to improve the results it is necessary to reduce stress. Based on new scientific literature will be performed analysis of stress coping techniques and identify cyclic sports (swimming and running), the representatives of the stress coping measures. The paper solves the scientific problem: what are stress coping techniques apply swimming and running sports representatives? The aim of the study was to analyse stress coping techniques of the Lithuanian elite swimmers and runners. Objectives of the study: 1. Determine stress coping techniques applied by the Lithuanian elite swimmers. 2. Determine stress coping techniques applied by the Lithuanian elite runners. 3. Compare stress coping techniques applied by the Lithuanian elite swimmers and runners. Hypothesis: Stress coping techniques of the Lithuanian elite swimmers and runners are different. **Methods:** 1. The scientific-methodical literature review; 2. Questionnaire; 3. Statistical analysis SPSS program. **Conclusions:** 1. The study has revealed that Lithuanian elite swimmers mostly apply the following stress coping techniques: trying to control their emotions, trying out of new, more effective ways of learning or work, listening to music, organizing their lives, trying to act methodically and rationally. 2. The Lithuanian elite runners mostly apply the following stress coping techniques: trying to control their emotions before taking any step they think about what to choose, organizing their lives, looking

for information that will help them to solve their problem, communication. 3. Coping with their stress the Lithuanian elite swimmers more frequently ($p < .05$) than runners listen to music, complain to their family members, try out new, more effective ways of learning or work and ask different people to express their opinion about what happened to them. Coping with their stress, the Lithuanian elite runners curse significantly more often ($p < .05$) than swimmers.

Keywords: stress, stress coping techniques, elite athletes, swimmers, runners.

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DEVELOPMENT PROSPECTS OF EQUESTRIAN SPORT IN TALSI REGION

M. Jakovleva, I. Dundure

Latvian Academy of Sport Education, Riga, Latvia

Background. Equestrian sport is not one of the most popular sports in Latvia, but it is constantly developing, although not in all Latvian regions similarly. It is observed that equestrian sport development in Talsi region does not occur. Research aim was to work out scientifically based strategy for the development of equestrian sport in Talsi region. Subjects: Equestrian sports organization managers and riders in Talsi region, Presidium of Latvian Equestrian Federation, employees of municipality in Talsi region. **Methods:** The analysis of scientific literature, documents, survey: questioning, mathematical statistics. **Results and Conclusions.** Strategic planning is significant in any organization because it helps to think and act strategically in order to achieve organization's aims. Moreover, its existence helps to better prepare for the internal and external environment changes in the future. The main planning document for the sports industry in Latvia is Sports policy guidelines 2014 – 2020. This planning document analyses the current situation and defines more than 10 major problems in the field of sports in Latvia. The goal formulated in guidelines and its five sub-goals are also valid for equestrian sport and it's offered sports classes and physical activities. After analyzing the equestrian sports development determinant indicators and study results, and based on personal experience we established a scientifically grounded strategy for equestrian sports development in Talsi region for four years (2017–2020). Strategic aim is equestrian sports development promotion in Talsi region. Strategic aim is dependent on sub-goals: Management process improvement in equestrian sports organizations in Talsi region; Number of children and teenager increasing in equestrian sport in Talsi region, improving their sporting skills; Financial amount increasing for equestrian sport in Talsi region; Material technical base improvement in equestrian sport in Talsi region; Information base improvement in equestrian sport in Talsi region; Competition system improvement in equestrian sport in Talsi region; Increasing riders participation in competitions from Talsi region.

Keywords: equestrian sport, strategic planning, process of management, Talsi region.

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IMPORTANCE OF TOURISM INFRASTRUCTURE AND RESOURCES IN TOURISM

R. Andriukaitienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Tourism as an activity fosters economic growth, is manifested by created infrastructure, increasing services and entertainment supply. There is a constant aspiration to increase the comfort level, to identify unique trends, to expand the market, but the main focus is on development of tourism infrastructure the creation of which leads to the available tourism resources. The aim of the research was to analyze the interaction between tourism infrastructure and tourism resources, to discuss the concept of infrastructure and tourism infrastructure and tourism resources as a factor resulting in the development of infrastructure. **Methods:** literature review, summary, synthesis of conducted theoretical and empirical research. Infrastructure concept is analyzed in the works of Buhr (2003), Navickas and Gaisryte (2003), Dwyer and Forsyth (2006), Cibinskiene (2009), Snieska and Zykiene (2010) and others, emphasizing the economic aspect and the importance of related elements complex as a basis for further activities. **Results.** The infrastructure consists of property, equipment and capital, ensuring the supply of electricity, transport and telecommunications services, structures protecting natural resources, public administration buildings. Tourist infrastructure includes long-term physical property and capital, increases the efficiency of private services, and supports quality level (Dwyer & Forsyth, 2006). Tourism infrastructure is defined as the collection of objects facilitating conditions for relaxation and tourist entertainment (Zukov, 2010; Korneva, 2012), as the necessary condition for assimilation of recreational resources and development of tourism industry (Builenko, 2008), a whole of structures providing services and influencing tourism industry system development or objects (Zorin, 2010). Tourism infrastructure is formed by companies fulfilling the needs of tourists (travel managers and agencies, transport, accommodation establishments), companies fulfilling the needs of tourists and the local population (culture and entertainment, shopping, health, insurance institutions). Companies providing tourism services use the communication system created in a given area, the regional administration services, cultural and public institutions, local technical distribution network. The main resources and services, influencing the creation of infrastructure, are natural, and recreational, cultural tourism resources; human resources, information systems, accommodation and catering services; transport and communications; leisure and entertainment options; financial mediation, medical care, etc. (Balezentis, 2008; 2012; Abugelyte, 2008, Damuliene, 2003, 2012; Balezentis & Zuromskaite, 2012 and others). **Conclusions.** Tourism infrastructure consists of material-technical complex that ensures the creation of the tourism product, the quality of tourism services and the attractiveness of the area development. General regional infrastructure intersects with tourism infrastructure.

Keywords: tourism infrastructure, tourism resources.

DEVELOPING AN EFFICIENT MODEL FOR EXTENSION OF PUBLIC SPORT IN TONEKABON PROVINCE USING DEMATEL TECHNIQUE

M. Hami, R. Davarpanah

Islamic Azad University, Sari Branch, Iran

Background. The present study was conducted to design an efficient model for extension of public sports in Tonekabon province. In this investigation, influences of privatization, sport facilities, rules and regulations, planning and human resource, financial resources, media and personal properties on extension of public sports were evaluated. **Methods.** The present study is an applied investigation which was conducted as a descriptive survey with correlation type. Regarding data collection procedure, this is a field study in which data were gathered by means of questionnaire. Statistical population includes 1212 women and men who were active in public sport participation. Using Cochran's formula, a sample of 292 people was selected. Each variable was assessed by questionnaire. The questionnaire was designed in two parts; the first part was devoted to personal properties such as age, gender, education level, etc.; while the second one included 60 author-synthesized questions. The questionnaire was scored by Likert five-point scale. Apparent and content validity was used to assess validity of the questionnaire. Reliability of the questionnaire was evaluated by Cronbach's alpha coefficient. To analyze the results and information, descriptive statistics such as central tendency indices (mean median, mode, percentage, frequency, table and related graphs) and inferential statistics including Kolmogorov-Smirnov test, one sample t-test, Friedman test, factor analysis, DEMATEL technique and fuzzy entropy technique were used. **Conclusion.** According to the results of one sample *t*-test, privatization, sport facilities, rules and regulations, planning and human resources, financial resources and media had influence on extension of public sports in Tonekabon province. Regarding variables interrelations pattern achieved by DEMATEL technique, it was revealed that financial resources had the highest influence, followed by privatization, sport facilities, planning and human resources.

Keywords: public sport, sport extension, DEMATEL technique.

LEISURE ORGANIZATION OBJECTS AND PHENOMENA – CONTEXTUALIZATION AND PERCEPTION DIMENSION OF VALUES

B. Švagzdienė¹; E. Jasinskas¹; V. Gutienė²

Lithuanian Sports University¹, Kaunas, Lithuania

Kaunas Emergency Medical Service Station², Kaunas, Lithuania

Background. According Bobrova (2012), a characteristic feature of the modern world is transformation of society, caused not only by the new social relations, but also by values, behavioural roles and lifestyle changes because the systemic reform of the XXI century has affected all areas of social life. Social life reality poses new challenges for the leisure organization. This involved the inclusion of objects and phenomena manifestation of values to perceptual aspect. Education, especially in some contexts of the social trends, occupies almost essential role to society's economic, social and political growth and development in the development of amplitude of values (Butvilienė, 2014). Šiaučiulienė (2011) argues that the leisure in the society historical-cultural evolution has

experienced major changes in both its content and forms, it was a shift from organized to optional free forms. Therefore, the analysis of the philosophical content of values is disclosed to a person-oriented leisure philosophy and supported by the educational opportunities for leisure. Individuals encounter with organized leisure activities, evoking cultural expression, value perception. Which personality adapts itself on the basis of their world view, understood the ideals, values, interests and attitudes. According Bartochevis (2013) in order to understand this phenomenon and properly treated, it is particularly important to realize that it is the inevitable result of the evolution of mankind. **Conclusion.** So values contextualizing understanding in human development process, is another contribution to the theoretical discourse of multiculturalism.

Keywords: leisure organization, educational opportunities, values perceptions.

THE ESSENCE OF HEALTH TOURISM: LET'S START FROM A...

B. Švagzdienė, G. Lekavičienė, D. Rimkevičienė

Lithuanian Sports University, Kaunas, Lithuania

Background. In order to understand and evaluate, interpret and see Health Tourism as an important aspect of human life quality, it is important to understand tourism in general. Health (Medicine) Tourism is just in the beginning stage in Lithuania, taking the first steps of development. Lithuania has the best doctors and specialists. Medical Tourism has all the conditions to evolve. In order to spread the popularity of Medical Tourism, the first step would be to create a marketing program with the goal to make medical treatments in Lithuania more popular. It is important to take care of an import of Medical Tourism users (Bujanauskaitė, 2010). Also it should be mentioned that studies about Medical and Health Tourism attracted a huge attention in the last decade. Health was always a big topic in every human life. People started to look for better conditions, better service, bigger choices or lower prices in other countries. The organizations of Health Tourism and different authors have different definitions and understanding for Health Tourism. World's Health Organization (WHO definition of Health) defines health as: „Health is a total physical, mental and social welfare, not only the absence of illnesses or disabilities“. Saracci (1997) did not agree with this definition because in his opinion this definition suits more for happiness, but not health. In short, Health Tourism by Ross (2001) can be understood as people travelling from their place of residence for different health reasons. Problem: In the last few years many authors tried to define Health Tourism, but different understanding of this subject lead to the problem that does not allow one to understand this definition clearly. The main goal of this review is to find the similarities in different definitions of Health Tourism and to offer a clear and understandable definition of this type of Tourism, because the current situation misleads business organizations and customers. Only then can we start looking for the ways to develop Health Tourism. To achieve this goal certain tasks were made – to compare the definitions of Health Tourism by reviewing the last few years of articles and literature as well as to compare definitions of Health Tourism in different countries. **Conclusion.** Health Tourism has all the opportunities and perspectives to be developed. In order to develop incoming and outgoing Health Tourism certain goals need to be achieved.

Keywords: wellness tourism, wellness, health, the concept of value.

USE OF INTANGIBLE CULTURAL HERITAGE IN THE CONTEXT OF RECREATIONAL ACTIVITIES

I. Smuka

Latvian Academy of Sport Education, Riga, Latvia

Background. The wealth of any nation of the world is its cultural heritage and Latvia is rich in its intangible cultural heritage, with folk songs and dances, games, traditions and seasonal festivities celebration. (Muktupāvels, 1989). The modern sense of the folklore heritage that we have received from our ancestors can be mastered only with the revival through our everyday experiences and applications. The author of the book "The new economic era" Jeremy Rifkin writes that "today's consumers are not asking: "What else I could see that I have not seen? ", but rather they are asking the question: "What else I could experience that I have not experienced before?" (Rifkin, 2004). Nowadays, despite the fact that a large part of our lives is taken by thoughts on new technologies, the achievements and material values, more and more public attention is given to an active lifestyle, and more and more is being said about a healthy lifestyle and recreation importance to human life. Speaking about popular game dances, toys and games, in the today's context, we can classify them as a means of recreation for children and adults (Smukā, 2014). The aim of the study was the development of recommendations for recreational event organizers in the context of the use of intangible cultural heritage in recreational activities. To achieve the objectives of the work and analyze the current situation, local and international law, to consolidate the best practices and achieve the goal, in the study both theoretical and empirical qualitative data interpretation **methods** were used: scientific literature analysis; document content analysis; analysis of international experience; semi-structured interviews. In the gathering of the basic data 8 industry specialists from Latvia and 4 specialists from Poland took part. The time of the research was from May 2015 to December 2015. In the document content analysis, 23 laws, regulations, relevant documents in the Latvian, Spanish and Polish languages were discussed and analysed. 100 sources of literature and scientific publications, of which 70 were in Latvian, 11 in English, 6 in Spanish, 7 in Polish and 5 in Lithuanian were explored. **Results.** 1. The events organised by recreation centres and cultural centres are fairly uniform and similar. 2. The most popular form of intangible cultural heritage, which is used for recreational activities is the seasonal festivals and related forms - games, dancing, game dances, folk songs. Artisans' workshops, fairs and Christmas themed fairs are also used. The organisation of all activities is associated with local community interests. 3. In other countries' practice the trends of using the recreational events and intangible cultural heritage in attracting tourists, providing tourists with experience through participation in these events are discernible. 4. The use and preservation of intangible heritage promote the community's awareness of the national identity and its use in tourism and recreation may be the driving force for the community's social and economic development, as both direct and indirect economic impact has been observed. **Conclusions.** To conclude, the recommendations were developed for recreation event organizers with regard to the use of the intangible cultural heritage in the context of recreational activities. As a side finding, it has been discovered that recreational events' organizers in recreation centres and cultural centres do not understand the community's economic impact, when including intangible cultural heritage forms and types in the context.

Keywords: recreation, leisure, intangible cultural heritage.

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“LASE JOURNAL OF SPORT SCIENCE” AS A PART OF THE CORPORATE IDENTITY OF THE LATVIAN ACADEMY OF SPORT EDUCATION (LASE)

J. Grants, I. Bula Biteniece

Latvian Academy of Sport Education, Riga, Latvia

Background. The LASE Journal of Sport Science was created in 2010 and every year published two Annual Issues in Sport Science. The necessity to publish the Journal was determined by the fast speed of information society of the 21th century with the need for narrow specialization and quick availability of information. The Journal publishes original research papers, review papers, short communication papers of sport integrated research in pedagogy, psychology, medicine, biology, biomechanics, sociology and economics. During the 6 years of active collaboration with authors and Journal board members and reviewers of the Journal have become an internationally recognized part of the corporate identity of the LASE. The aim of the study was to analyze success and failures of the development of the Journal and to point out the factors of corporate identity of the Institution.

Conclusion. The Journal as a part of corporate identity makes unique and visible in the educational business niche. Considering the three main criteria and aspects of sophisticated corporate identity gives better chance for educational and science related development: strengthening of corporate diversity and quality, author loyalty and long-term persistence.

Keywords: LASE, Journal of Sport Science.

EVALUATION OF THE LEGACY OF A BASKETBALL EVENT: THE CASE OF 2007–2013 EUROBASKET

G. Gudaitytė, E. Jasinskis

Lithuanian Sports University, Kaunas, Lithuania

Background. The aim was to assess the legacy of a basketball event. **Methods.** The study utilizes complementary qualitative and quantitative approaches to address the problems and contemplate the above mentioned purpose. The techniques used are scientific literature analysis, and expert survey. Scientific literature analysis was applied to assess the problems and level of exploration of the economic legacy of a sport event and also was created a new theoretical model for assessing the economic legacy of a sport event. The theoretical model was used to create the expert survey questionnaire. Empirical research method was expert survey. 20 “European Basketball Championships 2007–2013” organizers who participated in the survey shared the experience which allowed identifying the possibilities for the increase of economic legacy of the European Basketball Championships 2007–2013. **Results.** Based on the research results, it might be presumed that all criteria proposed in the MERLIN* methodology are important when evaluating the economic legacy of a sporting event however, they are not equally important. Out of eleven criteria, which are proposed to be evaluated by MacAdam (2011), the basketball experts distinguished 8 most important criteria which have the biggest influence on the economic legacy of a sporting event, that is: Event

equipment, Legacy capital of the country, Increased partnership with other countries, search, employment and training of volunteers, event promotion, Country's rating, Government investment. On the basis of basketball experts' evaluations, according to MERLIN* index (Multi Sport Event Return Legacy Index), which shows the legacy level of European Men's Basketball Championships in different countries (Spain, Slovenia, Poland and Lithuania). As shown in Figure 5, the highest level legacy is considered to be in Spain 8 years after "Eurobasket 2007" (41,0 point of 55 point). According to MERLIN* results, the legacy value of a championship in Spain is of the highest level as compared with Poland, Lithuania and Slovenia. Lithuania is in the second place by the legacy value. The novelty of this study is based on new legacy assessment of a basketball event theoretical model preparation. The model was used to assess Eurobasket 2007–2013 Championships which assessed the consequences that have the greatest positive / negative legacy on the economy of Spain, Poland, Lithuania and Slovenia.

Keywords: sport industry, Eurobasket 2007–2013, legacy of sport event, MERLIN*.

OXIDATIVE CAPACITY IN AGING STRIATED MUSCLE: EFFECT OF EXERCISE

T. Seene, P. Kaasik

University of Tartu, Tartu, Estonia

Background. The purpose of this presentation is to discuss the decrease of oxidative capacity in aging striated muscle tissue and accompanied loss in life quality; describe the effect of endurance training on the oxidative metabolism in aging muscle. **Results.** There has been much debate about changes of oxidative and endurance capacity in aging skeletal and heart muscle. Physiological changes during aging are associated with a decline in muscle mass, strength and endurance. Loss of in the number of muscle fibres as well as decreased production of anabolic hormones testosterone and growth hormone, insulin-like growth factor 1, and an increase in catabolic agents are causes of sarcopenia. Decrease of endurance capacity during aging is related with reduced oxidative capacity of skeletal muscle due to decrease of mitochondrial biogenesis. It has been shown that the aging –associated reduction in AMP-activated protein kinase (AMPK) activity may be a factor in reduced mitochondrial function. AMPK is activated in response to endurance exercise and related to metabolic adaptation of skeletal muscle. Changes in muscle quantity and quality are leading to disability in the aging population. Decrease of endurance capacity during aging is related with reduced oxidative capacity of skeletal muscle due to decrease of mitochondrial biogenesis. In contrast to striated muscle cells with high oxidative capacity, hypertrophy of muscle fibres with lower and low oxidative capacity is not developed during endurance training. Skeletal muscles respond to endurance training by increasing the fibre composition towards increase of fibres with higher oxidative capacity. Among striated muscle cells cardiocytes have high oxidative capacity, skeletal muscle fibres type I and IIA have higher oxidative capacity and type IIB/X low capacity. Skeletal muscle fibres with higher oxidative capacity are relatively small compared to fibres with low oxidative capacity, pointing to an increase in relationship between fibre CSA and VO₂max. **Conclusions:** Endurance exercise training is the effective way to increase oxidative and endurance capacity in aging muscle tissue and help to prevent disability in elderly.

Keywords: striated muscle tissue, oxidative capacity, aging, exercise.

AGE-RELATED CHANGES IN NEUROMECHANICAL PROPERTIES OF THE QUADRICEPS FEMORIS MUSCLE IN WOMEN

M. Pääsuke, J. Ereline, H. Gapeyeva, T. Kums, M. Leht, M. Nigul, K. Paju, R. Pääsuke

University of Tartu, Tartu, Estonia

Background. The aim of the present study was to investigate the contributions of neural and muscular factors to age-related weakness of the quadriceps femoris (QF) in moderately physically active women.

Methods. Sixteen young women (YW) with mean ($\pm$ SD) age of 22.3 ± 2.2 years and 14 older women (OW) with mean age of 74.7 ± 4.7 years volunteered to participate in this study. The torques generated during isometric maximal voluntary contraction (MVC) and electrically evoked twitch of the QF muscle were measured by custom-made dynamometer. Isometric twitches were induced by supramaximal femoral nerve stimulation. Voluntary activation of the QF muscle was assessed by twitch interpolated technique. The volume (VOL) of the QF muscle was determined by magnetic resonance Imaging. The body composition was measured by dual-energy x-ray absorptiometry. Physical activity was evaluated by Baecke questionnaire. Serum levels of interleukin-6 and by tumour necrosis factor-alpha (TNF-alpha) were analyzed. **Results.** MVC torque and voluntary activation of the QF muscle, and physical activity score were lower ($p < .05$) in OW compared to YW. Twitch peak torque and post-activation potentiation (PAP), MVC torque/VOL ratio, and twitch peak torque/VOL ratio did not differ significantly ($p > .05$) in measured groups. In YW, twitch PAP correlated positively with MVC torque ($r = .54$) and physical activity score ($r = .51$). In OW, twitch PAP correlated positively with voluntary activation ($r = .73$), VOL ($r = .66$) and physical activity score ($r = .59$). VOL of the QF muscle in OW correlated positively with physical activity score ($r = .53$) and negatively with TNF-alpha ($r = -.63$). **Conclusion.** In moderately physically active women, age-related weakness of the QF muscle might be more due to a reduced neural activation and muscle mass than due to changes in skeletal muscle contractile properties. No significant age-related changes in QF muscle quality were noted in this study by torques generated during maximal voluntary or evoked twitch contraction per unit of muscle volume. Twitch post-activation potentiation is associated with physical activity in young and older women. In older women, QF volume is associated with physical activity and level of inflammation.

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Keywords: ageing, women, skeletal muscle weakness, isometric force-generation, twitch potentiation.

CHANGING OF MINERAL STATUS IN ORGANISM OF YOUNG ATHLETES WITHIN ONE-YEAR TRAINING CYCLE

T. Krupskaja¹, L. Loseva¹, M. Pushkareva¹, O. Tsivunchyk¹, S. Anufrik¹, K. Milašius², M. Pečiukonienė²

*Yanka Kupala State University of Grodno¹, Grodno, Belarus
Lithuanian University of Educational Sciences², Vilnius, Lithuania*

Background. Minerals and trace elements are an important factor in increasing the athlete's efficiency and effective implementation in training, work and recovery. They contribute to a more rapid and effective solution in a high competitive training, and stimulate further developing of sports skills. Today's

trainings and competitions' conditions make pressure and have crucial requirements for the major functional systems of the body of an athlete and lead to profound functional exhaustion of resources. Thus, the role of the various tools helping to provide high performance, efficient flow restoration and adaptive processes has been greatly demanded. Therefore, study of hair in order to identify the balance of micro- and macro-elements in the body along with studies of blood, plasma, urine became significantly more and more interesting in the recent years. Concentration of trace elements in the hair allows to get an idea how they are taken by the organism over a long period of time and to study relative correlations with different genetic, dietary and environmental factors. One shall take into consideration that the concentration of macro- and microelements in the hair depends on the age, sex and place of residence. It indicates the status of the organism in general and a single hair sample is an integral indicator of mineral metabolism processes in the body. Nevertheless, it is still not enough information about the mineral status for young athletes of different sex, age and sport activities at various stages of preparation within one-year cycle. Research aim was to identify changes in the macro- and microelement status for young athletes involved in different sport activities depending on the preparation period within one-year training cycle. **Methods.** A total of 78 young athletes, aged 12–17 years, of which 32 were swimmers (I group), 17 – tennis players (II group) and 29 – Taekwondo athletes (III group) participated in the study. Biological material (hair samples), the volume of 0.5–0.6 g were taken for experimental studies in three periods of time, s.a. preparatory, competitive and transition period within one-year training cycle. Hair samples were analyzed using the method of X-ray fluorescence (XRF) in order to detect multiple elements. For quantitative analysis 8 chemical elements (sulfur, potassium, calcium, iron, copper, zinc, strontium and selenium) were determined in a single hair sample. **Results and conclusion.** A non-invasive method to determine mass fraction of the chemical elements (sulfur, potassium, calcium, iron, copper, zinc, lead, chlorine, bromine, strontium, selenium) in a hair sample is an informative method of assessing the physiological response of the body (young athletes) with physical activity at different stages of preparation. The statistical analysis of the obtained results revealed the dependence of the concentration of trace elements from a kind of sport activity and stage of preparation for young athletes.

Keywords: chemical elements, X-ray fluorescence analysis, young athletes, preparation stage.

COMPARATIVE ANALYSIS OF RACE MESOCYCLE IN PREPARING ELITE CANOEISTS (1000) FOR CHAMPIONSHIPS IN 2014 AND 2015

R. Dadelienė¹, R. Nekriošius², E. Balčiūnas¹

Lithuanian University of Educational Sciences¹, Vilnius, Lithuania
Lithuanian Sports University², Kaunas, Lithuania

Background. Anaerobic alactic, glycolytic and aerobic reactions are involved in the energetics of kayakers starting with the distance of 1000 meters lasting for 3–4 minutes (Dal Monte, 1996; Wilmore et al., 2008). Studies of Borges et al. (2015) demonstrate that $VO_2\text{max}$ has a close connection with the results achieved in competitions. Training at high-altitude is frequently used in the mesocycle for developing aerobic capacity (Wilber, 2011; McLean et al., 2013; Cristina & Catalin 2015). The aim of our work is to examine changes in aerobic capacity of highly skilled kayakers based on the race mesocycle in preparing for 2014 World Championship without using high altitude training and in preparing for 2015 World Championship by using high altitude training. **Methods.** Preparation of two elite kayakers during the race mesocycle for 2014 and 2015 world championships, where they won respectively the 6th and 7th places,

has been studied. The computer system Garmin Connect Forerunner 910XT was used to determine the scope of work and intensity during exercise. Aerobic capacity was studied by using a special DanSport Kayak Ergometer and the gas analyzer Oxycon Mobile 781023-052-5.2 according to Thode (1991) methodology before the mesocycle, before the race and after the race. **Results.** Studies have shown that high-altitude training in 2015 was carried out during the race mesocycle at the less mixed aerobic anaerobic zone than training in 2014 under conventional conditions and in the aerobic zone. A significant increase of haemoglobin concentration in the blood was determined during high altitude training, and hematocrit also increased significantly. Changes in VO₂max were not identified during the race mesocycle in 2014 and 2015. Work capacity at the critical limit of intensity before the race in 2014 and 2015 was at its peak, and in 2015, such increased special work capacity was maintained longer. Significant changes in work capacity within the ventilatory anaerobic threshold were found neither in 2014, nor in 2015. Lactate concentration in the blood taken after special work at the critical limit of intensity was between 11.6 and 14.8 mmol/l. Increased blood lactate concentrations were recorded in 2015 when training was carried out under high-altitude conditions. In 2015, the world championship was started on the fourth and sixth day after high-altitude training. It was observed that on the sixth day the athletes started worse as the time of increase of work capacity of the first phase after high-altitude training had already passed.

Keywords: kayaking, aerobic capacity, VO₂max, ventilatory anaerobic threshold.

DIFFERENCES IN FUNCTIONAL PERFORMANCE OF FALLERS AND NON-FALLERS WITH PARKINSON'S DISEASE

K. Medijainen, P. Taba, A. Lukmann, M. Pääsuke

University of Tartu, Tartu, Estonia

Background. Parkinson's disease (PD) is neurodegenerative disease characterized by tremor, rigidity, bradykinesia, gait disturbances and postural instability. Individuals with PD are known to experience falls commonly, even when compared with other fall-prone population groups. There is an extended number of tests and questionnaires used in fall risk assessment of PD patients. Still, it remains unclear which of these demonstrate distinct differences in non-fallers and fallers with PD. The aim of the study was to detect which commonly used fall risk assessment measures able to distinguish fallers and non-fallers with PD. Data was collected from 26 participants (8 persons with fall history) with mild to moderate Parkinson's disease. Fall risk was assessed with five-time-sit-to-stand test, Freezing of Gait Questionnaire, Activities Specific Balance Scale, 10 m walk test at three different speeds, Timed-Up-and-Go test, Four—step-test (FSST) and hand grip measurement. Additionally, neurological assessment was performed with Movement Disorder Society Unified Parkinson Disease Scale (UPDRS + subscales) and Hoehn&Yahr Scale (HY). **Results.** Neither of the used questionnaires was able to distinguish participants with fall history. Functionally, patients with no history of falling demonstrated significantly higher hand grip strength (dominant hand $p = .02$, non-dominant hand $p = .041$, in accordance with Wahba et al. (2013). They performed a 10 m walk test at motivated fast speed ($p = .042$) and FSST ($p = .036$) significantly faster. In addition, fallers were assessed to have more advanced PD according to HY (0.019) and higher score at postural instability and gait disturbance score of UPDRS (proposed by Stebbins et al. (2013). **Conclusion.** PD patients with falling history demonstrate lower hand grip strength and slower performance in functional test of dynamic balance (FSST). Current cut-off scores of questionnaires and functional tests used in fall risk assessment of patients with PD need revision.

Keywords: Parkinson, fall risk assessment, handgrip strength.

COMPARISON OF DIFFERENT STRIKES PERFORMING IN YOUNG TENNIS PLAYERS WITH DIFFERENT TRAINING PERIOD

J. Ereline, H. Gapeyeva, T. Kums, M. Pääsuke

University of Tartu, Tartu, Estonia

Background. The aim of the study was to compare the ability to perform the strike of different type and to estimate the upper extremity motor performance in young tennis players. **Methods.** Twenty young male tennis players aged 12 to 13 years participated in the study. In group I training period was 4 years ($n = 10$) and in group II 2 years ($n = 10$). All subjects were right-handed. The isometric handgrip strength (HGS) was measured by hand held dynamometer. The isokinetic peak torque (PT) and maximal rate of force development (RFD) of shoulder muscle (SM) at angular velocity of $90^\circ/\text{s}$ and $180^\circ/\text{s}$ was measured by isokinetic dynamometer. For measurement of the velocity of tennis ball (VTB) and energy of strike (ES) for different types of strike (strike of from above (SFA) and strike from the side (SFS)) two shock sensors were used. One of sensors located on the racket and other on the target. During the test distance between subject and the target (dimensions 1×1.5 m) was eight meters. Four tests were performed for each strike type and mean of VTB and of ES were calculated. **Results.** The PT values (mean $\pm$ SE) in group I were 34.1 ± 2.1 N·m and 22.1 ± 1.6 N·m at angular velocity of $90^\circ/\text{s}$ and $180^\circ/\text{s}$, respectively, and in group II were respectively 32.5 ± 2.0 N·m and 16.7 ± 1.1 N·m ($p < .05$ compared to group I). The RFD values at angular velocity $180^\circ/\text{s}$ in group I were 1516 ± 106 N/s and in group II 1205 ± 94 N/s ($p < .05$ compared to group I). The VTB values in group I was higher at SFA and SFS strikes 117.3 ± 7.1 km/h and 101.8 ± 6.3 km/h as compared to group II – 82.2 ± 7.7 km/h ($p < .01$) and 70.0 ± 6.1 km/h ($p < .01$), respectively. The HGS values for right hand had high correlation ($r = .75$, $p < .01$) with PT at angular velocity of $180^\circ/\text{s}$. This could be related to using of specific training exercises in tennis (1, 2). **Conclusions.** The VTB and ES in different types of strike were significantly greater in players with training period of 4 years. The PT and RFD of SM at angular velocity of $180^\circ/\text{s}$ were significantly greater in players with training period of 4 years, but these characteristics did not differ significantly between two groups at angular velocity of $90^\circ/\text{s}$. The HGS was significantly greater in I group and had significant correlation with PT at angular velocity of $180^\circ/\text{s}$.

Keywords: handgrip strength, isokinetic strength, young male tennis players, velocity of tennis ball.

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ASSOCIATION OF GENE VARIANTS WITH HIGH-SPEED, STRENGTH AND POWER SPORTS IN LITHUANIANS

V. Ginevičienė¹, E. Prancėvičienė¹, L. Tubelis², A. Utkus¹, V. Kučinskas¹

Vilnius University¹, Vilnius, Lithuania

Lithuanian University of Educational Sciences², Vilnius, Lithuania

Background. HIF1A, PPARA, PPARG and PPARGC1A genes code for transcription factors and co-activators primarily involved in glucose, insulin and lipid metabolism, mitochondrial biogenesis, thermogenesis and regulation of muscle fibre type composition. AMPD1 codes for skeletal muscle-specific adenosine monophosphate deaminase involved in the regulation of muscular energy metabolism. Gene variants (HIF1A rs11549465 C/T, PPARA rs4253778 G/C, PPARG rs1801282 C/G, PPARGC1A rs8192678 G/A, AMPD1 rs17602729 C/T) were studied for association with male sprint/power performance in Lithuanians. **Methods.** We studied male elite athletes ($n = 68$) engaged in high-speed, strength and power sports (mean age 23.2 ± 3.1) grouped into track and field (short distance runners, jumpers, throwers, $n = 38$) and wrestlers ($n = 30$) and 176 healthy non-athlete Lithuanian male controls. Genotyping was performed by PCR-RFLP. Genotype/allele frequencies were compared using χ^2 and exact Fisher tests. The binomial logistic regression analysis was conducted to assess the chances of belonging to the given sports group compared to controls. **Results.** Genotypes were in Hardy-Weinberg equilibrium within all groups ($p > .05$). PPARG and PPARGC1A genotype/allele frequencies were similar in athletes and controls. Rare alleles PPARA C (25.7 vs. 15.9%, $p = .02$) and AMPD1 C (91.9 vs. 84.4%, $p = .03$) were more prevalent in athletes. PPARA C allele was significantly more frequent in track and field athletes (26.3 vs. 15.9%, $p = .02$) while AMPD1 C allele was more prevalent in wrestlers (95 vs. 89.5%; $p = .02$). Rare HIF1 T allele was significantly more frequent in wrestlers compared to track and field (21.7 vs. 13.5%; $p = .03$). Odds ratio (OR) of being a wrestler rather than track and field athlete among carriers of HIF1 T allele (CT&TT) was 3.2 (95%CI (1.04–11.02), $p = .026$). **Conclusions.** In power-oriented Lithuanian athletes PPARA C and AMPD1 C alleles were over-represented compared to controls. Chances of achieving better results in wrestling sport rather than track and field is about 3 times higher for HIF1A CT&TT genotypes. These SNPs, related to muscular activity in anaerobic mode in humans, have already been associated to power-related phenotypes by others, therefore we replicated previous findings. In conclusion, HIF1A T, PPARA C and AMPD1 C alleles can be regarded as markers associated with liability to high-speed and strength athletics.

Keywords: strength and power sports, gene variants, elite athletes.

ASSESSMENT OF THE IMPACT OF SHORT-TERM CREATINE SUPPLEMENTATION ON UPPER-BODY ANAEROBIC POWER IN TRAINED WRESTLERS

V. Ööpik, M. Aedma, S. Timpmann, E. Lätt

University of Tartu, Tartu, Estonia

Background. Creatine (CR) is considered an effective nutritional supplement having ergogenic effects, which appear more pronounced in upper-body compared to lower-body exercise. Nevertheless, results regarding the impact of CR loading on repeated high-intensity arm-cranking exercise are scarce and in some cases conflicting. Furthermore, few of the conducted studies have structured their research

designs to mimic real world sporting events. Therefore, our purpose was to address the hypothesis that CR ingestion would increase anaerobic power output in consecutive upper-body intermittent sprint performance (UBISP) tests designed to simulate wrestling matches on a competition-day. **Methods.** In a double-blind, placebo-controlled, parallel-group study, 20 trained wrestlers were assigned to either placebo or CR supplemented group ($0.3 \text{ g} \cdot \text{kg}^{-1}$ of body mass per day). Four 6-min UBISP tests interspersed with 30-min recovery periods were performed before (trial 1) and after 5 days (trial 2) of supplementation. Each test consisted of six 15-s periods of arm-cranking at maximal executable cadence against resistance of $0.04 \text{ kg} \cdot \text{kg}^{-1}$ body mass interspersed with 40-s unloaded easy cranking periods and 5-s acceleration intervals (T1–T4). Mean power (MP), peak power (PP), fatigue index and heart rate parameters were measured during UBISP tests. Also, body weight and hydration status were assessed. Principle measures were statistically analysed with mixed-model ANOVAs. **Results.** Mean individual CR consumption in the CR group was $24.8 \pm 2.5 \text{ g} \cdot \text{d}^{-1}$. No significant ($p > .05$) differences occurred in body mass or hydration status indices between the groups or across trials. MP, PP and fatigue index responses were unaffected by supplementation; although, a significant reduction in MP and PP did occurred from T1 to T4 in both trial 1 and 2 ($p < .001$). Overall heart rate responses in the tests tended to be higher in the CR than PLC group ($p < .05$); but, trends in responses in trials and tests were comparable ($p > .05$). **Conclusion.** These results suggest that 5-day CR supplementation has no impact on upper-body muscle anaerobic power output in consecutive anaerobic UBISP tests mimicking wrestling matches on a competition day.

Keywords: competition day simulation, dietary supplementation, physical performance.

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THE MYOSTATIN GENE K153R POLYMORPHISM IN RUSSIAN AND LITHUANIAN STRENGTH / POWER ATHLETES

M. Aksenov¹, V. Ginevičienė²

Buryat State University¹, Ulan-Ude, Russia
Vilnius University², Vilnius, Lithuania

Background. The myostatin (MSTN) gene, also called “growth and differentiation factor 8” encodes a negative regulator of skeletal-muscle growth. Variants of the MSTN gene are associated with muscle hypertrophy phenotypes in a range of mammalian species. The MSTN K153R (Lys153Arg, rs1805086, 2379A>G) polymorphism may influence skeletal muscle phenotypes. Carrying the rare 153R allele was associated with greater muscle mass. We hypothesized that the MSTN 153R allele will be more prevalent among power-oriented athletes compared to non-athletes. The aim of the study was to assess the

frequency of the MSTN K153R polymorphism among two cohorts of European athletes and non-athletes controls (from Russia and Lithuania). **Methods.** A cohort of European Caucasians - 148 athletes (53 Russian powerlifters, 103 strength/power Lithuanian athletes) and 172 controls (non-athletes healthy, unrelated citizens of Russia ($n = 45$) and Lithuania ($n = 127$)) were genotyped for MSTN polymorphism (using the Taqman allelic discrimination assay). **Results.** Seven powerlifters (13% from Russia) and one canoe rowing athlete (1% from Lithuania) were carriers of the rare MSTN R allele (R/R genotype) and only one powerlifter carried the heterozygous K/R genotype (2% from Russia). The carriers of the rare MSTN R allele were not found in controls group. MSTN 153R allele frequency was significantly higher in powerlifters compared to controls (14.1% vs 0%, $p = 0.006$). **Conclusions.** In the present study the minor MSTN 153R allele was significantly more frequent in powerlifters compared to other athletes and controls. In contrast to athletes, the MSTN R/R genotype was not found in controls. The MSTN K153R polymorphism showed little variability across the cohorts we studied. Further research is needed with larger cohorts of these and other European populations. Whether evaluation of the MSTN K153R polymorphism can be used for sports selection in young athletes needs to be further studied.

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Keywords: myostatin gene, genotype and allele frequency, strength/power athletes.

EMG CHARACTERISTICS OF M.GASTROCNEMIUS WITH EXCHANGED LOCAL BLOOD FLOW REGULATION

A. Paeglitis¹, N. Varpa¹, M. Paasuke², J. Ereline², H. Gapejeva², Z. Galeja¹

*Latvian Academy of Sport Education¹, Riga, Latvia
University of Tartu², Tartu, Estonia*

Background. From the theory of applied physiology (AK) it is known that different external or internal influences could change neuromuscular regulation on the level of organisation of motor patterns (MP) and observed muscle could become weak-tested or become hypertonic. Research of 1970s described experimentally proven concept of muscle local blood flow redistribution to capillaries feeding active muscle fibres. Parallel with motor unit recruitment was regulated by somatic nervous system; the vegetative nervous system regulated local blood flow redistribution through capillaries feeding active muscle fibres. Incoherent action of these two neural systems led to inadequate energy supply for active motor units. Coordination of these two systems takes place in sub cortical level where MP of active muscle is organised. **Methods.** Bringing muscle to weak-tested condition with characteristic continuously increasing blood flow through active muscles during static voluntary contraction (SVC), we analysed possible changes in EMG activity between normal and weak-tested muscle conditions. In this experiment participants were young healthy women aged 20–25. We analysed EMG parameters – median frequency (MF) and root mean square (RMS) in 18 gastrocnemius muscles with normal contraction MP, and in weak-tested condition we obtained irritation of the greater omentum in pyloric part of stomach. EMG activity was recorded from medial part of gastrocnemius muscle using bipolar skin electrodes. Bioelectrical activity registries in rest position, during SVC with 5%MVC and MVC for both m. gastrocnemius MP conditions. The **results** were automatically analysed and calculated for MF and RMS. Analysing obtained results we observed statistically significant decrease of MF – 26 Hz and RMS decrease of 41,7 μ V·s in rest position, RMS decrease of 41,7 μ V·s in MVC position ($p > .95$) and force of MVC decreases for 20%. **Conclusion.** These results confirm AK theory that weak-tested muscle is not able

to contract in tonic contraction state and cannot realise full contraction force. The cause of this problem could be changes in neural regulatory processes, which reflects in changes of EMG parameters.

Keywords: normal and weak-tested muscle, muscles bioelectrical characteristics.

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THE CHANGE OF PARAMETERS CHARACTERIZING RESPIRATORY CYCLE AFTER REFLECTOR IRRITATION

Z. Galeja, A. Paeglitis, U. Gavrona, N. Varpa

Latvian Academy of Sport Education, Riga, Latvia

Abstract. In the literature, it was established that the pulmonary function changes, changing only some of the pulmonary function providing mechanism parameters, such as individual rib movement, the left and right rib synchronous operation, affect not only the respiratory system but also other body systems. The literature on the respiratory system evaluation describes methods which emphasize the measurements of the entire thorax as a whole. The aim is to find out how reflector irritation affects parameters that characterize the respiratory cycle in the level of vertebral column segments C0-C3 and C6 -Th3. **Methods.** The study included 20 men, aged 20–25 with a common feature of the deep neck flexor muscle functional weakness. To assess the rib (3, 4, 5.) pair mobility and movement asymmetry between the right and left ribs of the body, photogrammetric method was used. To evaluate pulmonary vital capacity the method of spirometry was used. For evaluating results methods of mathematical statistics was used. **Results.** Analyzing rib movements during respiratory cycle before reflector irritation along X axis 3rd right moves 2.95 ± 0.13 cm, 3rd left rib moves 2.88 ± 0.14 cm; 4th right moves 3.01 ± 0.67 cm, 4th left rib moves 2.94 ± 0.15 cm; 5th right rib moves 3.25 ± 0.14 cm, 5th left rib moves 3.04 ± 0.16 cm. After the reflector irritation along X axis these movements increase and these changes are statistically significant ($\alpha \leq .05$). Analyzing rib movements during respiratory cycle before reflector irritation along Y axis 3rd right moves 1.83 ± 0.07 cm, 3rd left rib moves 1.80 ± 0.06 cm; 4th right moves 2.15 ± 0.07 cm, 4th left rib moves 2.29 ± 0.08 cm; 5th right rib moves 2.44 ± 0.09 cm, 5th left rib moves 2.54 ± 0.09 cm. After the reflector irritation along Y axis these movements increase and these changes are statistically significant ($\alpha \leq .05$). Vital capacity is 5.55 ± 0.09 litres before reflector irritation, but after is 5.83 ± 0.09 litres. These changes are statistically significant ($\alpha \leq .05$). **Conclusions.** Reflectory irritation of neck segments causes adaptation processes of the whole organism and through the neural regulation influence separate rib motions.

Keywords: rib mobility, manipulation of vertebral column segments.

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EFFECT OF BODY FAT CONTENT AND LEAN BODY MASS ON VERTICAL JUMP HEIGHTS IN SOCCER PLAYERS

I. Pontaga

Latvian Academy of Sports Education, Riga, Latvia

Background. Increase of the body weight can be due to additional amount of skeletal muscles in soccer players or due to growth of the fat content in the body (Wittich et al., 2001). This is very important to analyze body composition in athletes with a purpose of selecting players for specific roles (Melchiorri et al., 2007). The aim of the investigation is to determine an effect of the body lean mass and fat content on vertical jumps heights in soccer players. **Methods.** Twenty nine well trained soccer players participated: the mean age was 23.6 ± 5.1 years, height – 183.7 ± 7.3 cm, weight – 79.3 ± 8.0 kg, lean body mass – 64.6 ± 6.1 kg, body fat content – 18.4 ± 3.7 %. The body mass composition is measured by the Body Composition Analyzer BC-418 (Tanita Corporation, Japan). Vertical jumps heights are measured on a special PC based diagnostic system FiTRO Jumper (Bratislava, Slovakia). Two kinds of jumps were performed: from standing position on the apparatus platform with the knees at the angle 90° and the hands on hips (SJ) and from the standing position and before to jumping counter– moved until the knee was flexed approximately to 90° and free movements of the arms (CMJ). Every kind of jumps was repeated five times, and the best results (highest SJ and CMJ) were taken into account. The relationships between the body lean mass (LM), body fat content (BF) and the height of jumps (SJ and CMJ) are determined. **Results.** The correlation between the LM of soccer players and SJ height is not statistically significant ($r = .20$, $p > .05$) and the correlation between the LM and CMJ height ($r = .24$, $p > .05$). This means, that the height of jumps does not depend on the skeletal muscles mass of soccer players (the main content of the LM). The relationship between the BF and SJ height was linear: $SJ \text{ (cm)} = 59.62 - 0.70 \cdot BF \text{ (%)}$; where $r = -.48$; standard error of the regression equation $S_{xy} = 4.74$ cm; $p < .013$. The relationship between the body fat content (BF) and CMJ height is negative linear: $CMJ \text{ (cm)} = 73.69 - 0.91 \cdot BF \text{ (%)}$; where $r = -.50$; $S_{xy} = 5.70$ cm; $p > .013$. **Conclusion.** Additional lean body mass due to skeletal muscles hypertrophy in soccer players does not influence vertical jumps height. Increase of the body fat content is a reason of the decrease of vertical jump height in soccer players.

Keywords: vertical jump height, body fat, lean body mass, soccer players.

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THE INCREASE OF STRENGTH OF ARM MUSCLES AND TRAINING OF MOTION ACCURACY OF PATIENTS WITH PARKINSON'S DISEASE

S. Sipavičienė¹, M. Pliuškis¹, A. Skurvydas¹, I. Klizienė², J. Požėrienė¹

Lithuanian Sports University¹, Kaunas, Lithuania
Kaunas University of Technology², Kaunas, Lithuania

Background. Decrease muscular strength may be a primary symptom characteristic in Parkinson disease (PD), (Cano-de-la-Cuerda et al., 2010). Scientific research showed the importance of physical therapy in the treatment of patients with PD (Schenkman et al., 2012; Borrionio et al., 2015). Therefore, we believe that it is appropriate to investigate hand strength increase and the accuracy of motion training opportunities using the isokinetic dynamometer for the patients with PD. **Methods.** The study involved 20 subjects (the experimental group had 11 men with PD and the control group had healthy men). The subjects were tested by using "Biodex Medical System PRO 3". The muscle strength of both hands were evaluated with isokinetic mode at 180 °/s velocity and isokinetic mode at 60 °/s velocity. The program with the isokinetic dynamometer was applied for 2 times a week for 8 weeks in both test groups. **Results.** After the experiment, the muscle strength of the subjects has increased ($p < .05$), the coefficient of arm strength fatigue has decreased ($p < .05$), the accuracy of arm motion has improved statistically significantly ($p < .05$) compared with the primary results. The results change was statistically significantly ($p < .05$) between the groups. **Conclusions.** The eight weeks program performed by isokinetic dynamometer has increased arm muscle strength and the accuracy movement for people with Parkinson disease.

Keywords: motion accuracy, strength, Parkinson's disease, isokinetic dynamometer.

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GLUCOCORTICOIDS CAUSED CHANGES IN ELASTICITY AND TONE IN OLD RATS' SKELETAL MUSCLE

A. Pehme¹, K. Alev¹, A. Vain¹, M. Aru², P. Purge¹, P. Kaasik¹, T. Seene¹

University of Tartu¹, Tartu, Estonia
Tartu Health Care College², Tartu, Estonia

Background. Administration of pharmacological doses of glucocorticoids leads to reduction in muscle mass, wasting of muscle, loss of muscle strength, selective atrophy of fast-twitch muscle fibers, and lower turnover rate of contractile proteins. The aim of this study is to estimate skeletal muscle elasticity

and tone in aging rats during dexamethasone administration and to find relationship between muscle atrophy and the above described muscle properties. **Methods.** The animals used in the study were female rats of the Wister strain, which were 2 years old at the beginning of the experiment. Dexamethasone was administered intraperitoneally 100 µg/100 g bm daily for 10 days. The animals were weighed daily, and drug doses were adjusted to changes in body mass. Lean body mass (Dual Energy X-ray Absorptiometry using the DPX-IQ densitometer (Lunar, Madison, WI, USA), with a special software for small animals), muscle biomechanical and viscoelastic properties (handheld MyotonPRO device MyotonPRO, Myoton Ltd, Estonia) were measured at baseline and after 10 days dexamethasone treatment. **Results.** After 10 days of dexamethasone treatment lean body mass decreased 16%, logarithmic decrement and oscillation frequency increased 17% and 32% respectively. The smaller the value of decrement, the more elastic was the tissue. A higher oscillation frequency indicated higher tone. The value of oscillation frequency correlated positively with the degree of atrophy. **Conclusions.** Changes of muscle tone (oscillation frequency) in aging animals after dexamethasone administration depends on the degree of muscle atrophy.

EFFECT OF STATIC STRETCHING ON DANCERS' PHYSICAL PERFORMANCE

T. Kums, S. Kängsepp, I. Neissaar

University of Tartu, Tartu, Estonia

Background. This study evaluated the effect of static stretching exercises on dancers' jumping performance and association with body composition. **Methods.** Twelve dancers aged 21.2 ± 2 years (170 ± 11 cm; 64.4 ± 10 kg; BMI 21.2 ± 2.4 kg/m², (mean $\pm$ SD)) participated in the study. Their prior dance experience 11.9 ± 5 years. Five separate jump tests were performed: leap from position I to I, leap from position I to II (static jumps didn't use swing), splits leap, fermee, and arch leap (dynamic jumps with swing). Dancers were tested twice. Prior to the first test dancers did regular dynamic warm-up. A week later, before second testing, participants performed static 30-s stretching exercises for quadriceps, hamstring and calf muscles. Jumping height was recorded by infrared device "Ivar" (Estonia) and body composition by Jawon IOI 353 device (Jawon Medical Co, Ltd). **Results.** The present study revealed that jump height decreased ($p = .012$ and $p = .028$), respectively in both static jumps after stretching among dancers who had greater visceral fat content when comparing the performance with warm up exercise. After 30-second static stretching exercises the height of dynamic jumps did not change significantly in dancers with greatest visceral fat. There were medium to high correlations between static jump height after static stretching and body fat % ($r = -.64 \dots -.75$) and visceral fat content ($r = -.47 \dots -.70$) respectively. **Conclusions.** Static stretching has negative effect on static jump height, but does not inhibit significantly the height of dancers' dynamic jumps. Static stretching reduced significantly leaps that do not require preparatory movement in dancers with greater visceral fat contents. In dancers with normal body composition there was no effect of static stretching on jumping performance. Static stretching is rather contraindicated for dancers with greater visceral fat content, which will be the more harm than good achievements of jumping height. Dancers with normal body composition can use static stretching in warm up, but it will not significantly add height of jump.

Keywords: static stretching, body composition, jumping height, dancers.

BETTER ECONOMY IN FIELD RUNNING THAN ON THE TREADMILL

R. Pind, S. Suvi, P. Purge, K. Mooses, A. Pehme, P. Kaasik, M. Mooses

University of Tartu, Tartu, Estonia

Background. Running economy (RE) has been traditionally measured by running on treadmill but this is not the same as running overground. Running on a treadmill is influenced by the lack of air resistance which purportedly results in lower energy cost and therefore better RE compared with track conditions at the same velocity. Research aim was to investigate the differences between physiological parameters and gait characteristics between running on indoor track and on treadmill (1% inclination). **Methods.** 17 male endurance athletes (25.8 ± 3.8 years; 73.9 ± 8.1 kg; 1.82 ± 0.06 m; 22.4 ± 1.6 kg·m⁻²) performed 4-minutes running bouts (at the speed of 11, 13 and 15 km·h⁻¹) interspersed with 5 minute breaks on indoor track and treadmill in randomized order. Metabolic parameters together with heart rate (HR), stride frequency, blood lactate concentration and rating of perceived exertion was measured. **Results.** Significantly lower VO₂ was found on the track compared to the treadmill conditions at speeds 11, 13 and 15 km·h⁻¹ ($p = .000$; $p = .000$; $p = .006$, respectively). Ventilation (VE) followed exactly the same pattern ($p = .000$; $p = .000$; $p = .006$). Stride frequency was significantly lower on track compared to treadmill at the speed 13 km·h⁻¹ ($p = .012$) and such a tendency was seen at speeds 11 and 15 km·h⁻¹ ($p = .064$; $p = .052$, respectively). Interestingly, HR was significantly higher on treadmill compared to track only at the speeds of 11 ($p = .001$) and 13 ($p = .003$), but not at 15 km·h⁻¹ ($p = .565$). There were no differences in blood lactate concentrations between two running conditions; however rating of perceived exertion (RPE) was significantly lower on track compared to treadmill conditions at all three speeds. **Conclusion.** The widely used 1% inclination on the treadmill is too high to reproduce similar efforts to those in track running on submaximal speeds. It remains to be studied whether the better running economy on track is caused by the changes in running technique.

Keywords: maximal oxygen uptake, running economy, running performance, running track, treadmill test.

RELATIONSHIP BETWEEN BODY COMPOSITION AND BLOOD BIOMARKERS IN OLDER WOMEN

M. Gintilienė¹, H. Gapeyeva², J. Erelinė², T. Kums², J. Jürimäe², M. Pääsuke²

Lithuanian Sports University¹, Kaunas, Lithuania

University of Tartu², Tartu, Estonia

Background. The aim of this study was to evaluate the relationship between body composition parameters and blood biomarkers in community-dwelling older women. **Methods.** A group of 31 women aged 69–81 years (mean age of 74.1 years) participated in this study. The body composition was measured by dual-energy x-ray absorptiometry. Absolute and relative values of whole body fat, body lean mass and appendicular lean mass (ALM), bone mineral content (BMC) and bone mineral density (BMD) were assessed in this study. Venous blood samples were collected and fasting serum concentrations of leptin, adiponectin, ghrelin, insulin, insulin growth-factor 1 (IGF-1), resistin, tumor necrosis factor α (TNF- α) and interleukin-6 (IL-6) were determined. **Results.** Serum leptin, log insulin and IL-6 concentrations were correlated ($p < .05$) positively with body mass, fat mass and fat percent ($r = .36$ – $.64$) and negatively with lean mass percent ($r = -.36$ – $.66$). BMC and BMD correlated ($p < .05$)

positively with body mass, fat mass and fat percent ($r = .36 - .70$) and negatively with lean mass percent ($r = -.46$ and $r = -.40$, respectively), whereas these parameters did not correlate significantly ($p > .05$) with any measured blood biomarkers. No significant correlations ($p > .05$) were noted between serum adiponectin, resistin, ghrelin, TNF- α , IGF-1, and assessed body composition parameters. Serum TNF- α correlated ($p < .05$) positively with leptin ($r = 0.46$) and leptin/adiponectin ratio ($r = .49$), and negatively with adiponectin ($r = -.38$), whereas serum IL-6 correlated ($p < .05$) positively with leptin ($r = 0.45$) and resistin ($r = .40$) values. **Conclusions.** In healthy older women, higher serum leptin, insulin and IL-6 were associated with higher body fat mass and lower lean body mass values. In contrast, no relationship of serum adiponectin, resistin, ghrelin, IGF-1 and TNF- α concentration with measured body composition parameters were observed in healthy older women in this study.

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Keywords: ageing, cytokines, body composition, osteoporosis, women.

GRIP AND BRIDGE TECHNIQUE IN NOVUS PLAYERS WITH DIFFERENT TRAINING EXPERIENCE

V. Talts, J. Ereline, M. Pääsuke, H. Gapeyeva

University of Tartu, Tartu, Estonia

Background. Stance, bridge and handling the cue are technical elements of billiards (1) and have to be acquired at an introductory level (2). Correct grip and forming a steady bridge to support the cue are considered the basis of accurate shots in cue sports. But as Chung et al. (2014) claim, even top players do not always follow the rules which are considered the basics. The aim of the present study was to compare cue grip and bridge technique in highly skilled (HSP), less skilled (LSP), and novice novus players (NP). **Methods.** Based on year 2015 ranking list, Estonian top ranked novus players (HSP, $n = 12$), players with lower ranking scores (LSP, $n = 28$), and beginners (NP, $n = 22$) with mean $\pm$ SE age 51.9 ± 3.1 , 42.3 ± 3.5 , and 9.1 ± 0.27 years, respectively, participated in the study. Their novus playing experience was 32.0 ± 3.8 , 12.0 ± 2.1 , 1.1 ± 0.1 years, respectively. Characteristics of their striking hand (placement of fingers on the cue, position of wrist, elbow joint, forearm, and upper arm during the shot) and bridge at novus strike were analysed by visual scores. **Results.** In 45.4% of the cases NP used an insufficient grip (thumb or index finger pointing up the cue). The same shortcomings were noted in 16.7% of HSP and in 10.7% of LSP. Assessing the placement of a cue arm during the shot, results showed that 36.4% of NP and 17.9% of LSP did not hold their forearm perpendicular to the playing surface. Open bridge technique was used by 83.3% of HSP, 85.7% of LSP and 72.7% of NP. The rest of the observed players applied closed bridge. From players who used open bridge, 40%, 18.5%, and 12.5% of HSP, LSP, and NP, respectively, committed their strike moving the cue on top of their bridge hand. In 77.3% of NP the bridge was assessed as unstable. No unsteady bridges were noted among HSP and LSP. **Conclusions.** It was concluded that most of competitive novus players used different variations of gripping the cue and bridge. No distinctive characteristics of grip and bridge technique were noted in HSP. The NP showed an unstable bridge and an incorrect grip technique.

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Keywords: Billiards technique, billiard players, cue arm kinematics.

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PHYSICAL ACTIVITY IMPACT ON BONE MINERAL DENSITY IN MIDDLE AGE AND ELDERLY WOMEN

V. Larins

Latvian Academy of Sport Education, Riga, Latvia

Background. Bone mineral density (BMD) significantly changes with the age up to 20-25 years and then gradually decreases, expressly in the age of menopause in women (Looker et al., 1998). BMD decrease is named osteopenia or osteoporosis which causes negative changes in the body, also commonly known as bone fractures in the elderly people (EPOS, 2002). BMD with the age is influenced by genetic factors, nutrition, changes in endocrine system, pharmacology etc. (Miles L., 2015). Taking into account the negative effect of osteoporotic process on health, actual are studies of various factors influence BMD change, including the effects of physical activity in the elderly. The aim of the research was to determine impact of physical activity on BMD on middle age and elderly women. Subjects of the research were 54 middle aged and elderly women, divided into 3 groups: 40–49, 50–59 and 60–69 years old. **Methods.** BMD was determined by DEXA densitometry method in the lumbar spine vertebrae L1–L4. Physical activity was evaluated by self-assessment in 10-point system. **Results.** BMD on average was –1.1, –1.2 and –1.8 SD in the first, second and third group accordingly. The initial development of osteopenia indicates that BMD decreases in women until 60 years of age, but after 60 this process rapidly increases and BMD decrease gain 60% ($p < .05$). In accordance with BMD diagnostic criteria (WHO, 1999) in the first group compliance of normal values were detected in 44%, in the second group - 33%, but in the third group only 17%. In the third group osteoporotic changes corresponding to osteopenia were established in 58%, but osteoporosis in 26% participants. In the evaluation of physical activity, insignificant decrease in the second group was obtained, but noticeable reduction in the third group ($p < .05$) was observed. Physical activity and BMD show positive correlation in all age groups, but with older age it shows close relationship. **Conclusions.** Obtained results allow concluding that in all age groups from 40 to 69 years old we established significant BMD decrease noticeable after 60 years of age. Physical activity in the 40–49 and 50–59 years of age groups correspond to the average, but in the group after 60 years we established fast decrease, and physical activity corresponded to the low level. In all age groups we obtained direct correlative relationship between physical activity and BMD indicating that physical activity had a

relevant role in BMD maintaining in middle age and prevented the development of osteoporosis in elderly people.

Keywords: bone mineral density, physical activity.

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ANALYSIS OF SERUM IRISIN CONCENTRATION IN RELATION TO BODY COMPOSITION AND SHORT-TERM PHYSICAL ACTIVITY

R. Lagzdina, M. Rumaka, G. Krievina, P. Tretjakovs

Riga Stradins University, Riga, Latvia

Background. In the regulation of metabolic intensity and body weight the role of skeletal muscles is considered to be increasingly important, due to the autocrine, paracrine and endocrine effects of myokines. Peptide irisin is one of the myokines with the widest, but also most controversial role in the regulation. Various studies have shown its impact on the overall energy consumption by stimulating fat tissue transformation and increasing heat production, as well as a possible connection with glucose regulation system. While numbers of studies have shown various results on effects of different types of physical activity on the irisin plasma concentrations, the cause for the quantitative change of the circulating irisin remains unclear. Aim of the work was to measure and compare the level of irisin in blood serum at rest and after a short exercise, analyze concentration of irisin depending on body composition and oxygen consumption during exercise. **Methods.** The study voluntarily engaged healthy adults ($n = 13$; mean age 30.1 ± 5.6 years) which body composition was measured with a bioimpedance analyzer Tanita MC-180. Before and after two short-term bouts of physical activity (walking, running) on the treadmill, participants were taken venous blood samples. Oxygen consumption was measured with the Oxycon Pro system. Irisin level in blood serum was determined by enzyme-linked immunosorbent assay. Wilcoxon test was used to evaluate changes of irisin concentration; the correlation analysis was performed using Spearman's method. **Results.** No statistically significant irisin changes in the serum after exercise was observed ($p = .46$). Strong correlation of irisin concentration with the body weight ($r = .75$, $p = .052$), as well with the lean body mass ($r = .75$, $p = .052$) and oxygen consumption in running ($r = .88$, $p = .008$) were found in males. Significant correlation in women with any of the body composition parameters and oxygen consumption was not identified. **Conclusions.** Short-term exercise on the treadmill does not credibly change the serum level of irisin. Irisin plasma concentration in male has strong, positive and

statistically significant correlation with body mass, lean body mass and oxygen consumption in running.

Keywords: myokines, irisin, physical activity.

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CYCLISTS WITH HIGHER FMS TEST SCORE HAVE BETTER POSTURAL STABILITY BUT NOT DIFFERENT PEDALLING EFFECTIVENESS DURING INCREMENTAL CYCLING EXERCISE

I. Rannama, K. Pedak, K. Reinpõld, B. Bazanov

Tallinn University, School of Natural Sciences and Health, Tallinn, Estonia

Background. The aim of the present study was to compare pedalling technique effectiveness and postural stability during different intensity cycling between high and low FMS score cyclists.

Methods. As many as 31 competitive cyclists (18.5 ± 2.1 years; 1.81 ± 0.06 m; 73.7 ± 7.5 kg) were categorized based on Functional Movement Screen (FMS) test (Cook et al., 2006) results in low (LS, $n = 19$; $FMS \leq 14$) and high (HS, $n = 12$; $FMS > 14$) score group (Kiesel et al., 2007). The pedalling effectiveness (PE – % of positive effective force in pedalling cycle) and smoothness (PS = mean and peak effective force ratio of pedalling cycle in %) of both leg and 6 ground reaction force (GRF) components (3 linear and 3 angular) were measured during incremental cycling exercise (step 2 min, increment 25W). 6 DoF postural stability was expressed as body mass corrected standard deviation of 3 linear (N/kg) and 3 angular (Nm/kg) GRF components during 30 sec cycling in every incremental step. The two-way ANOVA was conducted to test the differences in pedalling kinetic and GRF parameters between LS and HS group in aerobic (AeL), anaerobic (AnL) and VO₂max (MAX) level cycling. **Results.** HS and LS group average FMS scores were 15.9 ± 1.4 and 13.0 ± 0.8 points, no significant ($p < .05$) differences in anthropometry and in any intensity level power values were found. The HS group had significantly lower relative anterior-posterior direction force fluctuation in AnL and MAX level and also lower torque fluctuation in rotational movements around vertical axis in all intensity levels. No differences in PE, PS and other GRF components between groups were found. **Conclusion.** The cyclists in higher FMS score group showed greater cycling specific postural stability, expressed in horizontal plane GRF components fluctuation, but had no different pedalling effectiveness compared with low FMS score cyclists.

Keywords: GRF, functional movement screen, pedalling technique.

INFLUENCE OF DIFFERENT OCCLUSION PRESSURE ON HEAMODYNAMICS AND MUSCLE WORK CAPACITY

K. Bunevičius, A. Grūnovas, E. Trinkūnas, A. Buliuolis, V.Šilinskas

Lithuanian Sports University, Kaunas, Lithuania

Background. Blood flow restricted resistance exercise has become a popular area of research. However, studies use a range of blood flow restriction and resistance exercise protocols. We hypothesized that different pressure occlusion applied before high-intensity work load would affect the muscle work capacity. The aim of this study was to define the influence of different pressure occlusion to muscles hemodynamic and work capacity. **Methods.** The participants in this study was endurance runners who had 4–6 years training experience ($n = 36$). They were divided into control and two experimental groups (120 mmHg) and (200 mmHg) pressures. They performed two physical workloads, before and after occlusion. In the experimental groups, the subjects underwent a 15 min circulatory restriction with a 40 mm wide cuff on the groin, in control group participants sat at rest. Muscle haemodynamics and work capacity were assessed using venous occlusion plethysmography, dynamometry and ergometry, near-infrared spectroscopy (Initial values of O_2 saturation (StO_2) were normalized to 100%). **Results.** In experimental groups applied 120 mmHg and 200 mmHg occlusion had a negative effect on muscle work capacity (decreased $9.3 \pm 2.2\%$ and $8.7 \pm 3.2\%$ respectively) ($p < .05$). In control group muscle work capacity decreased ($3.9 \pm 3.2\%$) ($p > .05$). During and at the end of the first and second exercise StO_2 values decreased from the baseline significantly in all groups ($p < .05$). During the second workload, StO_2 significantly decreased in the group with 200 mmHg occlusion until the midpoint of the workload ($52.7 \pm 3.7\%$), compared to the first exercise ($41.7 \pm 4.3\%$) ($p < .05$). Blood flow intensity decreased significantly at onset of 120 mmHg and 200 mmHg occlusion ($p < .05$). At the end of occlusion in experimental group with 120 mmHg (2.7 ± 0.3 ml/100 ml/min) and 200 mmHg (1.6 ± 0.2 ml/100 ml/min), and in control group (3.6 ± 0.2 ml/100 ml/min) arterial blood flow intensity was different ($p < .05$). **Conclusions.** Occlusion of 120 mmHg and 200 mmHg pressure in the groin area reduces arterial blood flow intensity, and work capacity in calf skeletal muscles. The 200 mmHg occlusion decreased StO_2 in calf muscle and affects oxygen delivery to working muscles during the workload.

Keywords: occlusion, blood flow, work capacity, O_2 saturation.

APPLYING "DIAL-TRACK M-SCAN"-SYSTEM TO ANALYSIS OF KINETIC PARAMETERS OF RUNNING TECHNIQUE

N. Lukmanova, O. Rumyantseva

Northern (Arctic) Federal University, Arkhangelsk, Russia

Background. Efficient technique in track-and-field performances is an important training objective. Biomechanical analysis contributes to technique explanation and performance improvement. In our study we analysed kinetic parameters of running technique using values of foot pressure force on support and amplitude fluctuations of the centre of mass during sprint running. **Methods.** Seven track-and-field sprint athletes (mean age: 20 ± 2 years) performed 30-meter speed running test with tensiometric insoles of "Dial-Track M-Scan" – system where parameters' values were calculated by its special software. In order to determine fluctuations of parameters specifically to test distance parts ("start", "mid-distance running", "finish"), standard statistical methods and correlation analysis were

used. **Results.** We found that measured foot pressure force on support had a tendency to increase up to 4% ($p > .05$) from "mid-distance running" to "finish". Maximal values of amplitude fluctuations of the centre of mass were on Y-axis in "start" part, but not significantly different from "mid-distance running" and "finish" parts ($p > .05$). On X-axis, amplitude fluctuations of the centre of mass had a tendency to increase up to 8% from "start" to "finish" ($p > .05$). Using correlation analysis we found negative dependence between the values of foot pressure force on support to all three parts of 30-meter test distance ($p < .05$). **Conclusion.** Applying "Dial-Track M-Scan"-system with tensiometric insoles we measured the values of foot pressure force on support and amplitude fluctuations of the centre of mass. We found a tendency of increase of these parameters performing 30-meter speed running test, but not significantly different between its parts. However, we found negative dependence between the values of foot pressure on support to all three parts of the test distance. This peculiarity could be considered as an important factor influencing athletic performance in track-and-field and other sport events.

Keywords: biomechanics, amplitude, centre of mass, pressure force, track-and-field performance.

POSTURAL STABILITY EVALUATION IN CHILDREN WITH FUNCTIONAL DISABILITIES. REVIEW AND PILOT TESTING

A. Zuša, A. Kļaviņa, Z. Galeja

Latvian Academy of Sport Education, Riga, Latvia

Background. Postural stability is an early developing motor skill which allows a person to maintain upright stance (Shumway-Cook & Horak, 1986) and a fundamental building block of each children's daily activity (Memari et al., 2013). Postural stability parameters, such as postural sway area, path length or sway velocity, are less developed in children with functional disorders (Mache & Todd, 2016). While postural stability is a functionally highly relevant aspect of motor performance, poor postural stability increases the risk of falls. **Methods.** The target group included children (age range from 7 to 11 years) with the four types of functional disabilities: (1) physical disabilities (movement and coordination disorders, cerebral palsy etc.); (2) intellectual disabilities (autism, Down syndrome etc.); (3) hearing and (4) visual impairments. To apply common assessment approach to measure postural stability across the four groups the extensive literature review was done. **Results.** As a result, 31 research studies from journals indexed in Web of Science and Scopus data bases were selected for the analysis. The most frequently used methods for evaluation of postural stability in children with functional disabilities were EMG with surface electrodes, tenzodynamometry for postural sway area in anterior-posterior, medial-lateral range registration and video analysis to obtain kinematic variables. After the review of the evidence based research studies following tests were used for children with physical disabilities – standing/sitting posture, gait analysis, functional reaching, sitting-to-stand movement, task specific balance. For children with intellectual disabilities assessment included quite standing with eyes open/close, throwing a ball while standing, standing reach task, gait analysis, single/double leg stance, dynamic balance on unstable support. For children with hearing impairment: static balance test eyes open/close, single leg stance, balance beam walking, one-leg hopping, functional reach test, in-place jump, in-place hop. In children with visual impairment: static balance test eyes open/close, sit-to-stand movement. **Conclusions.** The outcomes and conclusions of pilot testing will be presented comparing with evidence-based research during the

presentation. The study is part of the Norway grant project: "Health and social indicators of participation in physical activities for children with disabilities" (Nr. NFI/R/2014/070).

Keywords: postural control, balance, children with disabilities.

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SHOULDER CONDITION IN PATIENTS WITH FROZEN SHOULDER SYNDROME

J. Sokk., M. Kimber, J. Ereline, M. Merila, M. Pääsuke, H. Gapeyeva

University of Tartu, Tartu, Estonia

Background. The purpose of this study was to evaluate the shoulder condition in patients with frozen shoulder syndrome (FSS) after manipulation under general anaesthesia (MUA) and rehabilitation. **Methods.** Seventeen patients (nine women, eight men, median age 52 years) with the diagnosis of FSS and 23 healthy subjects (twelve women, eleven men, median age 53 years) as controls participated in this study. Shoulder condition measured by active range of motion (ROM) during flexion (FL) and abduction (ABD), isometric maximal voluntary contraction (MVC) force during FL, ABD and shoulder muscle tone of the deltoid us anterior (DELA), and the trapezius upper part (TRU) were measured before, one and six months after MUA and rehabilitation. Shoulder pain was screened by visual analogue scale (VAS) in both groups. **Results.** Before MUA in patients with FSS the ROM during FL, ABD, and MVC force during FL, and ABD for the involved extremity were lower ($p < .05$) as compared with the uninvolved extremity and controls' right extremity, whereas in patients with FSS the muscle tone for the DELA and TRU for both extremities was greater ($p < .05$) as compared with controls' right extremity. One month after MUA the involved extremity ROM during FL, ABD (1), MVC force during ABD improved ($p < .05$) (2), whereas ROM during FL, ABD and MVC force during FL for the involved extremity remained lower ($p < .05$) as compared with the uninvolved extremity. Controls' right extremity muscle tone for the DELA and TRU muscles remained lower ($p < .05$) as compared with both extremities of patients one and six months after MUA. The ROM (3) and MVC force did not differ ("n's.") six months after MUA when comparing the patients' extremities with controls' right extremity. Shoulder pain (4) in patients with FSS decreased ($p < .05$) in all measured points. **Conclusions.** This study demonstrated improvement in the shoulder ROM and MVC force after MUA and rehabilitation in patients with FSS, whereas patients' muscle tone for the DELA and TRU muscles needed more attention during the recovery period.

Keywords: frozen shoulder syndrome, active range of motion, isometric maximal voluntary contraction force, shoulder muscle tone.

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EFFECT OF ICE BATHS ON BLOOD LACTATE LEVEL AFTER 3-MIN OF ANAEROBIC EXERCISE IN BASKETBALL PLAYERS

M. Dzintare, A. Krišāns

Latvian Academy of Sport Education, Riga, Latvia

Background. The aim of the study was to estimate the effect of ice baths on blood lactate decrease after anaerobic exercise in basketball players. Views about this effect are contradictory in literature. 14 healthy trained 20-30 year old male basketball players took part in this study. Ethics Commission of LASE has authorized this study. **Methods.** Peripheral venous blood samples were taken in rest (before load), immediately after load and 15 min after load. Anaerobic load (HR = 160 ± 5 beats per second) was performed on elliptical trainer for 3 min. Two types of recovery were compared, 10 min of cold-water (10°C) immersion up to the chest (1. day) with 15 min of passive recovery by sitting on a chair (2. day). Blood lactate concentration was measured spectrophotometrically in E. Gulbja laboratory, Riga, Latvia. **Results.** Blood lactate concentration (mmol/L, average $\pm$ SEM) in rest was 1.03 ± 0.05 and 1.11 ± 0.09 on the 1st and 2nd day, respectively – fitting normal range 0.5–2.2 mmol/L. After 3 min of anaerobic exercise it increased significantly to 5.90 ± 0.48 and 5.81 ± 0.51 , 1st and 2nd day, respectively (that exceeds lactate threshold 4mmol/L). 15 min of passive rest significantly decreased blood lactate to 4.39 ± 0.40 mmol/L – a decrease of 24%, but ice bath decreased it to 3.94 ± 0.46 mmol/L – a decrease of 33%. **Conclusion.** Ice bath tends to decrease blood lactate more efficiently compared to passive rest; however the difference is not statistically significant.

Keywords: ice baths, cold-water immersion, anaerobic exercise, lactate, recovery.

EFFECTS OF THE INDUCED EVENING THERMAL STRESS FOR NIGHTLY AND MORNING FUNCTIONAL EFFICIENCY OF COGNITIVE SYSTEM

M. Černych, A. Šatas, A. Rapalis, N. Baranauskienė, H. Paulauskas, N. Eimantas, M. Brazaitis

Lithuanian Sports University, Kaunas, Lithuania

Background. Thermal stress effect is described as a central nervous system inhibitory (Sutkoway et al., 2013). It has already been found that taking ordinary sauna increases internal body (rectal) temperature up to 39°C (Sohar et al., 1976). This body temperature is described as a high physiological thermal stress (hyperthermia) (Brazaitis et al., 2012), which worsens function of cognitive system (Racinais et al., 2008). Residual effect of thermal stress (all body hyperthermia) for cognitive systems functional efficiency is still not investigated. So it is not clear how in the evening induced thermal stress by sauna session will effect nightly and morning mental work capacity and cognitive system functional efficiency. Results of this research will be useful for people whose operating activities are related with making decisions, focusing attention, memory and manual labour. **Methods.** Cognitive function, saliva cortisol and plasma adrenaline were measured before, two hours after and nine hours after sauna. During sauna internal body temperature was measured. Participants slept between two last measurements. Cognitive function assessed with switching test from ANAM4 computer test. **Results.** Participants had high heat stress (PSI = 7.12) during sauna. Two hours after sauna saliva cortisol concentration was 3.7 times and plasma adrenaline 2.5 times higher compared with control. In the morning saliva cortisol decreased and was 0.35 times lower comparing with control, but plasma adrenaline concentration was still higher (1.29 times) comparing with control. ANAM test results were better two hours after sauna and did not differ after sleep comparing with control. **Conclusions.** Sauna induces high physiological stress. Due to acute stress the elevation of stress hormones was observed and stress hormones could influence cognitive functions (Dierolf et al., 2016). Two hours after sauna, when body temperature comes back to initial, stress hormones concentration still remains elevated. Increase of stress hormones stimulated the better cognitive function capacity. In the morning, due to elevated concentration of plasma adrenalin, cognitive function capacity remains the same comparing results with sauna in the evening and without sauna. The residual effect of sauna does not impair cognitive function capacity.

Keywords: cognitive function, stress hormones, stress.

GENETIC AND GENOMIC STUDY OF SKELETAL MUSCLE WEIGHT AND COMPENSATORY GROWTH

A. Kilikevičius¹, A. Lionikas²

*Lithuanian Sports University¹, Kaunas, Lithuania
University of Aberdeen², Scotland, United Kingdom*

Background. Identification of genes underlying muscle mass and growth can lead to pharmacological targets for treatment of muscle wasting conditions. The aim was 1) to identify laboratory mouse strains suitable for detection of such genes, and 2) to test effect of myostatin, an inhibitor of muscle growth, on the adaptive response to functional overload. **Methods.** Males of C57BL/6J (B6, $n = 17$), BALB/cByJ ($n = 7$), DBA/2J (D2, $n = 12$), B6.A-(rs3676616-D10Utsw1)/Kjn (B6.A, $n = 9$), C57BL/6J-Chr10A/J/Naj (B6.A-Chr10, $n = 8$), BEH+/+ ($n = 11$), BEH ($n = 12$) and DUi ($n = 12$) strains were studied. The B6 mice share the genome with B6.A and B6.A-Chr10 strains, with exception of ≈ 1.5 -Mb telomeric region of chromosome 10 (Chr10) or entire chromosome 10, respectively, introgressed from the A/J strain. BEH+/+, BEH and DUi are the high growth strains. The BEH+/+ strain genome differs from BEH by the myostatin allele; a wild type vs. non-functional, respectively. A compensatory growth of soleus and plantaris muscles in response to functional overload was induced by unilateral ablation of the gastrocnemius at the age of 12 weeks. Four weeks later animals were sacrificed, soleus and plantaris muscles removed bilaterally and weighed to a precision of 0.1 mg. Data were

analysed using ANOVA with tibia length as covariate. **Results.** Muscles weight in the control leg varied among the strains ($p < .001$ for both) from 5.2 ± 0.7 mg soleus and 11.4 ± 1.3 mg plantaris in D2 mice to 18.0 ± 1.7 mg soleus in DUi and 43.7 ± 2.6 mg plantaris in BEH strains. In addition, soleus and plantaris muscles in B6.A-Chr10 strain were larger ($p < .001$ for both) compared to the B6 by 3 mg and 3.6 mg, respectively. Functional overload led to a significant increase in soleus ($p < .01$) and plantaris ($p < .05$). However, the gain was strain-dependent for both soleus ($p < .01$) and plantaris ($p < .05$). The BEH strain emerged as the least responsive, with a 1.3-fold increase in both muscles compared to a ≈ 1.6 -fold gain in B6, BEH+/+, D2 and DUi strains for soleus, and a ≈ 1.5 -fold gain in BEH+/+, D2 and DUi strains for plantaris. **Conclusions.** Our results indicate that: 1) mouse chromosome 10 contains modifiers of muscle mass; 2) life-long suppression of myostatin reduces compensatory growth of skeletal muscles.

Keywords: skeletal muscle, compensatory growth, genetics.

BRAIN ELECTRICAL ACTIVITY DURING THE FINGER MOVEMENTS IN MEN HAVING HIGH OR LOW OUTPUT OF ALPHA-FREQUENCIES

A. Morenko, O. Korzhyk, O. Dmytroca, A. Poruchynsky

Lesia Ukrainka Eastern European National University, Lutsk, Ukraine

Background. For the investigation the correlation of characteristics of certain rhythms of the electroencephalogram (EEG) with features of the distal muscles control of the upper extremities special value show individual indicators of amplitude and frequency characteristics of α -rhythm, including modal frequency of this rhythm. The study is devoted to identify the cerebral cortex electrical activity in men with high or low output α -frequencies during the manual movements in response to sensory signals. **Methods.** The participants in our study were 104 healthy male volunteers from aged 19 to 21 years. Biomedical ethics rules were followed. The participants were divided into two groups according to the average magnitude of their individual modal α -frequency – groups with high and low values of individual modal α - frequency (I α F). Changes in power and coherence of the EEG spectral components individually determined for each tested subject in quiescent intervals and while performing movements by the right hand fingers were evaluated. **Results.** Manual movements executed are associated with any reduce of power in posterior cortical areas of EEG oscillations over a wide frequency range in comparison with the background. However, the power increase is locally fixed on θ -, $\alpha 1$ -and $\beta 2$ -waves in the frontal leads. These changes are followed by decreased coherent values of θ -, $\alpha 1$ -, $\alpha 3$ -, β -and γ -EEG oscillations in the cortex, particularly, in the left hemisphere, and the increased – in $\alpha 2$ -subrange in the frontal, anterior temporal and central areas, as well as β -frequencies – in the frontal areas of the cortex. Men with a low I α F in a quiescent state and during movements are characterized by a higher power of θ -, $\alpha 1$ -and $\alpha 2$ -EEG oscillations and lower – in the $\alpha 3$ -, $\beta 2$ -and γ -bands than subjects with a high frequency. Men with a low I α F relatively differ by higher values of the EEG coherent oscillations, particularly, in the frontal, temporal and central lobes of the cortex. Men having a high I α F are characterized by the greater locality and asymmetry of reduction of the electrical activity of the cortex in a wide frequency range. Activation changes are more diffuse in nature in subjects having a low frequency.

Keywords: brain electrical activity, finger movements, modal alpha-frequencies, men.

IMAGINATION TO INCREASE ALPINE SKIING ATHLETIC ACHIEVEMENTS

D. Krauksta, K. Volgemute

Latvian Academy of Sport Education, Riga, Latvia

Background. Scientists believe that mental training provides positive effect on athletes' success. If visualization is used in the training process, athletes' level of imagination raises, which improves the ability to monitor their performance in competitions. The study focuses on the role of the imagination in an alpine skier's preparation process, which is one of the aspects of the athletes' psychological preparation that leads to increased results. Developed imagination is able to influence the skiers in several ways: psychologically, emotionally, physically, technically and tactically. The research experimental part is developed and tested in practice with visualization exercises and tasks. The importance of the experiment is demonstrated and provided as an important part of developing the imagination of skier during preparation process.

Keywords: alpine skiing, psychological training, visualization exercises, training and competition results.

ASSESSMENT OF THE FRIENDLY MATCH PERFORMANCE OF ELITE YOUNG SOCCER PLAYERS

U. Alemdaroğlu, Y. Köklü

Pamukkale University, Pamukkale, Turkey

Background. The purpose of this study was to compare technical actions, physiological responses and time motion characteristics of young players in different periods of friendly game. **Methods.** The players underwent anthropometric measurements (height and body mass) followed by the YoYo intermittent recovery test (level 1). Then they played a friendly game, which consists of 6 x 15 minutes period according to FIFA rules. Heart rate (HR) responses, and distance covered in different speed zones and technical actions were measured during the game, whereas the Rating of Perceived Exertion (RPE) and Blood Lactate (La-) were determined at the end of the each period of the game. **Results.** One of the results of the study was, while there were no differences between La responses, HR and RPE responses were statistically difference in the different stages of the game. Additionally, there were no relation between YIRT1 performance and sprint, high and moderate intensity run in exception of walk and low intensity run. Finally, the relations were found between YIRT1 performance and ball contact and total pass. **Conclusion.** Trainers should increase aerobic capacity of their players not just for kinematic parameters, but also for technical skills.

Keywords: aerobic performance, high intensity, sprint.

COMPETITION – RELATED SOCIAL PSYCHOLOGICAL SKILLS OF YOUNG BASKETBALL PLAYERS PARTICIPATING IN LITHUANIAN STUDENTS' BASKETBALL LEAGUE

Š. Šniras, G. Starkevičiūtė, T. Bakanauskas

Lithuanian Sports University, Kaunas, Lithuania

Background. According to scientific literature we can state that much research analyses the problem of skills in sport. Scientific research deals with schoolchildren's social skills (Malinauskas, 2008; Ashlea et al., 2012). Sports activities are associated with ability to communicate, ability to cooperate and with self-confidence skills (Budreikaitė & Adaškevičienė, 2010). Klizas with colleagues (2014) proved that low social skills are the most frequent cause of adolescents' psychosocial problems. However, there is a lack of analysis of how young basketball players evaluate structured competition related to social psychological skills. Especially as basketball is one of the most popular sports in our country not only among boys but girls as well. The article forms the problem question what competition – related social psychological skills cadets and junior basketball players have. The hypothesis that junior basketball players taking part in Lithuanian Students Basketball League evaluate their competition- related social psychological skills better than cadets is checked. **Methods.** Competition-related social psychological skills were tested applying the modified questionnaire (Tokunaga & Hashimoto, 1988). Such skills as: ability to strengthen competition – related motivation, ability to stabilize emotional state, ability of self – confidence, ability to anticipate and ability to communicate are analysed. The statistical hypothesis was tested applying Student's t-test which enabled to compare averages of groups undergoing the test. The study took place from 2013 October till 2014 in different schools in Kaunas an hour before Lithuanian Students Basketball League matches. The study involved 239 cadets (boys – 113, girls – 126), 216 juniors (boys – 103, girls – 113). **Results.** During the investigation the hypothesis was confirmed partly. Competition – related social psychological skills of young basketball players taking part in Lithuanian Students Basketball League were assessed. The ability to strengthen competition – related motivation and ability to stabilize emotional state was statistically more favourably ($p < .05$) evaluated by junior basketball players. **Conclusion.** The results showed no significant difference ($p > .05$) between both groups (juniors and cadets) according to ability to communicate, ability to anticipate and ability of self – confidence.

Keywords: competition-related social psychological skills, cadets, juniors, young basketball players.

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CHANGE OF AEROBIC CAPACITY INDICES OF LITHUANIAN SKIERS IN A YEARLY TRAINING CYCLE

L. Jakeliūnas, K. Milašius

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Adaptation reactions of athletes' body, which are necessary in aiming to achieve the desirable sport results, must be perfected in all periods and stages of a yearly training cycle. The highest level should be reached at the stage of the main competitions, when the athlete demonstrates the best sport condition (Tønnessen et al., 2015). This is the reason why the effectiveness of the processes in charge is conditioned by the functional capacity of blood respiratory systems, as well as the contraction ability of the muscles employed and ability to produce energy for a long time when the performed work overcomes anaerobic threshold intensity and approaches the critical intensity level (Ingjer, 1992). For this reason, the change of aerobic indices at the anaerobic and critical intensity thresholds in elite skiers training appears to be a rather urgent issue in managing the training process of these athletes. The aim of the work was to establish change of aerobic capacity indices of Lithuanian skiers in a yearly training cycle. **Methods.** The research was carried out for eight Lithuanian skiers during three years period. Their aerobic capacity used to be measured using gas analyser Oxycon Mobile in different periods of the skiers' yearly training cycle. Established were the values of lungs ventilation, heart rate, oxygen consumption, oxygen pulse, volume of the performed work at critical intensity and anaerobic thresholds. **Results.** Very important information about skiers' body adaptation to training loads is provided by indices of aerobic capacity at critical intensity threshold. The results showed that lungs ventilation of the investigated Lithuanian skiers during yearly training cycle had a decreasing tendency in average from 162.7 ± 4.4 to 154.5 ± 1 l/min. Pulse rate at this threshold experienced rather little change. The main index of the aerobic capacity – VO_2max had a tendency to decrease in three years period of observation. During the transitory period, it reached 73.6 ± 1.5 ml/min/kg, while during the preparatory and competitive periods it decreased respectively to 70.2 ± 1.5 and 70.8 ± 0.7 ml/min/kg. The results of oxygen pulse index of the investigated skiers had the lowest values during the preparatory period. They were of a little increase in competitive period, but did not reach the values demonstrated during the transitory period. Nevertheless, running speed within the yearly training cycle had increased in average from 15.2 ± 0.3 to 16.5 ± 0.4 km/h between transitory and competitive periods. At the anaerobic threshold, oxygen consumption used to increase from 59.5 ± 1.3 in preparatory period to 62.8 ± 3.3 ml/min/kg in competitive period. Respectively, oxygen pulse increased from 25.6 ± 0.8 to 26.3 ± 3.6 ml/b, running speed – from 14.0 ± 0.3 to 14.9 ± 0.4 km/h. **Conclusions.** Our research demonstrated that aerobic capacity indices of Lithuanian skiers used to change little during three years period. VO_2max reached 70–73 ml/min/kg in average. Each year, the same tendency was observed: at the end of the season, during the transitory period, the highest level of aerobic capacity indices used to be recorded; during the preparatory period, this level used to decrease with a slight increase in competitive period. General level of Lithuanian skiers' aerobic capacity indices was evaluated as satisfactory.

Keywords: skiers, yearly training cycle, aerobic capacity.

PHYSIOLOGICAL FACTORS AFFECTING PERFORMANCE IN ELITE DISTANCE RUNNERS

L. I. Tjelta, S. Shalfawi

University of Stavanger, Stavanger, Norway

Background. The aim of the present investigation was to evaluate and examine the existing research literature to indicate values for factors that underlie success in distances from 1500 m to the marathon and to what extent different kinds of training have been reported to influence these factors in elite distance runners. **Methods.** Data were collected using systematic and manual literature databases search using a combination of the factors maximal oxygen uptake (VO_2max), utilization of the maximal oxygen uptake ($\%\text{VO}_2\text{max}$), running economy (RE), velocity at the anaerobic threshold (vAT), velocity at VO_2max (vVO_2maks) and the words “distance running” and “elite level”. **Results.** VO_2max for distance runners competing at an international level has been reported to be 70–87 and 60–79 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ in man and women, respectively. $\%\text{VO}_2\text{max}$ at vAT has been reported to be around 85%. In homogeneous groups there does not necessarily exist a correlation between $\%\text{VO}_2\text{max}$ and performance. Running economy (RE) is often expressed as the VO_2 at a speed of 16 $\text{km} \cdot \text{h}^{-1}$ on a treadmill with 1% slope. At this speed, VO_2 for good runners range from 45 to 60 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. The investigation shows that factors VO_2max , RE and $\%\text{VO}_2\text{max}$ explained 89% of the variation in vAT among distance runners at national and international level. A strong correlation is observed between vVO_2max and performance level in middle distances such as 1500 m and 3000 m steeplechase. Much of the current understanding regarding the response to exercise is based on studies of untrained and moderately trained individuals. To use this knowledge to give training recommendations to elite runners is hardly valid. **Conclusions.** Higher vAT and VO_2max are reported for long distance runners than for middle distance runners even though middle distance runners typically carry out more intensive training, which has been shown to be beneficial in increasing VO_2max in recreational runners. The training volume of international level distance runners were found be from 120–260 km per week of which 70 to 90% is carried out as easy and moderate continuous running[1].

Keywords: VO_2max , running economy, utilization of VO_2max , anaerobic threshold.

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PRACTICAL APPLICATION OF INFORMATION ANALYSIS ABOUT FOOTBALL GAME AN INJURIES EPIDEMIOLOGY IN FOOTBALL

J. Skābardis, A. Čuprika, L. Čupriks

Latvian Academy of Sport Education, Riga, Latvia

Background. Latvian Academy of Sport Education (LSPA) along with Football School METTA personnel is organising a pilot project for a research dealing with practical application of the information about analysis of football games and injury prevalence. The aim of this study was to explore the role of development of knee joint flexors and extensors in football. **Methods.** The methods employed for the study include review of literature and meta-analysis. The information from the sources dealing with

physiological requirements of football games, physical parameters during the game were summarised and analysed. We searched the sources for the information about the frequency of injury prevalence and its location in the body from the point of view of sports medicine. We also examined biomechanical parameters of the most common injuries and analysed movements during such injuries. **Results.** Interval nature of football game was found (Verheijen, 2014; Stølen et. al., 2005). The total volume is ~ 10–13 km, it differs for position on the pitch, the chosen tactics, as well as the players' tactical and technical training (Bradley et. al., 2013). The main difference between elite and amateur levels is the total volume of high intensity activity. It is ~1 km at elite level. Acceleration and sprint distance was 9–27 m (Bloomfield et. al., 2007; Bangsbo et. al., 2006; Stølen et. al., 2005; Bangsbo un Mohr, 2005; Mohr et. al., 2003; Kraemer un Hakkinen, 2002). Leg segments are injured most often (82.9–89.6%), more specifically – knee joints and thighs. Having examined more details results in terms of types of injuries, we found out that muscle/tendon injuries are most common (35% and more). More detailed classification indicates femoral muscles (especially muscles of the posterior part) (Stubbe et. al., 2015; Noya Salces et al., 2014; Ekstrand et. al., 2011; Woods et. al., 2004; Woods et. al., 2002). Injury effects have been seen in competitions and training lessons, which in turn reduces the competition performance improvement opportunities (Häggglund et. al., 2013). The analysis of the information on injury mechanisms revealed that the most common knee injuries are related to the loss of balance after landing, after an abrupt change of direction (Waldén et. al., 2015; Yu un Gerrett, 2007; Alentorn-Geli et. al., 2009). The analysis of the information sources on knee flexor injuries revealed that injury mechanisms are related to the end of swing stage when running and at the moment of contact with the ground (Stubbe et. al., 2015; Noya Salces et. al., 2014; Häggglund et. al., 2013; Opar et. al., 2012; Ekstrand et. al., 2011; Petersen et. al., 2005; Woods et. al., 2002). Mendiguchia et al. 2013) discovered that the most common injury mechanisms of quadriceps femoris are related to sprint and ball strike. REV-9000 was selected as a measuring device to perform assessment of strength properties and functional assessment of knee flexors and extensors, as there may be a wide range of power limits (0 to 600 Nm) and speed up to 400°/sec; and testing position can be varied (sitting, prone position, etc.) (Andrade, 2002; Ayalon, 2002; Brown, 2000; Kraemer, 2000; Brown, 1994; Anderson, 1991). When testing knee flexors and extensors, testing position should be as similar to the conditions of the game, running cycle as possible (Wollin et. al., 2015). Therefore when testing knee flexors, the required position is prone position, 45° angle in hip joints, which corresponds to the end stage of the swing shortly before landing. **Conclusions.** A set of exercises should be developed and approved for prevention of knee flexor and extensor injuries and strength development. The testing procedure should be improved and it should include conditions/ body positions that are close to the game in order to obtain appropriate data about muscle functions and their functional state in game-specific conditions.

Keywords. Football, physiological and physical demands, injury epidemiology, hamstring, quadriceps, injury mechanisms.

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LITHUANIAN ELITE KAYAK ROWERS' MOTIVES FOR ENGAGEMENT INTO SPORTING ACTIVITY

A. Šiupinytė, R. Nekrošius, E. Balčiūnas

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Training of kayak rowers is a complex process, including both physical and psychical preparation as important components. One of the main psychical factors, having influence on kayak rowers' preparation and their results is motivation. Motivation of athletes, in particular of the ones practicing kayak sport, is a factor lacking deeper investigation in scientific literature. This article presents a literature review on this topic. The aim of the research was to disclose motives which had impelled Lithuanian elite kayak rowers to choose and train a certain sport activity. **Methods.** The research involved theoretical method (analysis and summarizing of the scientific literature), as well as empirical method (anonymous questionnaire survey). The questionnaire survey was performed in the Sport Science Institute of Lithuanian University of Educational Sciences, athletes were also interrogated during their sport training camps and training sessions. Lithuanian national team elite kayak rowers (male), aged from 20 to 30 ($n = 14$), participated in the research. 5 open and 9 close questions made the content of the questionnaire. The answers to the open questions were classified and converted to digital information, in order to prepare the obtained material from empirical research for analysis using mathematical statistics methods (percentage rate) and to achieve quantitative comparison of the results. **Results.** The investigation of Lithuanian national kayak rowers disclosed that one of the main motives for choosing sports activity; in particular kayak rowing is an interesting experience and new, exciting emotions. According to the research results, reinforcement by parents or coach is of remarkably less influence. **Conclusion.** The results of this investigation might be useful in preparing and improving kayak rowers' training programs, as well as in attaining better quality in an athlete – coach communication.

Keywords: motivation, development, kayak rowers.

ANALYSIS OF SOME PADDLING KINEMATIC PARAMETERS FOR LONDON OLYMPIC MEDALLISTS CANOEISTS

A. Alekrinskis¹, V. Krauksts², J. Grants², D. Bulotienė¹

Lithuanian Sports University¹, Kaunas, Lithuania
Latvian Academy of Sport Education², Riga, Latvia

Background. Sprint kayaking performance is based around the simple premise of maximising propulsive forces while minimising drag forces. In a race it is an uncomplicated matter of whoever crosses the line first, i.e. has the highest average velocity, they win. The canoe paddle transfers blade forces from the paddler to the water and hence to the Kayak (Michael, Rooney & Smith, 2009). That is the paddler applies force against the water through the paddle blade which results in forward movement of the canoe (Michael, Rooney, & Smith, 2009). Blade force is a combination of drag and lift forces acting parallel and normal respectively to the direction of the blade motion (relative to the water) (Jackson, 1995). Propulsive forces are determined by the drag and lift forces generated by the blade when in water and how these forces are transmitted to the canoe through the paddler's seat and footbar though there is debate on the proportion each force contributes to boat propulsion (Sanders & Baker, 1998). The object of the research was paddling kinematic parameters. **Methods:** scientific literature analysis, video analysis of paddle kinematic characteristics. The aim of the paper was to determine some paddling kinematic parameters of London Olympic canoers - medallists. **Conclusions.** The motion of a sprint canoe blade through the water is extrapolated from video analysis of the paddle handle motion and used to approximate the forces acting on the blade throughout a stroke. Frame analysis of the video provides the displacement of the blade, and consequently the water velocity and angle of attack at both the top and bottom of the blade. Based on a quasi-steady approach, the relative velocities and angles of attack are used to approximate the lift and drag forces acting on the blade, which are then decomposed into propulsive and vertical forces. Lift forces on the blade contribute significantly to both propulsive and vertical forces. The different flows and forces in the three phases of the stroke: catch, draw, and exit, can be seen. The end of the catch phase experiences large propulsive and small upward vertical forces. During the draw phase there is a strong propulsive force, with evidence of a double peak. The vertical force steadily declines and becomes negative as the horizontal angle becomes greater than 90°, and reaches large negative values at the end of the draw. During the exit phase both the propulsive and vertical forces approach zero. Is it? ONLY if blade is oriented correctly. Imagine a Force Arrow sticking out perpendicular from the back of the blade. That Force Arrow needs to be pointing as much as possible in the direction you want to go when you pull on it.

Keywords: London Olympic medallists, canoers, paddling kinematic parameters.

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EFFECT FROM RESPIRATORY DEPRESSION ON ORGANISM FUNCTIONALITY IN PRE-SEASON TRAINING PERIOD IN CYCLING IN TRIATHLON

I. Siminaitis, A. Čuprika, L. Čupriks

Latvian Academy of Sport Education, Riga, Latvia

Background. The purpose of this study was to investigate effects of the lack of oxygen on organism functionality in low season preparation term on cycling stage in triathlon. This study might be applied to many different sports. “Oxygen intake”, “Hypoxia”, “Respiratory muscles training”: are very actual topics in now day sports. **Methods.** The subjects were twenty healthy sportive triathletes (males $n = 15$, females $n = 5$), age (20 ± 7 years). All subjects were competitive at national and international level. All were trained in the equal conditions using Spinning bikes in the same room ($22^{\circ}\text{C} \pm 2.4^{\circ}\text{C}$ and $82 \pm 4\%$ RH), same time, same cadence (100 revolutions ± 5 rev.), performing the same exercises. All participants had 4 monocycles pre-experimental preparation (PP). Then we took 12 monocycles (hypoxia training – HT) as a part of monthly microcycle. During 40 min session, two groups were using Ultrabreathe and Elevation Mask 2.0 and none of those devices for control group. Other 4 monocycles were for recovery (R). Data were collected by the end of each phase-PP (4 monocycles in one week), the end of phase-HT (12-monocycles using Elevation Mask 2.0 and Ultrabreathe devices) and the end of phase-R (4-monocycles with no respiration effort). Spirometry and heart rate (HR) were measured using portable telemetry units (CONTEC SP10 Digital Spirometer and POLAR heart rate monitor V800), whereas blood samples were collected for lactate (Accutrend Plus). **Results.** The performances expressed in changes of spirometry parameters correlated with both total gas intake and total gas exhale per 1st second (FEV1 – 1 and FEV1 – 1). HR and changes in TLC per HT ($\Delta\text{TLC} - 1$): the stronger hypoxia (lack of oxygen) was gained, the higher the HR and lactate was absorbed. **Conclusions.** HT might be used for pulmonary function increase and respiratory muscles preparation, but should not be used during competitive period.

Keywords: “Oxygen intake”, “Hypoxia”, Respiratory muscles training”.

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FACTORS AFFECTING LONG-TERM ATHLETE DEVELOPMENT: A REVIEW

A. Lazauskas, A. Skarbalius

Lithuanian Sports University, Kaunas, Lithuania

Background. A long-term athlete development can be discussed as a process or as a result of the consecutive system. Much research has proven (Henriksen et al., 2010; Li et al., 2014) that an elite athlete can be trained only in the right environment, where many factors can be implemented in the process of the preparation of the elite athlete. There are many interacting factors involved in the development of sport expertise (Henriksen et al., 2010). Nowadays it is proven that the most important factor is practice experiences during childhood and adolescence (Forsman et al., 2016). **Methods.** The

following research methods were applied: analysis of scientific literature and generalization methods to disclose the factors affecting a long-term athlete development. **Results.** Evidence has shown that factors significantly influence elite performance (Li et al., 2014). Factors affecting long-term athlete development can be discussed in different levels: macro, mezzo and micro (Smolianov et al., 2014). In some cases factors can be discussed in the dimension of time (Henriksen et al., 2010). Researchers agreed that factors could be grouped into different categories. According to Li et al., (2014) factors affecting athlete development can be grouped into three categories: milieu, individuals and provision. Henriksen et al. (2010) created a model where factors affecting athlete development can be divided into athletic and nonathletic factors. **Conclusions.** Overall environment affects a prospective elite athlete. Many researchers focus on factors in the micro-environment, but they consider that factors in the macro environment can form a sport policy of the whole country. They suggest that only holistic approach to the long-term athlete development can be successful. Various sport environments must be taken into account that successful transition to the senior level can be reached only by focusing on individual athlete's environment.

Keywords: long-term athlete development, expert performance, intrapersonal factors.

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THE MUSCLE POWER ENDURANCE OF HIGH PERFORMANCE YOUNG BASKETBALL PLAYERS DURING COMPETITIVE PERIOD: A CASE STUDY

R. Paulauskas, R. Paulauskienė

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. The aim of our recent study was to assess anaerobic alactic endurance of high performance basketball players during a competitive period. **Methods.** We studied players ($n = 12$) of Lithuanian national basketball league aged (mean $\pm$ standard deviation) 20.1 ± 0.8 years old, with body mass 94.2 ± 10.3 kg, training experience 9 ± 1.5 years. They trained 6 times in 2 hours during the week and played two matches. A 10 second maximal ergometer sprint test was used for setting anaerobic alactic power

and endurance. With use of Monark Ergonomic 894 Ea ergometer, work gear was selected for resistance to the body mass - pedalling 70 rep/min on 4 watts of body mass. After 15 min warm up, including a practice start requiring the athlete to accelerate, subjects had to work to maximum power and to maintain it for 10 s. Work output (W) was recorded. The anaerobic alactic endurance of high performance basketball players was the maximum capacity of work time. **Results.** During the test, the average power value 1364.0 ± 168 was reached between 2 and 3 seconds and a peak power output between 5 and 6 seconds. In the group of physically active students work was distinguished by figures of such trends: the average power (832.4 W) achieved between 4-5 s, peak power in 6 s. Power loss reflects our investigated endurance of anaerobic alactic power. Basketball team players average endurance was 6.00 ± 1.1 s. This ratio of physically active students was 6.07 ± 1.2 s. A statistically significant difference between were not found ($p > .05$). Endurance characteristics of both groups is the dispersion area of 4 to 8 seconds, and the players dispersion around the mean is the average $V = 18.3\%$. **Conclusion.** Our research shows, that high performance basketball player have the same anaerobic alactic endurance as physically active students. Basketball training and competitions have a great impact on anaerobic alactic muscle power. Our previous studies showed that basketball players have a high rate of endurance of intermittent work. It may be theoretically assumed that basketball performance does not have direct effect on work endurance of ATP-PC system. The game gets a big power in a short work, the ability to quickly recover and repeat the action at high power again.

Keywords: anaerobic alactic reactions, endurance, fitness.

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INFLUENCE OF STANCE FORM AND FOOTWEAR CHOICE ON THE CENTRE OF PRESSURE DISPLACEMENT IN OLYMPIC ARCHERY. PILOT STUDY

M. Rjabkova, A. Zuša

Latvian Academy of Sport Education, Riga, Latvia

Background. Sport result in archery is provided by high accuracy (Clemente et al., 2011), which depends on various factors such as environmental conditions, technique, and fatigue (Kolayis et al., 2014). The movement itself is described as containing three phases: the stance, the aiming, and the releasing (Leroyer et al., 1993; Ganter et al., 2010). Nowadays there are three stance positions, which the archers adopt – the open, the square and the close stance. The aim of the pilot study was to compare the influence of open, close, square stance and footwear choice on CoP displacement in sport archery. **Methods.** One national level experienced archery female shooter participated in the study (33 years, 75 kg body mass, 165 cm height) with a recurve bow (38 lbs, 68"), athlete's regular foot position – square stance. CoP displacement was registered with two force plates (BTS, Italy). Athlete was asked to perform 3 shots from each stance barefoot, with sport shoes and with boots (total $n = 27$). **Results.** According to

the results more stable conditions were found in open stance barefoot (CoP area was 9.8 ± 2.2 mmq), in square stance with sport shoes (CoP area 9.8 ± 1.3 mmq) and in close stance with boots (CoP area 17.1 ± 2.7 mmq). There were high variations between the results of CoP radius and area in the same conditions, for example, CoP area in close stance barefoot for left leg was 16.0 ± 8.0 mmq. We did not find any clear relationship between CoP area and radius according to stance form or footwear. **Conclusions.** In future research it is necessary to increase number of shots and to find a solution for more accurate counting the aiming and the releasing phase. We believe that it could help to reduce high variation between the results in the same conditions.

Keywords: sway patterns, stance, footwear, sport archery.

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SUBJECTIVE RATINGS OF TRAINING LOAD IN YOUNG CROSS-COUNTRY SKIERS

J. Mäestu, E. B. Heinsoo

University of Tartu, Tartu, Estonia

Background. The aim was to investigate how the 10-point intensity scale can be used in characterizing training intensities in young skiers and whether there is similarity of training intensity perceptions between the coach and the athlete. **Methods.** Participants were 13 young cross-country skiers, aged 14–17 years. During the 17 day training camp their training data and the subjective intensity perceptions of the coaches and athletes were recorded. Based on the time-in-zone method the subjects trained 71.8% in zone 1, 27.1% in zone 2 and 2.1% in zone 3. **Results.** According to subjective assessment 74.1% of trainings were done in zone 1, 19.0 in zone 2 and 8.0 % in zone 3. There were no significant differences between intensity distributions between zone 1, but according to subjective scale, subjects trained significantly less in zone 2 and significantly more in zone 3. Subjective assessments of coach and athletes indicated the highest correlations between zone 2 ($r = .80$) and interval trainings ($r = .71$) and were lower for basic ($r = .25$) and recovery trainings ($r = .35$). **Conclusion.** In conclusion, 10-pt scale to describe training intensities is a practical method for young athlete training zone distribution assessment.

Keywords: exertion, training intensity, subjective rating, adolescents.

EVALUATION OF COACHES' PROFESSIONAL COMPETENCES IN THE VIEW OF ELITE LITHUANIAN OLYMPIC TEAM ATHLETES

S. Sabaliauskas

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Research on coaches' professional activity is constantly carried out in Lithuania; however, the results obtained are based on coaches' subjective self-evaluation of their professional activity. The aim of the research was to reveal Olympic team athletes' evaluation of their coaches' professional competences. **Methods.** The research included 28 Olympic team athletes (15 females and 13 males), representing swimming, track-and-field athletics, wrestling, cycling, rowing, canoe and kayak rowing sports. All investigated athletes were participants of London Olympic Games, 26.7 ± 5.2 years of age, their sporting experience being 13.4 ± 4.6 years. The research was carried out after the Olympic Games, in 2012. Questionnaire for professional coaches' competences (Santos et al., 2010) was applied in the research. The items were answered on a 5 point Likert type scale from 1 to 5. To establish homogeneity of professional competences evaluation scale content, test on questionnaire inner compatibility was performed (Cronbach's α .977). In the research, factor analysis was not carried out due to the little number of the participants (only elite athletes). **Results.** Following the sport training methodology and didactics, five groups of coaches' professional competences were formed: 1) long-term sport training planning and organizing skills/competences (Cronbach's α .961); 2) sport training and competitive activity organizing skills/competences (Cronbach's α .952); 3) competitive activity planning and organizing/implementing skills/competences (Cronbach's α .923); 4) personal competences (Cronbach's α .906), 5) managing competences (Cronbach's α .911). The results of the research showed that the athletes gave the highest evaluation for their coaches' long-term sport training planning and organizing skills (4.04 ± 0.9) and competitive activity planning and organizing/implementing skills (4.13 ± 0.8), while coaches' managing competences received lower range of evaluation (3.63 ± 1.12). No statistically significant differences were established between the answers of male and female respondents. The highest evaluations by the athletes were given to their coaches' abilities to establish the competition multi-annual plan (4.27 ± 1.13), to guide an athlete during the competition, considering technical and discipline aspects (4.17 ± 1.02), to coordinate the competition with the annual plan (4.17 ± 1.05). The lowest evaluation was provided to the coaches' abilities to communicate ideas, problems and solutions (3.42 ± 1.25), to solve problems within new situations (3.64 ± 1.13), to manage other coaches' education (3.64 ± 1.22), to lead an organization, managing the athletes, coaches and sport specialists' activities (3.96 ± 1.22), to assume the head coach's role, managing other coaches and sport specialists' activities (4.00 ± 1.12) ($p < .01$).

Keywords: elite sport, coach, competences.

PHYSICAL ACTIVITY AND PERSONALITY

K. Budzyńska, P. Mazur, R. Wiśniewski

University of Szczecin, Szczecin, Poland

Background. Personality traits are relatively constant components, they do not change rapidly. Personality traits determine the nature of human activity. Physical activity is denominated as attitude

towards body that is associated with a desire to obtain a benefit for physical and mental health. The aim of this study was to present connection between personality and physical activity of students of Psychology at the University of Szczecin, declaring regular physical activity. **Methods.** Research group included listed above 38 students of the second year of Psychology at the University of Szczecin, declaring regular physical activity. So as to measure characteristics of personality *Inventory of Personality NEO-FFI* by Costa and McCrae in a Polish adaptation by Zawadzki, Strealu, Szczepaniak and Śliwińska was used. The short version of *The International Physical Activity Questionnaire* (IPAQ) was used to measure health-related physical activity (PA) in populations. Statistical analysis included descriptive statistics and calculation Spearman's rank correlation. **Results.** The analysis of relationship between characteristics of personality and physical activity brought the following results: the higher the levels of extraversion, the higher the level of physical activity: ($\rho = -.515, p < .05$). The higher the level of thoroughness, the greater the physical activity ($\rho = .347, p < .05$), and the higher the level of neurosis, the lower the overall physical activity ($\rho = -.400, p < .05$). The study showed the relationship between personality traits and physical activity levels among respondents. The higher the levels of extraversion and conscientiousness, and lower levels of neuroticism are conducive to making physical activity. **Conclusion.** The findings may suggest that physical activity can have an impact on personality traits (e.g. to reduce the level of neuroticism or increase the level of extraversion and conscientiousness). They also suggest that people who are characterized by extroversion, conscientiousness and low levels of neuroticism are more willing to undertake physical activity.

Keywords: physical activity, personality.

CHANGE AND INTERRELATION OF ANAEROBIC AND AEROBIC CAPACITY IN ELITE ROWERS DURING YEARLY TRAINING CYCLE

E. Petkus, M. Masilionis, A. Raslanas, J. Skernevičius

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Average time, spent by elite rowers to overcome the distance in competitions, reaches from 5 to 7 minutes. Such duration of the work requires energy production from anaerobic alactic, glycolytic and aerobic reactions (Milašius, 2005; Wilmore et al., 2008). According to Dal Monte (1996), 10% of all energy is produced in anaerobic alactic way, 30% – in glycolytic, and 60% – in aerobic way. Other scientists consider greater importance of aerobic reactions (Steinacker, 1993; Jaščaninienė & Krupecki, 2002). During the competitions, aerobic capacity requires 26-98% of maximal oxygen consumption (Hartmann & Mader, 1993). Lately, Lithuanian rowers are multiple winners of European and World Championships. Their training undergoes constant scientific exploration (Petkus, 2009; Masilionis et al., 2013). Particular success of the rowers can be considered 2015 World Championship, followed by ten entries to the Olympic Games. The aim of our work was to explore the change of anaerobic and aerobic capacity in Lithuanian elite rowers during yearly training cycle, preparing for 2015 World Championship. **Methods.** Seven rowers took part in the investigation, which lasted from October 2014 to July 2015. Six tests were performed. Along with the tests on body development and functional capacity, special anaerobic power in 10 sec work by rowing ergometer 'Concept II' was established, recording of momentum highest and average power. Aerobic capacity used to be investigated by establishing anaerobic lactic threshold by recording pulse rate (PR) and power, blood lactate concentration being 4 mmol/l. **Results.** The research results demonstrated that the indices of Lithuanian elite rowers' body development, functional capacity and anaerobic and aerobic power in yearly training

cycle, preparing for 2015 World Championship, were of little and statistically not significant change. Correlational analysis disclosed that hand force of more convenient hand is in a strong correlation with Ruffier index, which reflects blood system functional capacity, as well as with 10 sec anaerobic phosphocreatine power ($p < .01$). PR after applied standard physical load had strong correlation with PR at the anaerobic threshold limit. Special working power at the anaerobic threshold limit had strong correlation with 10 sec working power average, but not maximum, values.

Keywords: rowers, anaerobic, aerobic capacity.

SWIM START REACTION TIMES OF THE WORLD'S BEST DISABLED AND ABLE BODIED SWIMMERS

B. Statkevičienė

Lithuanian Sports University, Kaunas, Lithuania

Background. Swimming competition has been a part of the Paralympic Games from their inception (1960) (Wahlstrom & Statkevičienė, 2015). Disabled athletes are classified into several different disability groups: physical, visual and mental impairment groups. Swimmers with physical disability are additionally placed in 10 separate classes (S1-S10) and there are 3 groups for visual impaired athletes (S11-S13). The rules for swimming competition by IPC are identical to the FINA rules. The research task was to compare the world's best disabled swimmers' (S8-S14) start reaction time with the best able bodied swimmers start reaction times. **Methods:** Analysis of literature sources, mathematical statistics. Research subjects were the best disabled swimmers (S8–S14 classes) and able bodied swimmers start reaction times at 2015 IPC and FINA World championships. **Results.** Swimming distance 50 m freestyle. S9–S14 groups athletes' start reaction times averages (0.65–0.73 s.) did not statistically differ among the different classes of disability. S8 class average data were significantly lower than the data of the others of disabled athletes groups. Disabled men's and women's start reaction time averages did not statistically significantly differed (except for group S13). Similar results were obtained in 100 m breaststroke swim events. 100 m backstroke start reaction time averages (0.65–0.68 s.) by disabled swimmers were statistically significantly better than in freestyle or breaststroke events. Start reaction time averages in the 100 m backstroke (all groups) between disabled athletes and able bodied swimmers were not statistically significant. We determined that the first place winners' at 2015 IPC and FINA World championships swimmers start reaction times mainly did not differ. **Conclusion.** Disabled swimmers desiring to improve their results need to improve their start reaction times and to strive to equal the reaction times of the able bodied swimmers.

Keywords: swimming, disabled swimmers, start reaction time, disability group.

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COMPARISON OF THE HEART RATE AND BLOOD LACTATE RESPONSES OF DIFFERENT SMALL SIDED GAMES IN YOUNG SOCCER PLAYERS

Y. Köklü, U. Alemdaroğlu

Pamukkale University Denizli, Pamukkale, Turkey

Background. The purpose of this study was to compare the heart rate (HR), percentage of maximum heart rate (%HRmax), blood lactate (La^-), and RPE 10 responses among the small-sided games (SSG) in elite young soccer players. **Methods.** Fourteen players (average age 16.7 ± 0.6 years; height 177.6 ± 4.1 cm; body mass 66.3 ± 4.7 kg; average training age 6.7 ± 1.6 years; percentage of body fat $8.4 \pm 2.6\%$; HRmax 195.7 ± 7.4 beat. min⁻¹) volunteered to perform YoYo intermittent recovery test and eight bouts of soccer drills including 2-a-side, 3-a-side, and 4-a-side games without goalkeeper in random order at two days intervals. Heart rates were monitored during all SSGs, whereas the rating of perceived exertion (RPE, CR-10) and venous blood lactate were determined at the end of the last bout of each SSG. **Results.** The differences on La^- , %HRmax and RPE either among the small-sided games or among the bouts were identified using 3x8 (games x exercise bouts) two-way analysis of variance with repeated measures. Significant differences were found on La^- , HR and %HRmax among SSGs ($p \leq .05$). 3-a-side and 4-a-side games were significantly higher than 2-a-side games on %HRmax ($p \leq .05$), whereas 4-a-side game significantly resulted in lower La^- and RPE responses compared to 2-a-side and 3-a-side games. **Conclusion.** The results of this study show that physiological responses are different during eight bouts of small-sided games.

Keywords: intermittent exercise, game based training, RPE.

ASSESSMENT OF THE FRIENDLY MATCH PERFORMANCE OF ELITE YOUNG SOCCER PLAYERS

U. Alemdaroğlu, Y. Köklü

Pamukkale University Denizli, Pamukkale, Turkey

Background. The purpose of this study was to compare technical actions, physiological responses and time motion characteristics of young players in different periods of friendly game. **Methods.** The players underwent anthropometric measurements (height and body mass) followed by the YoYo intermittent recovery test (level 1). Then they played a friendly game, which consists of 6 x 15 minutes period according to FIFA rules. Heart rate (HR) responses, and distance covered in different speed zones and technical actions were measured during the game, whereas the Rating of Perceived Exertion (RPE) and Blood Lactate (La^-) were determined at the end of the each period of the game. **Results.** One of the results of the study was, while there were no differences between La^- responses, HR and RPE responses were statistically difference in the different stages of the game. Additionally, there were no relation between YIRT1 performance and sprint, high and moderate intensity run in exception of walk and low intensity run. Finally, the relations were found YIRT1 performance and ball contact and total pass. **Conclusion.** Trainers should increase aerobic capacity of their players not just for kinematic parameters, but also for technical skills.

Keywords: aerobic performance, high intensity, sprint.

THE EFFECTS OF SHORT-TERM BODY WEIGHT LOSS ON ENDURANCE PERFORMANCE IN COMBAT SPORT ATHLETES

H. Yarar, U. Karli, G. Buğdaycı, H. Oğuzman, E. M. Aydın

Abant İzzet Baysal University, Bolu, Turkey

Background. Combat sport athletes are categorized by using body mass to countervail their body size before competitions. Hence "making weight" at a lower weight class gives one an assumed advantage over an opponent; many athletes are going to practice rapid weight loss applications (Artioli et al., 2010). The loss of large amounts of body mass in a short time is extremely harmful to the athletic performance especially in sports required endurance (Timpmann et al., 2008; Weiss et al., 2007). The reasons for the decrease in endurance performance were not clearly explained in previous studies. Therefore, the aim of this study was to investigate the effects of short-term body weight loss on endurance performance in combat sport athletes. **Methods.** Twelve experienced male combat sports athletes [(mean $\pm$ SD) age: 22.50 ± 1.50 years; stature: 172.25 ± 6.41 cm; body mass: 78.15 ± 11.65 kg; body fat %: 15.05 ± 5.24] previously lost weight for competitions were participated as volunteer in this study. Athletes were involved in a period with weight loss as experimental application and a period without weight loss as control application in a randomized crossover design with one week interval. Measurements were made before weight loss, during weight loss, after weight loss and 18-hour after recovery period. Athletes were ensured to lose 5% of their body weight within 48 hours. In this period body fat percentage, fat free mass, $VO_2\max$, total running time, urine density, serum sodium, chlorine and osmolality were examined. Two way ANOVA with repeated measures were used for statistical analysis. **Results.** According to the statistical analyses $VO_2\max$ and total running time significantly ($p < .05$) decreased due to weight loss. Moreover, significant ($p < .05$) reduction was found in body fat percentage and fat free mass. On the other hand, significant ($p < .05$) increase was seen in urine density, serum sodium, chlorine and osmolality. Consequently, the results of this study revealed that 5% body weight loss within 48 hours negatively affects aerobic capacity, body composition and physiological responses related to endurance performance. **Conclusion.** Therefore the combat sport athletes should avoid rapid weight loss in order to protect their athletic performance and health.

Keywords: dehydration, electrolytes, total running time, $VO_2\max$.

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PLAYING STYLE OF LITHUANIAN NATIONAL FOOTBALL TEAM

D. Gražulis, V. Šaveiko

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Players' individual actions and team action during the football match determines the performance of the game, as well as the final score of the match (Carling et al., 2005; Collet, 2013). Soccer match analysis method allows a more objective evaluation of teams and individual players' performance during the match. There may be some different performance indicators between Lithuania and the world's best football teams. This can result in team ratings at the global level. The aim of our study was to analyse the game performance of Lithuanian and the world's best football teams. **Methods.** The data used on our study was obtained through official website of FIFA World Cup 2014 (<http://www.fifa.com/worldcup/archive/brazil2014/statistics/index.html>). We also analysed four matches of Lithuanian team. We did not analyse individual players or their amplua indicators, we counted only the whole team actions during a match. We compared ten indicators: short passes, long passes, shots on target, shots off-target, goals scored, goals against, fouls committed, fouls suffered, tackles won, tackles suffered. We also compared the efficiency of four variables: short passes, long passes, shots on target, tackles won. **Results.** The results show that Lithuanian team is weaker in short passes, shots on target and fouls committed indicators. Lithuanian team has higher indices in tackles won, tackles suffered and shots off-target. The main difference is the shooting efficiency - it is about 20 percent lower. The analysis of other indicators shows no differences between the teams. **Conclusions.** Summarizing, we can say that Lithuanian team has lower indices in possession, as well as in shooting. Lithuanian team needs lower indices in tackles. Different indices show different performance, as well as some indicators can determine different place in FIFA World ranking table.

Keywords: football, soccer, match analysis.

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RESEARCH OF ANTHROPOMETRIC AND PHYSICAL FITNESS INDICATORS OF LITHUANIAN JUDO ATHLETES

E. Butkevičiūtė, L. Dudėnienė, B. Statkevičienė

Lithuanian Sports University, Kaunas, Lithuania

Background. There is considerable amount of literature on anthropometric indicators on athletes from various branches of athletics (1, 2, 3). However there is insufficient data for the top Lithuanian judo athletes' anthropometric indicators and their relation to their physical fitness. Our work objective was to determine relationships among the anthropometrical and physical fitness indicators of Lithuanian men's judo athletes in different weight categories. **Methods:** analysis of literature sources, anthropometrics, physical fitness testing, mathematical statistics. We researched the top Lithuanian judo athletes aged 17–21; we divided them into three groups according to their weight categories: group I – 55–60 kg, group II – 66–73 kg and group III – 81–90 kg athletes. We researched their anthropometric and their physical fitness indicators. We determined correlation between the anthropometric indicators and their physical fitness in each weight category. **Results.** The obtained results show that the different weight categories' athletes differ significantly in their total body measurements; however, they all have a normal body mass index. We did not find any asymmetry in their body extremity indicators in any of the categories. Statistically significant body extremity indicators were most often noted between the researched groups 1 and 3. Upper and lower extremities were larger in group 3 athletes. Physical fitness indicators research demonstrated that group 3 athletes had the worst performance in push-ups. **Conclusion.** Judo athletes differ in their basic body measurements depending on their weight category, however the larger weight category athletes' physical preparedness indicators were not better than those of the smaller weight category athletes.

Keywords: judo, weight categories, males, anthropometric, physical fitness.

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EVALUATION OF SPORT TECHNIQUE EFFICIENCY IN HIGH LEVEL WEIGHTLIFTERS

J. Lanka¹, A. Shalmanov²

Latvian Academy of Sport Education¹, Riga, Latvia

Russian State University of Physical Education², Sport and Tourism, Moscow, Russia

Background. The effectiveness of training process, especially in high qualification athletes depends on the timeless and completeness of the information about the condition and the quality of his techniques. This is the main objective of biomechanical monitoring in sports. Currently there is rich theoretical and experimental evidence collected on the biomechanics of weightlifting exercises (Garhammer, 1991; Bartonietz, 1996; Shalmanov et al., 2013). Most of the studies were mainly carried out in laboratory settings. In recent years, interest has shifted to the study in the extreme conditions of sport fight. This was facilitated by the development of specialized hardware and program sets. To register the trajectory of the bar and calculate kinematic and dynamic parameters

of its movement, a specialized hardware-program complex (APC), including photo-video camera, has been developed with a marker on the end of the bar and a computer with software. Recording was carried out during major competitions. The total number of surveyed was 331 people. The report presents the results obtained in the snatch in men and women. Regularities in the change of kinematic and dynamic bar movement parameters were determined with an increase in weight category and sport performance. The main indicator determining performance in classic snatch is the absolute maximum power developed by the athlete during acceleration of the bar in the final phase of its lifting: $r = .75$, $p < .001$. **Conclusions.** Indicators of absolute power developed during acceleration of the bar in the snatch, are the most informative in assessing the level of physical preparedness on athletes and the prediction of sportive results. At the same level of athlete technical mastery the increase of power by 50 watt will increase the result in the snatch per 1 kg on average.

Keywords: sport technique efficiency, physical preparedness, sport performance.

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ANALYSIS OF THE US NATIONAL BASKETBALL TEAM'S OFFENSIVE ACTIVITY BASED ON 2014 FIBA WORLD CUP GAMES

B. Bazanov, I. Rannama

University of Tartu, Tartu, Estonia

Background. The aim of current study was to identify the offensive teamwork structure and evaluate the efficiency of the US basketball national team played during the 2014 FIBA World Cup in Spain. Our earlier research (Bazanov et al., 2005) has helped to work out the analysing system of the competitive activity of the game which enables to determine the structure and intensity of the offensive teamwork and to find interesting models of game activity from the data. **Methods.** For this research the winning team of the FIBA World Cup held in 2014 in Spain under observation. The data were gathered from 766 ball possessions of 9 recorded games, it was grouped according to successful (> 1 point, $n = 429$) and non-successful ($= 0$ points, $n = 337$) possessions and statistically analysed using descriptive statistics. Furthermore, offensive game indicators (the count of elements used in the offensive zone, the time in possession, teamwork intensity, outcomes and others) were analysed by the means of Data mining method. The special program „WizWhy“summarized the data and presented the main patterns and listed the rules that related between the dependent variable and the other fields. **Results.** The results showed that the US teams' offensive efficiency indicator (points/possessions) was equal to 1.23 and the „teamwork intensity“ was at the level of 0.85 on average ($SD = 0.37$). Based on the results of comparing the statistical data (T -test, F -test), it was found that the average duration of successful ball possessions in the offensive zone ($t = 6.22 \pm 4.76$) and „teamwork intensity“ (0.93 ± 0.4) was reliably different from unsuccessful (accordingly t

= 7.23 +/- 4.81, „teamwork intensity“ 0.76 +/- 0.31). Based on the analysis of association rules we found that the total time duration of the successful fast break was equal to 3.84 s accompanied by a minimum number of elements (≤ 3) in offensive zone which ends with lay-up or dunk. The successful set offense is characterized by duration of transition phase between 2.56–7.89 s followed by the time of possession in offensive zone 10.12–11.51 s. Lower „teamwork intensity“ increased the frequency of turnovers. **Conclusion.** On the basis of the research we can conclude that US basketball team's high offensive efficiency indicator was achieved due to the high “teamwork intensity” Index.

Keywords: basketball, performance analysis, offensive teamwork intensity.

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SOME PADDLING KINEMATIC PARAMETERS ANALYSIS (LONDON OLYMPIC MEDALISTS CANOERS)

V. Krauksts¹, K. Ciekurs¹, J. Grants¹, A. Alekrinskis²

Latvian Academy of Sport Education¹, Riga, Latvia
Lithuanian Sports University², Kaunas, Lithuania

Background. Sprint kayaking performance is based around the simple premise of maximizing propulsive forces while minimizing drag forces. In a race it is an uncomplicated matter of whoever crosses the line first, i.e. has the highest average velocity, they win. The motion of a sprint canoe blade through the water is extrapolated from video analysis of the paddle handle motion and used to approximate the forces acting on the blade throughout a stroke. Frame analysis of the video provides the displacement of the blade, and consequently the water velocity and angle of attack at both the top and bottom of the blade. Based on a quasi-steady approach, the relative velocities and angles of attack are used to approximate the lift and drag forces acting on the blade, which are then decomposed into propulsive and vertical forces. Lift forces on the blade contribute significantly to both propulsive and vertical forces. The different flows and forces in the three phases of the stroke: catch, draw, and exit, can be seen. The end of the catch phase experiences large propulsive and small upward vertical forces. During the draw phase there is a strong propulsive force, with evidence of a double peak. The vertical force steadily declines and becomes negative as the horizontal angle becomes greater than 90°, and reaches large negative values at the end of the draw. During the exit phase both the propulsive and vertical forces approach zero.

Keywords: flat water sprint canoeing, kinematic parameters, positive values, negative values displacement of the blade.

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A BRIEF HISTORY OF VIBRATION AND BASICS OF VIBRATION STIMULATION

K. Ciekurs, V. Krauksts, J. Grants

Latvian Academy of Sport Education, Riga, Latvia

Background. Whole body and local vibration is a worldwide innovation as a part of training method that helps athletes to regain the power and get ready for the next training faster. However, less attention is paid to local vibration where an isolated muscle or muscle group is stimulated by the use of a vibration device. The first indications about the positive effect of vibration on the human body are found in ancient Greece. Much later, in the 18th century, abbot Pjerre invented a “trembling” chair, and used it to treat his patients. Later different constructions were made, operated following the sewing-machine or tonometer principle. These devices were applied both locally and to the whole body. Nowadays mechanic vibration has become as a permanent therapeutic or sports training means which from ancient times through centuries has been developed and gradually improved in different countries. Today vibration massage, based on vibration frequency, amplitude, acceleration and other specific vibration components, is becoming more popular than the classical massage. In sports vibration stimulation improve: warm up muscles before competition, maintain physical condition, injury prevention, relaxing after competition. In medicine vibration stimulation improve: post-traumatic rehabilitation, post operation rehabilitation, regeneration after serious illness, diabetes and many others.

Keywords: vibration history, local vibration, vibration parameters, vibration training.

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THE PECULIARITIES OF PRESCHOOL CHILDREN BASKETBALL COACHING

K. Matulaitis, E. Bartuševičius

Lithuanian Sports University, Kaunas, Lithuania

Background. Basketball is one of the most popular fields of sport in Lithuania and all over the world. It is quite an active and interesting game played by people of different age and physical training. This game strengthens health, increases working – capacity and, moreover, it stimulates collectivity and discipline (Stonkus, 2002; 2003). The aim of scientific research was to find out what was the influence of coaching frequency and the practice of power exercises per week on preschool children's movement ability training. The object of study was the peculiarities of preschool children basketball coaching. The purpose of research was to ascertain the influence of coaching frequency per week and practice of power exercises on preschool children movement abilities. To reach the aim of research these objectives were set: 1. To ascertain the influence of coaching frequency per week on 6-year-old boys' movement ability training. 2. To ascertain the influence of power exercises on 6-year-old boys' moving ability training. **Methods.** Thirty-four 6-year-old boys, attending the coaching of the national basketball academy, participated in the research. Methods of the research: 1. Analysis of scientific literature; 2. A pedagogical experiment; 3. A pedagogical observation; 4. Testing; 5. Statistical analysis. **Conclusions.** 1. It has been ascertained that moving abilities of those preschool boys, who exercised 2 times per week, improved compared to those who exercised 1 time per week. 2. It has been ascertained that coaching program which included power exercises for preschool children helped to improve their results in running changing direction ($p < .01$) and jumping in squares compared to the results ($p < .01$) of those who did not have power exercises in their coaching program.

Keywords: preschool age, movement abilities, experiment.

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RESEARCH METHODS FOR MEASUREMENT OF PHYSICAL LOAD PARAMETERS ON ORIENTEERING DISTANCES

A. Peipins, A.Fernate

Latvian Academy of Sport Education, Riga, Latvia

Background. Sprint race (2001) and sprint relay (2014) are relatively young events in the World Orienteering Championships, originating in 1966 and only a short distance race (roughly 25 minutes) was added in 1991. Sprint running time of the winner: 12–15 minutes (Leumann et. al., 2013). As a novelty of event, research on physiological and biomechanical aspects of sprint orienteering is not published yet. Little is known about research methods for measurement of physical load parameters on orienteering sprint distance. Therefore, it is important to find out which research methods are used for measurement of physical load parameters on other orienteering distances and to evaluate those methods strengths and weaknesses. Research aim was to estimate strengths and weaknesses of research methods for the measurement of physical load parameters on orienteering distances. **Methods:** review of scientific articles "Scientific Journal of Orienteering" from 1985–2015. **Conclusion.** Physical load on orienteering distances is researched during distance running (field experiments), on treadmill (laboratory experiments) and compared with orienteering distance running load (field experiments), modified distance running load compared with orienteering distance running load. Blood lactate concentration,

heart rate values and running speed are mostly used as physical workload parameters on orienteering distances.

Keywords: orienteering, physical load, methods.

ALTERATION OF CARDIOVASCULAR PARAMETERS AND THEIR INTERACTIONS INDUCED BY SESSION OF CONTINUOUS AND COMBINED TRAINING

Ž. Kairiūkštienė¹, J. L. Poderys¹, K. Poderienė¹, D. Velička²

Lithuanian Sports University¹, Kaunas, Lithuania

Lithuanian University of Health Sciences², Kaunas, Lithuania

Background. Functional state can be assessed from the dynamical changes of functional parameters during testing manoeuvres. This study was designed to determine the alteration of cardiovascular parameters and their interactions induced by session of continuous and combined training (CT). **Methods.** The participants of the study (16 females, previously active athletes) performed two heath training sessions, separated by 7 days. The first session was designed for aerobic training, i.e. 30 min of jogging and the second session was performed as CT, i.e. additionally 4 interval sprint bouts at the end of the same type of running session were added. The table-tilt test (orthostatic probe) was used as the testing manoeuvre before and after the session. Arterial blood pressure measurements and 12-lead ECG were recorded for later analysis by means of computerized ECG analysis system. Dynamics of concatenation between indices was made by use a method based on matrix theory. Two synchronous time series ($x_n = 0, 1, 2, \dots$) and ($y_n = 0, 1, 2, \dots$), which represent results of measured indices were structured and analysed by using the numerical characteristics of second order matrix and main components of it. From definitions of matrix characteristics the main interest has discriminants of the matrix: $\Delta_n = ((x_n - y_n)^2 + 4((x_{n-1} - y_{n-1})(x_{n+1} - y_{n+1}))$ The parameters were interpolated using cubic splines, then discriminants between all investigated relationships were defined. **Results.** The results obtained during the study showed that after both training sessions a lot of registered cardiovascular indices were changed: increase of heart rate, ST-segment depression, shortening of JT interval, peripheral vascular tone in response to orthostatic increase was slower. The difference between influences of training sessions was more evident on comparison of interactions of cardiovascular indices and their changes induced by exercising. Some negative changed was expressed significantly more after CT session. **Conclusion.** The important point is the significant increase of ST-segment depression during the orthostatic probe in some participants of this study after CT. This means that ischemic episodes in myocardia point about non-physiological influence of sprint type of workloads in the content of CT session.

Keywords: aerobic training, interval training, cardiovascular system.

ATHLETIC TALENT AND THEORY OF DELIBERATE PRACTICE: NEW FINDINGS AND CRITICAL ISSUES

V. Issurin

Wingate Institute, Netanya, Israel

Background. Theory of deliberate practice has been postulated as universal background for discovery and development of exceptional athletic talent. This theory presupposed accumulation of 10000 hours of highly dedicated training during 10 years as obligatory condition of attainment of superior athletic performance. Available data evidence this theory is restrictedly applicable to reality of high-performance sport and needs appropriate verification. The aim was the examination of theory of deliberate practice and its applicability to carrier of exceptionally talented athletes in different sports. **Methods.** Annual

accumulated training time expenses until attainment the level of sport excellence and data of performance trends were collected in 14 Olympic champions representing swimming, canoeing, rowing, windsurfing, hammer throwing and artistic gymnastics. Data of in-depth interviewing were subjected to retrospective and statistical analysis. **Results.** The data of all respondents were subdivided in two groups: findings of athletes representing endurance sports and hammer throwing (12 athletes) termed as basic group, and findings of athletes from artistic gymnastics (2 athletes). Representatives of basic group obtained the level of excellence following 4–7 years of specialized preparation with average accumulated training time expenses equal to 3084 hours (variation between 1840 and 4495 hours). The representatives of artistic gymnastics obtained the level of excellence after 10 years of highly dedicated training accumulating in average 9055 hours of training time expenses. **Conclusions.** The findings of athletes representing endurance sports and hammer throwing largely contradict to theory of deliberate practice and 10-years rule. However the data of Olympic champions from artistic gymnastics are consistent with this theory and support its postulates. Apparently that acquisition of large number of complicate technical skills and achievement of virtuosity requires larger training time and longer period of deliberate practice. Therefore 10-years rule and theory of 10000 hours of deliberate practice is selectively applicable to reality of different sports.

Keywords: athletic talent, deliberate practice, 10-years rule, superior performance.

EFFICIENCY OF THE FREE-THROWS IN THE LITHUANIAN NATIONAL BASKETBALL TEAMS, BOTH MEN AND WOMEN

R. Kozlovski, R. Kreivytė

Lithuanian Sports University, Kaunas, Lithuania

Background. Free throw shooting has its specific position in a basketball match. Successful realization of free throws shooting can have a significant share in the victory of the team, mainly in tactically demanding ends of close matches (Zuzik, 2011). Free throws shooting in basketball is a specific individual activity of an individual equally important in both men's and women's categories. The aim of this research is to contribute to the knowledge on the successfulness of free throws shooting in men and women in competition basketball matches of the Lithuanian national teams in various age categories. The main task was to process data in both categories and to compare them mutually. We assume that the percentage of the rate of success of free throws shooting in a basketball match of men's age categories will be higher than in the women's age categories. **Methods.** All data characterizing the rate of success of free throw shooting were reduced according to sex, age and performance (European Championship 2015 – men and women). Methods of documents analysis, percentage of effectiveness and non-parametric Mann-Whitney U- test were employed. **Results.** In men's categories, Lithuanian national men's team showed good accuracy of free throws (78 %). The younger age men's teams showed significantly worse results (U20 – 65.9%; U18 – 66.7%; U16 – 57.5%) then national men's team ($p < .05$). In women's categories, free throws accuracy of women's national team was good in 2015 European Championship (77.9%). The younger age women's teams showed significantly worse results (U20 – 62.3%; U18 – 63.5%; U16 – 56.2%) then women's national team ($p < .05$). When comparing the successfulness of men's and women's teams in various age categories, weren't found statistically significant differences ($p > .05$). **Conclusions.** Results have not proved the assumption that the percentage rate of success of free throw shooting in a basketball match in men's categories will be higher than in women's ones.

Keywords: basketball, men and women age categories, free throw shooting effectiveness.

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USE OF RELAYS FOR COORDINATION SKILL DEVELOPMENT DURING THE RHYTHMIC GYMNASTICS PRACTICAL TRAINING

A. Borisevič, M. Katinas

Lithuanian university of Educational sciences, Vilnius, Lithuania

Background. Coordination is very important for the successful performance of different combinations and exercises. Gymnasts aged 9–10 years still find it hard to feel the music tempo acceleration and deceleration, at the appropriate time they hardly focus their attention quickly and not always quickly assess the situation – flight of the tool path, the balance support. All this is concentrated in the rhythmic gymnastics dance in just 1 min 30 sec. We believe that it would be appropriate to prepare a relay of complexes training coordination skills at an early age. Research aim was to analyse coordinating skill development peculiarities for 9–10-year-old girls during the rhythmic gymnastics practical training. **Methods:** pedagogical experiment, testing, mathematical statistics, analysis of literature. Experimental program included the contents of running with or without ribbons, balls, gymnastic jumps with and without ropes, jumps through hoops, static balance, acrobatic and other unusual exercises. We tested certain physical features, and more widely coordination of individual skill levels at the beginning and end of the experiment. **Results.** At the beginning of the experiment all test results were insignificant. E1 group girls were divided into two groups every second training; they ran four relays with different content. They effectively improved coordination skills, physical abilities during the experimental period, but only the long jump sideways ($p > .05$) and 20 m shuttle run ($p > .05$) differences of average changed statistically insignificant. It seems that the properties of these relay complexes were not effective for researched physical abilities. E2 girls worked under the trainer program. Their coordination skills, physical abilities and flexibility level changed very little. **Conclusion.** The application of our prepared relay complexes during rhythmic gymnastics practical training justified tested physical skills progression for all experimental period. It was quite effective and quite pleasant training method for some coordination, physical features in the form of game, perfectly suited for young 9–10-year-old gymnasts. They enjoyed such way of training, and it increased their motivation for training coordination skills.

Keywords: ribbons, balls, acrobatic, coordination skills, flexibility, rhythmic gymnastics.

DEPENDENCE OF COMPETITION RESULTS ON ATHLETE MENTAL TOUGHNESS INDICATORS

Z. Vazne

Latvian Academy of Sport Education, Riga, Latvia

Background. With the increase of psychological stress in competitions and the growth of general level of athlete technical and tactical preparedness and physical condition, psychological aspects as mental toughness are being emphasized more and more in winning competitions in sports. The research aim of this study was the evaluation of the effect of the mental toughness indicators on the result in competitions. Mental toughness has been described as one of the most used but least understood terms in applied sport psychology (Jones et al., 2002). The term mental toughness describes athlete's stable ability to act productively in the increased stress situations, in the most responsible moments of competitions, accurately performing technical and tactical elements, that is one of the professionalism criteria. Mental toughness during competition process has mutual connection with psychic regulation – athlete's skill to relax and regulate both the effect of mental stress and his/her psycho-emotional condition and behaviour (Butt et al., 2010). The research **methods** included the competitive subscales of TOPS tests (Thomas et al., 1999), PPI-A test (Golby et al., 2007), documental material analysis and mathematical statistics. The research subjects were: athletes from three teams ($n = 12$), who won the first three places in the Lifesaving World Championship (Australia – the gold medal, France – silver, Latvia – bronze); the athletes who represented Latvia in the Olympic Games ($n = 33$). **Results and conclusions.** Both tests have adequate reliability and can be used in Latvian environment (TOPS test Cronbach's alpha coefficient is 0.86 and the PPI-A tests $\alpha = .78$). The indicators of the TOPS test scales „Automaticity“, „Self-talk“ and „Positive thinking“ were higher for the teams which won a higher place in the Lifesaving World Championship ($p < .01$) (Plonis, 2016). The indicators of the PPI-A test scales for Latvia Olympians were medium in all scales (from 11.95 ± 0.28 up to 17.43 ± 0.6). Mutual correlations ($p < .001$) were stated for the general mental toughness result and the indicators of the following scales: “Self-belief” ($r = .662$); “Positive cognition” ($r = .705$) and “Determination” ($r = .607$) (Astaficev, 2016). In this research the models of linear regression were not appropriate to describe the effect of mental toughness variables on the result in competitions.

Keywords: mental toughness, high level sport, correlation analysis, regression analysis.

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LINEAR STRATEGY-BASED BASKETBALL-SPECIFIC TRAINING IMPROVES PLAYERS' LEG POWER

V. Pliauga^{1,2}, J. Stanislovaitienė¹, I. Garbašauskaitė¹, R. Sakalauskas^{1,3}, J. Jaszczanin⁴,
S. Kamandulis¹, A. Skurvydas¹, I. Klizienė², A. Stanislovaitis¹

Lithuanian Sports University¹, Kaunas, Lithuania

Kaunas University of Technology², Kaunas, Lithuania

Lithuanian University of Health Sciences³, Kaunas, Lithuania

Gdańsk University of Physical Education and Sport⁴, Gdansk, Poland

Background. The purpose of the study was to compare the effect of linear- and nonlinear-strategy-based basketball-specific training on advanced players' leg power. **Methods.** Ten college-level males (age (mean $\pm$ standard deviation (SD)), 21.5 ± 1.7 years; weight, 83.5 ± 8.9 kg; height, 192.5 ± 5.4 cm) were divided into two teams according to the training model. Linear training (LT) consisted of the following phases: aerobic endurance (AE), anaerobic endurance (AnaE), recovery (R), and power (P). Nonlinear training (NT) included a combination of various training stimuli (AE, AnaE, and P) within a 1-week microcycle, and standard loading strategies were applied during the whole training period. Training stimuli were distinguished by drill duration and intensity, while the majority of drills were basketball specific in both loading models. Both groups played a simulated basketball game with each other before and after every phase of the linear training model. Vertical countermovement jumps height was measured before the game, after each quarter, and 20 min, 24 h, and 48 h after the game. **Results.** The LT group exhibited major increases in jump height after the recovery and power phases ($p < .05$). In contrast, there was no increase in jump height in the NT group in any of the training phases. Subjects were able to maintain the jump height during the game regardless of training strategy and phase. After 8 weeks of training, the LT group achieved an 8.8% increase ($p < .05$) in vertical jumping, whereas the NT group exhibited an improvement of only 0.33%. **Conclusion.** We conclude that 8 weeks of linear-training-based basketball-specific drills resulted in enhanced leg power production. The linear training approach is especially favourable for coaches who aim to combine conditioning and specific basketball exercises in the preseason preparation of players.

Keywords: adaptation, periodization, vertical jump, conditioning, sports specific.

ATTITUDES OF HIGH-LEVEL FEMALE SPRINTERS TOWARDS FACTORS INFLUENCING THE TRAINING SYSTEM

L. Grinčikaitė-Samuolė

Lithuanian Sports University, Kaunas, Lithuania

Background. The aim of the research was to discuss factors influencing the training system of high-performance female sprinters. Research conducted in the field of sport science has supported the idea that training high-performance athletes is a consistent process, covering the development of not only physical abilities (Bompa & Haff, 2009). **Methods.** The qualitative research method, i.e. interview, was used to obtain the opinion-based information from high-level female sprinters on factors affecting their training system. Research methodology is based on a content analysis strategy – the researcher's numbered categories were divided into subcategories, which facilitated to reveal the respondents' opinions on the questions provided. Twenty best Lithuanian high performance female sprinters, dominating at the top of the World's and Europe's ratings, have been interviewed. The qualitative research data analysis has been performed using the method of content analysis. Responses of high performance female sprinters were firstly processed using the content analysis method, where phrases and thoughts similar in their meaning were categorized and subcategorized. In other words, individual but similar in their content phrases, received a generalizing label called category, and subcategories specifying such categories in more detail allowed to detect the differences in respondents' attitudes toward the given question (Rupšienė, 2007). **Results.** High performance female sprinters lack attention in the process of their training dedicated to a significant training component – psychological training. It was established that the external motives (monetary prizes, bonuses) rather than the internal ones (willingness to improve results, honour to represent the country) affected their training and improvement of performance. **Conclusion.** High-performance female sprinters fail to focus on a

significant component of sports-related training process – psychological training. The results have demonstrated that the external factors rather than the internal ones influence their sports-related training and improvement of results.

Keywords: high-performance female sprinters, training system

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EUROPEAN CHAMPIONSHIP PREPARATION ANALYSIS OF NATIONAL WOMEN UNDER 16 AND UNDER 18 BASKETBALL TEAMS

I. Garbašauskaitė¹, J. Stanislovaitienė¹, A. Stanislovaitis¹, V. Pliauga^{1,2}, R. Sakalauskas^{1,3}

Lithuanian Sports University¹, Kaunas, Lithuania

Kaunas University of Technology², Kaunas, Lithuania

Lithuanian University of Health Sciences³, Kaunas, Lithuania

Background. Preparation of national team requires a complex training of motor abilities, energy supply systems as well as control of proper recovery and training load. It has been found that decrease in the performance of athlete is often associated with an imbalance between workload and recovery period (Mazon et al., 2015). The external load of players per game consists of up to 1,000 different actions (defence, sprints, changes of direction, jumps, walking, etc.) (Abdelkrim et al., 2010). The purpose of the study was to analyse and compare national women under 16 (WU16) and under 18 (WU18) basketball teams European Championship preparation strategies. **Methods.** Fourteen WU16 players and fourteen WU18 players were preparing for European Championship for 5 weeks. WU 16 had an experimental microcycle that included combination of various training stimuli within a 1-week microcycle (power, anaerobic endurance, aerobic endurance and recovery) when every training session was based on specific goal. Training stimuli were distinguished by drill duration and intensity, while the majority of drills were basketball specific. WU18 had no strict distinction between the training sessions and the training sessions consisted of mixed training stimuli per session. Vertical countermovement jumps height, agility and 20 meters sprint were measured before and after the preparation. **Results.** After 5 weeks of training, WU16 achieved significant increases by 12.94% in vertical jumping, 6.8% in 20 meters sprint and 12.45% ($p < .05$) in agility, whereas WU18 exhibited insignificant improvements of only 2.12, 0.37% and 0.33% alike. Moreover, WU16 total volume of training was 63 hours when WU18 108 hours. **Conclusions.** We conclude that 5 weeks of experimental periodization resulted in enhanced power, speed and agility production. Accordingly, to enable athletes to achieve a maximal performance at a desired time, it is necessary to strictly control their training loads through structuring and planning in periods or stages, also known as periodization (Bompa & Buzzichelli 2015). National team preparations are complex and difficult processes to plan in order to get the team in the best possible shape by the competition.

Keywords: periodization, national team, training load, power.

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CHARACTERISTICS OF LITHUANIAN YOUTH NATIONAL HOCKEY TEAM PARTICIPATION IN EUROHOCKEY YOUTH CHAMPIONSHIPS

M. Ivanauskaitė, K. Milašius

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. Hockey is a dynamic, athletic and emotional game, requiring good physical, technical and tactical preparation. All these parts of training process are interrelated and interdependent. The scientific problem appears how to implement the system of young hockey players training in Lithuania, so that it could assist in the preparation of higher level players, able to represent Lithuania in international competitions both in youth and adults groups. Yet, there is a lack of studies on Lithuanian hockey players' training, as well as on changes in their physical and functional capacities and game activity. The aim of the work was to investigate Lithuanian youth national hockey team preparation and the quality of the game the team played in EuroHockey Youth Championships 2015. **Methods:** Analysis of the training load of the athletes ($n = 17$) during the preparatory period; testing of the players' physical, technical and tactical fitness and its assessment by a 10-point system. Physical fitness was assessed using the following tests: sit-ups in 30 sec, push-ups in 30 sec, 30, 50, 100 m running, standing long jump, standing high jump, shuttle run, ball throw. Players' technical fitness was assessed by giving evaluation on the results of actions, performed during the competitions – hits, passes, lost and tackled balls, as well as successfully performed goals. **Results.** The content of preparation for EuroHockey Youth Championships consisted of 30 days of Lithuanian Championship period, 26 days of control competitions, 40 days of training camps, 8 days of testing. Each player performed all tests of physical fitness. The best result was given 9.5 points in evaluation, the worst – 6.3 points. On average, physical fitness of the athletes received 8 points in evaluation. Analysis of technical and tactical actions used to be carried out during training sessions and competitions. During European Championship, 4 matches were assessed. Technical and tactical actions in the best played matches were given on average 9.25 points of evaluation, while the worst received 6.5 points; average evaluation of all played matches was 7.9 points. **Conclusion.** Considering the team's training conditions and possibilities it can be stated that the achieved third place in European Youth Championships was evaluated as good.

Keywords: hockey, physical, technical, tactical preparation, game actions.

SOCIAL AND PROFESSIONAL SKILLS OF LITHUANIAN BASKETBALL REFEREES: COACHES' ATTITUDE**K. Čyžius, R. Paulauskas***Lithuanian University of Educational Sciences, Vilnius, Lithuania*

Abstract. The aim of this research was to determine how coaches view the work and social skills of Lithuanian basketball referees. **Methods.** The research was performed during off-season, when there were no official matches. Only coaches who had licenses issued by the Association of Lithuanian Basketball Coaches (AoLBC) and who had obtained coaching qualification participated in the research ($n = 68$). Mean age of research subjects was 37.5 ± 11 ($X \pm S$) years, and their work experience was 14.6 ± 10 years. The research was performed with the approval of the Association of Lithuanian Basketball Referees (ALBR). Only referees who work in Lithuanian Basketball League (LBL), National Basketball League (NBL), Regional Basketball League (RBL), Lithuanian Womens' Basketball League (LWBL) and Lithuanian Students' Basketball League (LSBL) were included in the research. Communication between basketball coaches and referees can be assigned to situational social skills, which are needed to create good professional relationships. Emotional background during basketball game can be considered a special situation when true feelings of coaches are revealed. **Results.** Even 57.4 percent of coaches claimed that referees were too assertive when they made their decisions. Decision making skills revealed an individual's ability to predict the outcome of their behaviour in various situations and take responsibility, therefore, when making a decision it is important to predict positive and negative outcome of each possible decision. Forty five percent of coaches claimed that referees knew how to get out of a predicament. Such opinion of the respondents shows that not only referees lack certain skills, but there is also poor two-way communication. **Conclusions.** In summary, according to Lithuanian basketball coaches, basketball referees are prone to show exaggerated strictness, tend not to acknowledge their mistakes and are too self-confident. However, they behave politely and properly and have a sense of humour. The majority of basketball coaches think that referees perform their duties objectively, know how to get out of a predicament and look athletic and fit. However, the majority of coaches think that referees have little knowledge on game tactics and players' psychology.

Keywords: basketball game, professional qualification, relationship, communication, cooperation.

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NBA AND EUROLEAGUE PLAYERS' GAME CHARACTERISTICS IN EUROBASKET 2015: A COMPARATIVE ANALYSIS

P. Kamarauskas, R. Paulauskas

Lithuanian University of Educational Sciences, Vilnius, Lithuania

Background. The goal of our research was to compare different basketball national team players' contributions during Eurobasket 2015. **Methods.** We studied the average statistics of players who played for Euroleague teams ($n = 82$) and players who played for NBA teams ($n = 26$). For the research we used official statistics of the Eurobasket games. **Results.** The results showed that on average, an NBA player during the tournament scored (Mean $\pm$ SD) 12.02 ± 5.35 points, took 5.15 ± 2.27 rebounds, made 1.94 ± 1.47 assists and made 0.48 ± 0.36 steals per game. Meanwhile, an average Euroleague player was better at assists and steals per game – averaging 2.21 ± 1.74 and 0.5 ± 0.43 respectively. However, players who played in Europe were worse at rebounding (avg 3.2 ± 1.79) and scoring (avg 7.90 ± 4.65) than their opponents who came from the NBA. The top scorer of Eurobasket 2015 come from the NBA. Chicago "Bulls" and Spanish national team best player P. G. was the leading scorer of the tournament with 25.6 points per game. Just behind him was Atlanta "Hawks" and German national team point guard D. S. with average of 21 points per game. Out of Euroleague players, a centre from Czech Republic, J. V. was averaging the most points – 19.3. He was the third best scorer in the tournament. The second best scorer from a Euroleague team was Italian forward A. G. who played for Milan "Emporio Armani" last season. Europeans who play in the NBA were also better at rebounding. The best rebounder in Eurobasket 2015 was player from Russia and Moscow "CSKA" forward A. V. Very close to him was Czech Republic's centre J. V. and Ukraine's centre K. F. Point guards who play in Euroleague were much better at assists than their opponents from the NBA. The record for most assists in a game was broken multiple times during this tournament and from now on the record belongs to "Barcelona" and Czech Republic national team point guard T. S. who ended up averaging 7.3 assists per game – second best result of all players in Eurobasket 2015. Lithuanian point guard M. K. ended up averaging 7.8 assists per game - the most out of all players in Eurobasket 2015. NBA players were not sharing the ball with their teammates as much as Euroleague players. Out of all NBA players, German National team point guard D. S. was averaging the most assists per game – 6. However, it was only the sixth best average in the tournament in this category. **Conclusion.** Overall, we came up to a conclusion that in Eurobasket 2015 Euroleague players were more likely to play better defence, share the ball more and play more team – oriented basketball, while NBA players were better at scoring and rebounding the ball.

Keywords: turnovers, points, rebounding, assists, defence, offense.

HEART RATE DEMANDS IN SEMI-PROFESSIONAL FEMALE HANDBALL

G. Vidūnaitė, A. Skarbalius

Lithuanian Sports University, Kaunas, Lithuania

Background. The modern handball game is characterized as dynamic sport which requires special physiological demands (Michalsik et al., 2015). Accurate athletes' control is necessary to establish the physical nature during match-play to compare to the physical demands for training (Manchado et al., 2013). The aim of the study was to assess physiological demands in semi-professional women handball.

Methods. HR of the handball players was monitored in 12 matches using TEAM Polar2 ProSport (Polar Electro, Kempele, Finland) in regular five-second intervals. Intensity (HRmean, %HRmax, HRmax; VO₂max) of the match-play was calculated for players who played ~60% of total playing time. Loads' Training Impulse was assessed as arbitrary units according Stagno (2007) method. Statistical analyses included calculating: mean, standard deviation, correlation, effect size, confidence interval. Significance was set at $p < .05$. **Results.** The intensity (HRmean 141.8 ± 15.1 beats/min-1) was 29 bpm less compared to elite (Michalsik et al., 2015) set value (170.5 ± 15.2), but %HRmax (73.3 ± 7.5) was found 5.1 less (78.4 ± 5.9) according to the findings by Manchado with co-authors (2015). Indices of volume are in line to other findings. It was found 14607.2 ± 2585.1 total beats. Onusaitytė (2013) set value (1149.7), TRIMP – 195.8 ± 48 AU per match-play. **Conclusions.** The indices of HRreserve between elite and semi-professional female handball players might be the reason of explanation controversy findings between values of HR mean, %HRmax, VO₂max. Total beats per match-play can be used as a simple method for load's volume assessment and intensity of the training.

Keywords: loads'volume, intensity, HR, TRIMP.

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THE TIME COURSE OF EFFECTS OF STATIC STRETCHING ON SPRINT PERFORMANCE

E. M. Aydin, Y. Uçan

Abant İzzet Baysal University, Bolu, Turkey

Background. It is believed that static stretching (SS) exercises reduce injury risks and improve athletic performances (Kirmizigil et al., 2014). However, recent studies indicate that performing SS before athletic performances affects sprint performances negatively (Kistler et al., 2010; Paradisis et al., 2014). There are few studies about time course of SS effects on anaerobic performances (Fowles et al., 2000; Bradley et al., 2007). The purpose of this study was to investigate acute effects of static stretching on sprint performance and determine the time course of potential effects on sprint performance over 45 minutes. **Methods.** Twenty six male amateur soccer players volunteered to participate in this study. Participants were assigned randomly three groups (control group (CG); $n = 9$, 15 seconds (s) group (15SG); $n = 8$, 30 seconds group (30SG); $n = 9$). 15SG and 30SG performed SS exercises. SS exercises were performed for quadriceps, hamstring, and triceps surae muscles. SS exercises for each muscle groups were performed 8 times for 15 seconds to 15SG and 4 times for 30 seconds to 30SG. CG did not perform any SS exercise. 30 meters (m) sprint performances of participants were determined before static stretching as pre-test and immediately after, 5, 10, 15, 30 and 45 minutes after static stretching protocol as post-tests. Participants performed 2 sprint attempts with 1 min rest between attempts. The best score evaluated. Repeated measures analysis of

variance was used for statistical analysis of data. **Results.** The findings of the study show that significant impairments were found in 30 m sprint time of three groups with respect to pre-test. There were significant impairments in sprint times at 30th and 45th minutes of CG, 15th, 30th and 45th minutes of 15SG and immediately after stretching, 5th, 30th and 45th minutes of 30SG. **Conclusions.** In the present study it was found that SS impaired the sprint time. Both mechanical and neurological factors led to increase of sprint time. Sprint time recovered 10 minutes after 30 seconds static stretching. It is thought that impairment of sprint time at 30th and 45th minutes of all groups might be related to cooling down of muscle temperature.

Keywords: warm-up, stretching, sprint performances.

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LOCOMOTION AND PHYSIOLOGICAL CHARACTERISTICS IN SEMI-PROFESSIONAL FEMALE WING HANDBALL PLAYER

A. Kniubaitė, A. Skarbalius

Lithuanian Sports University, Kaunas, Lithuania

Background. Modern handball is a physically demanding sport which requires for players special fitness depending playing position (Michalsik et al., 2013). It is highly important to find out locomotion and physiological demands during handball match in order to design right training program for individual player position. The aim of this research was to evaluate locomotion and physiological characteristics in semi-professional wing female handball player. **Methods.** Using GPS device OptimeEye X4 (Catapult, Australia), which enabled to register triaxis locomotion and using another device (Polar Team System, Finland) for registering physiological demands, four official matches in Baltic League competition were recorded. Individual indices of semi-professional wing female handball (age 25 years, height 174 cm, body mass 62 kg, fat mass 14.69% (9.1 kg), free fat mass 53 kg) functional capacity were determined in the laboratory by incremental treadmill until exhaustion wearing gas analyser (HRmax – 201 beats/min-1, ventilation threshold 1 was at HR 171 beats/min-1, ventilation threshold 2 was at HR 192 beats/min-1, VO₂max 50.3 ml.kg-1.min-1). Percentage structure of zones intensity was calculated according Stagno (2007) classification (%): I ≤ 71, II 72–78, III 79–85, IV 86–92, V 93–100. Training impulse (TRIMP) was calculated using Edwards (1991) TRIMP method and Stagno (2007) equation was applied. **Results.** The

fact that locomotion in vertical axis exceeded indices in frontal axis significantly ($p < .001$; ES 2.358 [very large]) and sagittal axis significantly as well ($p < .001$; ES 3.464 [very large])) suggests, that exercises for power are highly recommended for wing player in semi-professional female handball. Determined TRIMP altered between 267 and 331 arbitrary units on average (301.2 ± 34) in line to elite handball. These findings allow asserting that specificity has the same affect for elite and high-performance handball female players (Stagno, 2007). **Conclusion.** Locomotion and physiological demands in semi-professional wing female handball player were determined for the first time and will be useful for the implementation of practical needs for individual wing female handball training.

Keywords: TRIMP, heart rate, demands in handball match.

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SPORTS ETHICS RELATIVITY: POINT OF VIEW OF ATHLETES AND SPORT COMMUNITY MEMBERS

A. Kardišauskas, R. Malinauskas

Lithuanian Sports University, Kaunas, Lithuania

Background. There is a lack of scientific research and articles which analyse professional athletes' ethics. The main purpose of this article was to analyse the ethics of professional athletes and compare the results with the remaining part of the sports community. **Methods.** The study is based on a quantitative survey, which was conducted with 115 (65 men and 50 women) sport community members. Participants' age in this study ranged from 16–43. The respondents were divided into two groups: test and control. The population of the test group consisted of 41 (23 men and 18 women) professional athletes. The test group's age in this study ranged from 16–36. The control group consisted of 74 (42 men and 32 women) sport management and training systems students. The Control group's age ranged from 19–43. **Results.** The study observed one statistically significant difference ($p < .01$): the test group had lower ethical evaluation of autonomy than the control group.

Keywords: philosophy of sport, morality of modern sport, sport.

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ANALYSIS OF ELITE FINSWIMMERS' TECHNIQUE MODEL

V. Kunitson, K. Port

Tallinn University, Tallinn, Estonia

Background. Finswimming is a sport where the athlete uses one big monofin to produce the propulsion. This study was a pilot study to control a methodology of filming and analysing the technique of finswimming. The purpose of this study was to describe the parameters of swimming technique among elite class finswimmers. **Methods.** Six elite level monofin swimmers, 3 male (age 25.6 ± 5.1 , height 186.3 ± 12.9 cm, weight 90.0 ± 5.0 kg) and 3 female finswimmers (age 27.0 ± 2.6 , height 171.3 ± 10.4 cm, weight 64.3 ± 5.1 kg) performed a 15 meter monofin surface swim at full speed. Swimming was video recorded with a stationary GoPro Silver 3+ underwater video camera at 60 frames/second. Recording was conducted during the 2015 Finswimming World Championship in Yantai, China. Collected video material was analysed with Race analyser program (Estonia). **Results.** The average speed of male swimmers was 3.1 ± 0.2 m/s and the kick rate 132 ± 21.5 kick/min. Pitching of the hands was 21 ± 3 cm, amplitude of the hip movement was 25.7 ± 16.7 cm while the movement of the ankle was 52.7 ± 12.1 cm. Knee bending angle during a kick was 122.7 ± 8.7 deg, hip angle at the same time was 168 ± 6.8 deg and angle of the legs to water surface at the end of a down beat was 24.3 ± 3.2 deg. Female finswimmers had an average speed of 2.7 ± 0.03 m/s and a kick rate of 109.7 ± 12.4 kick/min. Pitching of the hands was 16 ± 8.9 cm, amplitude of hip movements was 18.3 ± 7 cm, ankle movement was 47.3 ± 12.5 cm. Knee bending angle during a down beat was 114.3 ± 5.1 deg and a hip angle at the same time was 150.7 ± 10 deg. Angle of the leg to the water surface at the end of a down beat was 26 ± 9.6 deg. **Conclusion.** Current method of utilising a stationary camera demonstrated an effective and feasible way for the analysis and modelling of finswimming during a complex situation of a competition of world fastest finswimmers. We also learned that independent of the gender effectiveness of finswimming seems to depend on the kick rate and joint (hip, ankle) angles. Further analysis is needed for confirmation.

Keywords: finswimming, monofin, propulsion.

THE INITIAL VALIDATION OF MULTIDIMENSIONAL SCALE TO MEASURE THE PERCEPTION OF THE TEACHERS' AUTONOMY SUPPORTIVE BEHAVIOUR

H. Tilga, V. Hein, A. Koka

University of Tartu, Tartu, Estonia

Background. This article outlines the development and initial validation of the Multidimensional Perceived Autonomy Support Scale for Physical Education setting (MD-PASS-PE), a multidimensional self-report measure designed to assess the students' perception of the teachers' autonomy supportive behaviour in physical education from the perspective of self-determination theory (Ryan & Deci, 2002). **Methods:** Cross-sectional questionnaire design. Study 1 generated a pool of items based on past literature and feedback from students and academic experts. The factorial structure of the questionnaire was tested using exploratory and confirmatory factor analyses across Study 2. Participants in Study 1 were 62 students aged 12 to 15 years. Five academic experts in SDT-based research were asked to review the content validity of the items from a theoretical perspective. Participants in Study 2 were 1152 students aged 12 to 15 years (from 6 to 8 grade) split into two groups for exploratory (EFA, $n = 576$) and

confirmatory factor analyses (CFA, $n = 576$). **Results.** Analyses of Study 1 revealed a 37-item model to test factorial validity in Study 2. The final EFA in Study 2 provided a 21-item solution with 3 factors (i.e., organizational, cognitive and procedural autonomy support) and CFA confirmed the final 15-item model displaying an excellent fit to data: $\chi^2(87) = 170.88$, CFI = .983, NFI = .965, RMSEA = .041. All subscales revealed internal consistency. Also, evidence for gender and age invariance was found. Results also indicated that students from 8th grade perceived autonomy support significantly less than 6th grade students, but no differences existed between boys and girls. **Conclusions.** The MD-PASS-PE was supported as a valid measure of perceived autonomy support, which may help to understand how distinct dimensions of perceived autonomy support can contribute to the motivational processes in PE. Teachers should consider age differences in providing students autonomy support during PE lesson.

Keywords: self-determination theory, autonomy supportive behaviour, organizational autonomy support, procedural autonomy support, cognitive autonomy support, scale development.

ASSOCIATIONS BETWEEN BONE AND ADIPOSE TISSUE BIOCHEMICAL MARKERS WITH BONE MINERALIZATION IN PUBERTAL BOYS: A LONGITUDINAL STUDY

D. Vaitkevičiūtė, E. Lätt, J. Mäestu, T. Jürimäe, M. Saar, P. Purge, K. Maasalu, J. Jürimäe

University of Tartu, Tartu, Estonia

Background. Optimizing peak bone mass during puberty is a key factor for a healthy skeleton in later adult years [1], about 40% of peak bone mass is accumulated during pubertal maturation [2]. Bone is a metabolically active and dynamic tissue with continuous remodelling occurring throughout the life and different bone turnover markers participate in bone formation and resorption [3]. The aim of this study was to investigate longitudinal relationships between bone metabolism markers and adipocytokines with bone mineral content (BMC), bone mineral density (BMD), moderate-to-vigorous physical activity (MVPA) and sedentary time (SED) in pubertal boys. **Methods.** Ninety-six boys (11.9 ± 0.6 years old) were measured at baseline, after 12 and 24 months. Body composition (fat mass [FM], lean body mass [LBM]), and whole body (WB), lumbar spine (LS) and femoral neck (FN) BMD and BMC were assessed. Additionally, serum leptin, adiponectin, osteocalcin (OC) and C-terminal telopeptide of type I collagen (CTX) were measured. **Results.** OC had a strong longitudinal inverse effect on changes in WB_BMD ($p < .0001$) and LS_BMD ($p = .0214$), while CTX had an inverse effect only on changes in FN_BMD ($p = 0.0113$). Leptin had an inverse effect on changes in WB_BMC/WB_BMD ($p = .0003$), FN_BMD ($p = .0018$) and LS_BMD ($p = .0006$). MVPA showed a longitudinal inverse effect on changes in leptin ($p = .0295$), however no longitudinal effect of SED to bone metabolism markers and adipocytokines was found. **Conclusion.** In conclusion, bone formation (OC) and bone resorption (CTX) markers negatively affect bone mineralization in healthy boys during puberty. Leptin, but not adiponectin was inversely associated with BMC and BMD increment. Finally, MVPA negatively influenced the leptin level in pubertal boys indicating a strong effect against adolescents' obesity problem.

Keywords: longitudinal analysis, pubertal boys, bone turnover, adipocytokines, physical activity.

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SPORT STUDENTS' UNDERSTANDING OF THE GOSPEL BY READING THE BROCHURE "MEET MY HEAD COACH" AND THEIR ATTITUDE TOWARDS THE GOSPEL MESSAGE

G. Talberga, A. Fernate

Latvian Academy of Sport Education, Riga, Latvia

Background. Spiritual dimension is one of the areas to be developed if we are taking holistic approach to the personal development (Ginger, 2000; Purnell, 2003). An essential part of spiritual growth is the understanding of the Gospel (Kleinig, 2008). The brochure "Meet My Head Coach" is made to explain the Gospel by basketball metaphor because people use metaphors to explain and to understand abstract ideas. When speaking to other people, conceptual metaphors help to communicate the idea by using common experiences (Lakoff, 2003). Fourteen 2nd year students (10 women, 4 men) of Latvian Academy of Sport Education took part in the study to find out how sport students understand the message of the Gospel that is communicated through the brochure "Meet My Head Coach" and what is their attitude towards it. **Methods:** structured e-interview and theory based content analysis. The research was carried out from a Christian worldview. The four main points of the Gospel were explained in the metaphor as follows: 1. God is the coach of our life; 2. Because of the disobedience (sin) we are too bad players in the game of life to get the victory; 3. God sent a substitute player Jesus Christ so that we could get the victory in the game of life; 4. It is our decision to obey God as a coach or not. These were chosen as four categories during the content analysis to explore how students understood each of these ideas. Half of the students grasped the idea of God as a coach who has the best game plan of life and therefore we should trust Him. Three kinds of attitude were observed to the idea – I do not agree with this, we should let God guide our lives in some ways and we should let God guide our lives more than we do it now. None of the students mentioned the metaphor that we as people are bad players and only one student understood the metaphor of Jesus Christ as substitute player and His significance for us to get the victory in the game of life. Nevertheless while describing their attitude 5 students emphasized that they did not agree that the consequence of sin (not obeying God) is death. **Conclusion.** Further study is needed to find out how negative previous experiences with Christianity or basketball may affect understanding of the metaphor.

Keywords: sport students, sport metaphor, understanding of the Gospel.

A PHENOMENON OF PARENT EXPERIENCES IN CHILD SPORT ACTIVITIES: AN INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS

A. Lisinskienė, S. Šukys

Lithuanian Sports University, Kaunas, Lithuania

Background. The number of children participating in sports has been decreasing in recent times (Smoll, Cumming, & Smith, 2011). The majority of scholars admit that parents have the biggest impact on children's sport participation (Dorsch & Smith, 2016). Parents can model children's behaviour and give it a positive direction. Parents influence the discovery and recognition of their child's talent, the joy of participation in sporting activities experienced by their child, the perception of athletic excellence, competition anxiety, stress management experience, and development of psychological skills (Holt & Knight, 2014). This study sought to explore parents' experiences and to gain an understanding of parents' personal lived experiences in youth sport. **Methods.** Eight youth sport parents participated in one semi-structured interview (total of eight interviews). The data were analysed using interpretative phenomenological analysis. **Results.** Three key themes were identified: parents' perceived value of sport; parents' acquaintance with adolescents' sporting life; the expression of parents' involvement in youth sport. **Conclusion.** The phenomenological interpretative analysis revealed the significance of the parents' role in motivating their children to participate in sports. Parents can have both positive and negative effect on children's sports activities. The effectiveness of children's sports activities depends on the educational methods used to develop the child's skills and abilities: interest stimulation, pressure or psychological influence. Too strict requirements of parents to achieve high results may negatively affect children's motivation to participate in sports. A child's progress in sport is often related with the realization of the parents' personal goals. Children's participation in sports also changes the behaviour of parents; interest in sports creates positive emotions and builds stronger relations between parents and children. Supportive participation of parents in children's sports activities changes parents' awareness and attitude to the quality of leisure time as well as lifestyle.

Keywords: youth sport, parents, adolescents, semi – structured interviews, interpretative phenomenological analysis.

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STUDENT'S PHYSICAL ACTIVITIES: SCHOOL EXPERIENCE AND PHYSICAL ACTIVITIES AT UNIVERSITY**E. Shishlova, A. Fernate***Latvian Academy of Sport Education, Riga, Latvia*

Background. Even 36% of students in Latvia are not physically active. The main interfering factors are the lack of time, the availability of sports facilities, and the financial aspect; 89% of students would like physical activity to be introduced into the study program. Riga Technical University organizes compulsory physical activity for all 1st year students, eliminating the interfering factors. However, 15% of the students provide medical excuses from doctors of exemption from physical activities at the beginning of the academic year. After the analysis of scientific literature it can be concluded that the experience gained in physical activity at school can affect people's participation in physical activity later in life (Tammelin, 2003; Thomson, 2003; Nia, 2012; Allender, 2006). **Objective:** To find out the students' experience in physical activities at school and their relationship with the attitude to physical activity at university. **Methods:** Riga Technical University student survey, using the Theory of Planned Behaviour, Social Cognitive Theory and the Self-Determination Theory, descriptive mathematical statistics, correlation analysis. **Results.** The negative attitude towards the compulsory physical activity is associated with negative experiences at school.

Keywords: student's physical activity, compulsory physical activity, school experiences.

THE EFFECT OF INTERVAL-WALKING TRAINING ON PHYSIOLOGICAL, BIOCHEMICAL AND ADIPOSITY OUTCOMES IN TYPE 2 DIABETES PATIENTS**K. Rodionova, A. Šnēvelis, A. Kļaviņa***Latvian Academy of Sport Education, Riga, Latvia*

Background. Exercise plays an important role in the management of type 2 diabetes (T2D) (Laughlin, 2015). Traditionally, aerobic and endurance exercise have been recommended for patients with T2D (Kang et al., 2009) however, recent studies show that interval exercise training can be prescribed safely to patients and could yield a greater improvements in health related outcomes (Kartsoft et al., 2012). This study aimed to evaluate the efficacy of interval walking training for type 2 diabetes patients in Latvia. Also, it investigated the effect of particular training modality on physical fitness, body composition, and glycemic control for the target group. **Methods.** The single subject design was applied in this study. The research phases included the baseline and the treatment phase consisting of the two different physical activity interventions: (1) continuous walking (CW) and (2) interval walking trainings (IWT) (A- baseline, B – continuous walking, and C – interval walking). Participants were four patients (age range from 61 to 74 years) with type 2 diabetes. The intensity of physical activities were controlled using the accelerometer and heart-rate monitor. Also, the self-reported diary was created for each participant. During continuous walking participants performed the one hour continuous walking with HR 55% from max, while during the interval walking training they used 3-min long repetitions at low (40% from max HR) and high intensity (70% from max HR). Intensity was prescribed individually to each participant according to the pre-test results where the following variables were measured: body composition, blood pressure, heart rate and glycemic control. **Results.** The baseline included an evaluation of the initial state of the patient and indicated that two participants had normal weight, and two were heavily overweight.

Blood glucose level and blood pressure ranged from 6.1 mmol/l to 11.9 mmol/l and from 140/60 mmHg to 160/105 mmHg respectively. The intervention phases are implemented now. The results will be presented during the presentation. **Conclusions.** While the effect of interval – walking training has been indicated in previous studies (Mitranun et al., 2014; Kartsoft et al., 2012; Kartsoft et al., 2014), this research will present the comparative effect of two different treatment programs in T2D patients.

Keywords: type 2 diabetes, interval walking, glycemic control, body composition.

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THE SITUATION OF PHYSICAL EDUCATION IN PRIENAI REGION SCHOOLS: TEACHERS' ATTITUDE

L. Beitnaras, L. Trinkūnienė, I. Palavinskienė

Lithuanian Sports University, Kaunas, Lithuania

Background. According to scientific research, likewise social and cultural experience, it can be said, that the current situation of physical education in the majority of Lithuanian general education schools is problematic. According to Prienai region municipality sports sector indicators' analysis (2012) together with internal environment weaknesses and external environment threats, it can be said, that in this land of Lithuania, physical education and sports are also not dissociated from certain financial barriers and social difficulties. Assuming that the most important person to ensure the quality of physical education process at school is physical education teacher, our investigation aims to find out what is the situation of physical education in Prienai region schools in the aspect of physical education position. **Methods.** The survey was carried out using a questionnaire with reference to Sport Science and Physical Education Councils (ICSSPE/IOC), an international study Second World-wide Survey of School Physical Education, Final Report (Hardman, Marshall, 2009). Questionnaires were distributed to all twelve Prienai region schools, while the questions were answered by all 22 (100 percent) physical education teachers. **Results/Conclusions.** Research reveals that in Prienai region: a) physical education teachers mainly teach team games, athletics and organize outdoor activities; b) from the unusual physical activities teachers mostly use checkers or chess, weight lifting and darts; c) teachers evaluate students' progress and achievements in physical education lessons based on the grades; d) physical education classes for all physically weaker pupils are conducted in conjunction with the whole class, whilst students exempted from physical activity due to health conditions or temporary illness, are usually offered by teachers to play checkers or chess; e) physical education teaching tools and learning equipment quality at schools is good, whereas the quantity is above average; f) the status of physical education subject as well as the status of physical education teachers are the same as with any other subjects and their teachers at school.

Keywords: situation, physical education.

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OXYGEN UPTAKE KINETICS DURING TREADMILL WALKING IN 6–19-YEAR-OLD CHILDREN WITH DIFFERENT PHYSICAL ACTIVITY

V. Šidlauskaitė, A. Stasiulis, B. Zacharienė

Lithuanian Sports University, Kaunas, Lithuania

Background. The pulmonary oxygen uptake ($\dot{V}O_2$) kinetic response at the onset of exercise provides a non-invasive method of evaluating aerobic metabolism in muscles during growth and maturation (Armstrong & Barker, 2009). However, to date only limited research has been devoted to investigating the $\dot{V}O_2$ kinetics during exercise in children with different physical activity. Therefore, the aim of this study was to compare the oxygen uptake kinetics in physically active (PA), non-physically active (NPA) and overweight (OW) 6–19 years old children. **Methods.** Two consecutive treadmill exercises sessions (separated by one hour) were performed. During each session $\dot{V}O_2$ data were collected at subjects rest and during walking (at 6 km/h and a 4% grade treadmill) for 6 minutes. The kinetics of $\dot{V}O_2$ during exercise was analysed by applying mono exponential function. **Participants.** We divided participants in three groups. Group I: ten PA (8 ± 1.6 years), ten NPA (8 ± 1.4 years) and five OW (8 ± 1.7) children. Group II: ten PA (12 ± 1.9 years), ten NPA (12 ± 2.0 years) and five OW (12 ± 1.8 years) children. Group III: ten PA (16 ± 1.4 years), ten NPA (16 ± 2.2 years), five (16 ± 2.1 years) children participated in this study. **Results.** The time constant of $\dot{V}O_2$ was significantly slower in all OW and NPA groups compared to the PA groups ($p < .05$). The amplitude of $\dot{V}O_2$ response was similar in OW and NPA groups. **Conclusions.** These findings show that children who are non-physically active or have overweight demonstrate slower $\dot{V}O_2$ response at the start of exercise. The main finding of the present study was the $\dot{V}O_2$ kinetic response in consecutive treadmill exercises sessions was slower in NPA and OW children in different age (6–19 years) compared with PA children. Our findings are in agreement with studies that reported slower $\dot{V}O_2$ kinetics across a range of workloads in non-physically active compared with physically active adolescents. It is still not enough research in children $\dot{V}O_2$ kinetics in pre pubertal, pubertal and post pubertal age, also the influence of obesity and overweight to $\dot{V}O_2$ kinetics in children.

Keywords: overweight children, physical activity of children, oxygen uptake in children.

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METASTABLE EXERTIVE PAIN DYNAMICS DURING INCREMENTAL EXHAUSTIVE EXERCISE

A. Slapšinskaitė¹, N. Balagué Serre¹, R. Hristovski², S. Razon³

INEFC, Barcelona¹, Spain

Ss. Cyril and Methodius University², Skopje, Macedonia

Ball State University³, Muncie, Indiana, USA

Background. People experience local discomfort and exertive pain during intense endurance exercise [1]. Nevertheless, no studies have explored the evolution of exertive pain and its spatiotemporal topology dynamics during incremental exercise. The purpose of the present study was to delineate the spatiotemporal topology dynamics of exertive pain during incremental cycling. Specifically, we hypothesized that: (a) the number of bodily locations with exertive pain would increase throughout the duration of the incremental cycling task, and (b) perceived exertive pain would display metastable states during the task. **Methods.** Fifteen physical therapy students (MAge = 22.5 ± 0.43) were tested while cycling at 60 rpm with an initial load of 30 W and with 30 W/min increases up to volitional exhaustion. During the tests, participants reported their discomfort and pain on a body map every 15 s [2]. “Time on task” for each participant was divided into five equal non-overlapping temporal windows within which their ratings were considered for analysis. The PCA method was used to reduce the dimensionality of multivariate datasets. **Results.** The analyses revealed that the number of body locations with perceived pain and discomfort increased throughout the five temporal windows until reaching the mean ($\pm$ SE) values of 4.26 ± 0.59 locations. Left and right quadriceps, lower back and left ankle were dominant locations with exertive pain. The metastable dynamics of body pain locations in the space spanned by 3 PCs. **Conclusions.** Findings from this study unravel the spatiotemporal dynamics of topologically defined areas with perceived exertive pain in incremental exercise. The number of reported locations with pain increased as a function of time on task. Also, sensory interactions and integration of information from locations with pain displayed metastable states. Implications and recommendations for upcoming research will be discussed.

Keywords: exertive pain, incremental exercise, dynamics, metastability.

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MUSCULOSKELETAL DISCOMFORT IN ASSOCIATION WITH PHYSICAL ACTIVITY IN FEMALE OFFICE WORKERS AND SUPERMARKET CASHIERS

T. Sirge, J. Ereline, T. Kums, H. Gapeyeva, M. Pääsuke

University of Tartu, Tartu, Estonia

Background. Continuous sitting while working is a common source of musculoskeletal discomfort (MSD) and fatigue. The aim of the present study was to compare prevalence and localization of perceived MSD in association with physical activity in office workers and supermarket cashiers. **Methods.** Fifty female office workers (aged 27–63 years) with mean ($\pm$ SD) age of 44.0 ± 11.7 years, body mass index (BMI) of 24.1 ± 3.3 kg/m² and 50 female supermarket cashiers with mean age of 43.4 ± 9.7 years, BMI of 24.5 ± 4.2 kg/m² participated in this study. All subjects were sedentary almost 8 hours a workday. They filled the standardized Nordic Questionnaire, Baecke Physical Activity Questionnaire, and informative form concerning bio-demographic variables. **Results.** Perceived MSD in office workers in the last 6 months was localized primary in low back (56%), in neck (52%), in shoulders (44%), in knee (30%), in wrist/hand region (28%) and less in elbow (8%). Prevalence of MSD in the last 7 days was mainly in neck (38%), in shoulders (30%), and in low back (26%). Supermarket cashiers perceived discomfort in the last 6 months in low back (78%), in neck (64%), in wrist/hand (62%), in shoulders (52%), in knee (40%) and less in elbow (26%). In the last 7 days, the prevalence of MSD in cashiers was also extremely high. Similar to office workers, the most fatigued body parts were neck (52%), low back (50%), and shoulders (42%). Pain and discomfort in wrist/hand region reported 52% of cashiers, whereas only 6% of office workers reported discomfort in wrist/hand region in the last 7 days. Office workers were more physically active: at least half of them (56%) had sport activities in their free time, whereas only 26% from cashiers had sports activities. In supermarket cashiers, discomfort level correlated negatively with their physical activity. **Conclusion.** The higher prevalence rate of perceived musculoskeletal discomfort in office workers and supermarket cashiers was found in low back, neck and shoulders. In cashiers, wrist/hand region is more fatigued. Office workers are more physically active than cashiers in their free time.

Keywords: musculoskeletal discomfort, females, office workers, cashiers, physical activity.

ACUTE EFFECT OF SHORT TERM STATIC AND DYNAMIC STRETCHING ON STRETCH-SHORTENING CYCLE OF MALE TRACK-AND-FIELD ATHLETES

T. Meerits¹, S. Bacchieri², M. Pääsuke¹, J. Ereline¹, A. Cicchella², H. Gapeyeva¹

University of Tartu¹, Tartu, Estonia

University of Bologna², Bologna, Italy

Background. The capability to utilize the stretch-shortening cycle (SSC) efficiently is an important factor of high level performance in explosive muscular power demand sports. There is evidence that eccentric utilization ratio (EUR) provides the information about of the SSC performance of athletes across a range of different sports (1) and using different stretching exercises during the warm-up affect significantly results of maximal speed or power needed performance (2, 3). Formerly, acute effect of static or dynamic stretching exercises was slightly investigated from the perspective of SSC. The purpose of this

study was to compare the acute effect of short term static and dynamic stretching on SSC augmentation. **Methods.** Fourteen power-trained male track-and-field athletes with mean age ($\pm$ SD) 22.6 ± 2.4 years and mean ($\pm$ SD) exercise experience of 12.8 ± 2.3 years participated in the study. Height and take off speed of squat jump (SJ) and countermovement jump (CMJ) were analysed before and after static and dynamic stretching exercises using telemetric system with an accelerometer G-sensor (BTS S.p.A, Italy). The height, peak power (PP), take off speed, EUR of jump heights, direct comparison (DC) and pre-stretch augmentation (PSA) of jumps were measured. **Results.** After static stretching, height and PP of SJ decreased ($p < .05$) by 4.2 and 2.8%. EUR increased by 4.3%, DC by 55.7% and PSA by 63.8% ($p < 0.01$). Jump height and PP of CMJ did not change significantly. After dynamic stretching, height of SJ increased by 6.2% ($p < .001$) and PP – by 4.2% ($p < .01$). Height and PP of CMJ did not change significantly, but EUR decreased by 3.1%, DC by 34.8% and PSA by 35.7% after dynamic stretching. Take off speed of SJ and CMJ did not change significantly after static or dynamic stretching. **Conclusions.** Dynamic stretching exercises induced an increase and static stretching exercise induced a decrease of concentric power generation capacity in leg extensor muscles during semi-squat vertical jump. Capacity to store potential energy in elastic components of the tendons and muscles decreased after short term dynamic stretching. Stretching exercises did not affect take off speed. Dynamic stretching exercises, as part of warm-up, are recommended before maximum power needed performances.

Keywords: stretch-shortening cycle, static stretching, dynamic stretching, vertical jump, warm-up.

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A MOUSE MODEL FOR REVEALING ENDURANCE GENES

M. Kvedaras¹, P. Minderis¹, T. Venckūnas¹, A. Ratkevičius^{1, 2}, A. Lionikas²

Lithuanian Sports University¹, Kaunas, Lithuania
University of Aberdeen², Aberdeen, Scotland, UK

Background. A better understanding of the factors underlying endurance is important because of its impact on fitness, health and exercise performance [1]. Phenotypic diversity between laboratory mouse strains provides a model for studying the underlying genetic mechanisms. The A/J strain is characterized by poor endurance performance in different exercise models [2, 3]. The aim of this study was to test if endurance is determined by the genes residing on mouse chromosome 10. **Methods.** The C57BL/6J (B6) strain mice ($n = 16$) were compared with C57BL/6J-Chr 10A/J/NaJ (B6.A10) chromosome substitution strain animals ($n = 21$) which carry the A/J chromosome 10 on a B6 strain background. **Results.** There was no difference in voluntary wheel running over 3-day period ($p = .6$), however, the B6.A10 mice ran only 64% of the distance completed by B6 ($p < 1 \times 10^{-6}$) in the forced running endurance test.

Conclusions. We conclude that mouse chromosome 10 harbors gene(s) determining endurance capacity, and that the A/J variants of these genes contribute to weaker endurance performance of this strain.

Keywords: aerobic capacity, citrate synthase.

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INFLUENCE OF EXCHANGED NEUROMUSCULAR REGULATION OF MUSCLE GASTROCNEMIUS ON ITS AEROBIC PERFORMANCE

U. Gavrona, A. Paeglitis, N. Varpa, Z. Galeja

Latvian Academy of Sport Education, Riga, Latvia

Background. Comparing theories of applied kinesiology and muscle local aerobic performance it is obvious that exchange neuromuscular regulation on the level of organization of motor patterns (MP) and muscle local energy supply take place in sub cortical level of the central nervous system. Different external or internal influences could exchange neuromuscular regulation on the level of organization of motor patterns (MP) and observed muscle could become weak-tested or become hypertonic. The aim of this study is to find out connection between muscle's neuromuscular regulation and its local aerobic performance. **Methods.** We investigated relative force impulse in the leg during static voluntary contraction with contraction force 5% of knee flexor muscle maximal static voluntary contraction (MVC) in position with knee flexed till 60 deg. All participants were examined in prone position. In this experiment participate 17 LASE students in age 20–25 with normotonic m. gastrocnemius and 17 LASE students in age 20–25 with weak-tested m. gastrocnemius. Muscle tests were performed according AK testing method in prone position. MVC was measured with electrical dynamometer Lafayette Instrument (model 01165 Manual Muscle Tester). Angle of knee flexion was measured by goniometer Basoline AcuAngle Inclinator Japan. Test was performed until exhaustion, which manifested as the inability to hold the test position. **Results.** We found statistically significant ($p > .05$) differences of relative force impulse in muscles triceps with and without exchanged neuromuscular regulation during static contraction with contracting force of knee flexors 5% MVC. The differences were observed all the time of the static contraction. **Conclusion.** Changes of neuromuscular regulation cause decrease of aerobic performance.

Keywords: prolonged static voluntary contraction, aerobic performance.

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EFFECT OF A LONG-TERM HABITUAL PHYSICAL ACTIVITY ON BODY COMPOSITION, NEUROMUSCULAR PERFORMANCE AND MOBILITY IN HEALTHY OLDER WOMEN

A. Rava, A. Pihlak, J. Ereline, H. Gapeyeva, T. Kums, P. Purge, J. Jürimäe, M. Pääsuke

University of Tartu, Tartu, Estonia

Background. The purpose of this study was to evaluate the effects of long-term habitual physical activity on body composition, neuromuscular performance and mobility in healthy older women, and examine the relationship between skeletal muscle mass, strength and mobility. **Methods.** Overall 32 healthy older women aged from 65 to 80 years participated in this study. They were divided into two groups according to their physical activity history: regularly exercising (EXE, $n = 22$) and sedentary (SED, $n = 10$). EXE women practiced in Nordic walking, running and gymnastics at least twice a week, minimum of 60 min per training. SED women did not train or they completed only one physical activity session per week, which did not last longer than 30 min. Whole body composition, isometric hand grip and leg extensor muscle strength were measured. Also power output during vertical jumping and mobility indices were assessed. **Results.** SED women had higher values for body mass, body mass index and fat mass in comparison with EXE women. EXE women had significantly higher values for leg extensor muscle strength and leg extensor muscle strength adjusted with body mass, also for appendicular muscle mass adjusted with body mass and lower extremity muscle quality. EXE women covered significantly longer distance in six minute walk test and performed five-times-sit-to-stand in shorter time compared to SED women. For overall group, leg extensor muscle strength and power output during vertical jumping, and appendicular muscle mass per unit of body mass correlated significantly with mobility parameters in healthy older women. **Conclusion.** Long-term exercising is beneficial for older women to reduce age-related changes in body composition and maintain lower extremity strength, muscle quality and mobility. Mobility in healthy older women is associated with maximal and explosive force-generation capacity of the leg extensor muscles, also with skeletal muscle mass adjusted with body mass.

Keywords: aging, regular exercise, body composition, mobility.

INFLUENCE OF EXCHANGED NEUROMUSCULAR REGULATION OF M.GASTROCNEMIUS ON THIS MUSCLE TONE

N. Varpa¹, A. Paeglītis¹, M. Paasuke², U. Gavrona¹, Z. Galeja¹, J. Ereline², H. Gapeyeva², T. Kums²

*Latvian Academy of Sport Education¹, Riga, Latvia
University of Tartu², Tartu, Estonia*

Background. It is known from theory of applied kinesiology (AK) that different external or internal influences could exchange neuromuscular regulation on the level of organisation of motor patterns and observed muscle could become weak-tested or become hypertonic. Since 1970s, literature has described experimentally proved concept of muscle local blood flow redistribution to capillaries feeding active muscle fibres. Coordination of these two systems take place in the same regulatory level where there is organised motor pattern of active muscle. These coordination problems were observed in an experiment where dynamics of blood flow during static voluntary contraction of leg muscles in two conditions – normal muscles motor pattern organisation and in situation when controlled muscles were weak- tested was compared. The aim of the study was to find relevance between muscle`s neuromuscular regulation and muscle tone. **Methods.** Young healthy women in age 20–25 participated in this experiment. We analysed myotonometry parameter – frequency (Hz) in 18 gastrocnemius muscles with normal contraction motor pattern and in weak-tested condition obtained irritating the greater momentum in pyloric part of stomach. We used Myometer Myoton-2 (University of Tartu, Estonia). For results we put myotonometer on the belly, the medial muscle gastrocnemius. Muscle tone was registered in rest position, during isometric contraction 60 degree flexion of the knee, then during isometric contraction with 5% of MVC, and then again in rest position for booth condition of m. gastrocnemius motor pattern. **Results.** Analysing obtained results we did not find statistically significant changes in muscle tone of every position in booth conditions of m. gastrocnemius motor pattern what can be connected with changes of the muscle local blood flow.

Keywords: neuromuscular regulation of muscles motor pattern, muscle tone, weak tested muscle.

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BODY COMPOSITION, BONE MINERAL DENSITY AND FUNCTIONAL PERFORMANCE IN DIFFERENTLY TRAINED AND UNTRAINED WOMEN

A. Pihlak, A. Rava, J. Ereline, H. Gapeyeva, T. Kums, P. Purge, J. Jürimäe, M. Pääsuke

University of Tartu, Tartu, Estonia

Background. The aim of the study was to compare body composition, bone mineral density and functional performance in older women with different levels and types of habitual physical activity. **Methods.** Totally 32 elderly women aged 65–80 years volunteered to participate in this study. They were categorized into three groups considering their exercise type: (1) endurance trained (END) practiced in Nordic walking, running or skiing), (2) recreational gymnasts (GYM) and (3) untrained (UNT). END and GYM practiced at least twice a week, minimum of 60 min per training. The protocol consisted of static standing balance tests with eyes open in bipedal (30 s) condition, and from different mobility and functionality tests: timed-up-and-go (TUG); 5 sit-to-stand-up (5STS), and six minutes walking test (6MWT). Postural control test was performed on the force plate, both on stable and unstable surfaces. Dual-energy X-ray absorptiometry was used to measure body composition. **Results.** END women had lower ($p < 0.05$) body fat compared to untrained, and they had higher ($p < .05$) bone mineral density compared to GYM group. There were no significant differences ($p > .05$) in other measured body composition parameters between the groups. During static standing balance tests on a stable surface, END group had smaller sway in anterior-posterior and medial-lateral direction but higher sway speed and trace compared to other measured groups. END group showed shorter TUG test time compared to other groups, whereas GYM group had the longest time. Recreational GYM group had better results ($p < .05$) in 5STS compared to other groups. END groups showed significantly better ($p < .05$) results in 6 MWT compared to other groups. Body composition parameters were strongly correlated with postural control parameters in all measured groups. **Conclusions.** Both measured types of recreational training can enhance physical capacity in its different parameters. Endurance training seems to be a more effective way to improve body composition, bone mineral density and functional performance in the older women as compared to recreational gymnastics.

Keywords: women, elderly, endurance training, recreational gymnastics, functional performance.

COMPARISON OF INITIAL LOADING RATE AND THRUST MAXIMUM BETWEEN SHOD AND BAREFOOT RUNNING

V. Abolins, E. Bernans, J. Lanka

Latvian Academy of Sport Education, Riga, Latvia

Background. Classical elite runners race with shoes. But historically there have been several elite barefoot (BF) runners. In 1960, at the Olympic Games, a marathon was won running BF. Nowadays it is hard to find elite runner who performs his race without shoes, but among non-elite runners BF running is getting more popular because of its probable benefits for runners. The aim of this study was to determine differences in initial loading rate (LR) and thrust maximum (TM) between shod running and BF running. **Methods.** Several male long distance runners participated in the experiment.

In first part of the experiment each participant ran 1 km repetitions with 30 second resting time between them. During the resting time blood lactate concentration level was measured. First repetition's pace was 3:50 min/km and every next repetition's pace was 0:10 min/km higher than previous until participant's blood lactate concentration reached 4 mmol/l. In the second part of the experiment participants ran 50 m distance with the pace at which participant reached 4mmol/l. During running ground reaction forces were measured for both legs. Participants ran with shoes and BF. LR and TM were calculated and compared. **Results.** First results show individual responses in LR and TM when switching from shod running to BF running.

Keywords: barefoot running, biomechanics, running, loading rate, thrust maximum.

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INTERINDIVIDUAL AND INTRAINDIVIDUAL VARIATION OF GROUND REACTION FORCES IN DISTANCE RUNNING

E. Bernans, J. Lanka, V. Abolins

Latvian Academy of Sport Education, Riga, Latvia

Background. Characteristics of ground reaction forces (GRF) have been widely studied for more than half of the century. Results show differences in GRF data interpretation between group of runners and individuals. The aim of the study was to determine individual and group ground reaction forces variation in running. **Methods.** Twenty one ($n = 21$) national level male distance runners took part in this study. Ground reaction forces were registered during two levels of running intensity: submaximal and submaximal intensity increased by 10%. The submaximal level of intensity was previously determined by performing a field test. Runners performed 5 successful running trials at both levels of intensity. Ground reaction force of one complete running step was measured using two synchronized force plates. **Results.** Results showed interindividual and intraindividual variation in GRF characteristics.

Keywords: running biomechanics, ground reaction forces.

SIT-TO-STAND AND WALKING PERFORMANCE IN ASSOCIATION WITH ANXIETY AND QUALITY OF LIFE IN FEMALE MIDDLE-AGED AND OLDER FALLERS AND NON-FALLERS

T. Moroz^{1,2}, A. Gribanov¹, M. Pääsuke²

*Northern (Arctic) Federal University¹, Arkhangelsk, Russia
University of Tartu², Tartu, Estonia*

Background. It is known that the age-related changes in postural control and mobility are common among older people and cause their fall, which can result in serious injury and loss of social independence. The aim of this study was to compare mobility in association with anxiety and quality of life in community-dwelling female middle-aged and older fallers and non-fallers. **Methods.** A group of 246 community-dwelling women aged 55–74 years participated in this study. They were divided to (1) fallers ($n = 95$) and (2) non-fallers ($n = 151$) by incident of falls in the past year. Posturography complex «Balance Master» was used to measure sit-to-stand (STS) and walking performance by different tests (Walk Across, Tandem Walk, Step-Quick Turn and Step-Up and Over). Trait and state anxiety by Spielberg-Hanin, and quality of life by SF-36 questionnaire were assessed. **Results.** The measured parameters of STS test did not differ significantly ($p > .05$) in measured groups. The average speed in Walk Across test and in Tandem walk test was lower ($p = .020$ and $p = .030$, respectively), and step width and end sway in Tandem walk test were higher ($p = .016$ and $p = .029$, respectively) in fallers as compared to non-fallers. Step-Quick Turn test time was longer, and sway was higher ($p = .016$ and $p = .011$, respectively) during turning left and right in fallers then in non-fallers. Trait anxiety was higher and quality of life level was lower in fallers compare to non-fallers ($p = .012$; $p < .001$ and $p < .001$, respectively). In fallers, walking performance associated with anxiety and quality of life. **Conclusion.** Middle-aged and older community-dwelling female fallers demonstrated lower walking speed on distance and during turn around and wider step width in tandem walk compare to non-fallers. They had also higher level of anxiety and lower level of quality of life. No significant differences in sit-to-stand performance were suggested between measured groups. No associations between the number of falls and parameters of mobility were revealed. **Acknowledgments.** This study was performed as part of the state task project in the field of scientific activities for Ministry of Education and Science of Russian Federation for 2014–2016, No2025 Northern (Arctic) Federal University.

Keywords: ageing, falling, mobility, anxiety, quality of life.

THE KINETICS OF OXYGEN UPTAKE DURING WALKING IN ELDERLY WOMEN

L. Šilinė, L. Stasiulė, A. Stasiulis

Lithuanian Sports University, Kaunas, Lithuania

Background. The aerobic capacity usually decreases during aging (Cunha et al., 2010). Several studies have shown that cardiovascular and respiratory parameters demonstrate slower kinetics at the start or after exercise in old persons as compared to young ones (Murias et al., 2011; Gravelle et al., 2012). However it has been not evaluated if there are differences between middle aged and elderly women.

The aim of the study was to assess the kinetics of oxygen uptake (VO_2) during walking in elderly women. **Methods.** 23 healthy, inactive female participated in this study. The participants were divided by age into two groups: 9 middle age women (47.3 ± 5.2 years) and 14 elderly (65.4 ± 4.1 years). During their visit to the laboratory total and segmental body composition assessment was carried out and each woman performed standard 6 minute walk test (speed - 6 km/h, inclination – 4%) on treadmill. Three minutes before the test participants walked at 3 km/h. Five minutes post-test participants lied in supine position. Each subject performed the same test twice with hour of rest between sessions. Respiratory gas exchange values were measured breath by breath using a portable system. VO_2 response was applying a mono-exponential equation: $\text{VO}_2(t) = \text{VO}_2 \text{ baseline} \pm \text{Amplitude} (1 - e^{-t/\tau})$, where τ is time constant of response. **Results.** The absolute VO_2 was lower in elderly women as compared with middle age ones ($p < .05$), but there was no difference between groups in the relative VO_2 ($p > .05$). The slow component of VO_2 kinetics was higher in elderly group ($p < .05$). The kinetics of VO_2 during recovery was slower in elderly group as well ($p < .05$). **Conclusions.** The older women demonstrated greater amplitude of the slow component of oxygen uptake kinetics during exercise and slower time course of oxygen uptake during recovery. The time constant of oxygen uptake response at the onset of walking was similar in middle aged and elderly women.

Keywords: oxygen uptake kinetics, women, age, recovery.

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TURKISH FOOTBALL FANS' OPINION ABOUT THE FOREIGN OWNERSHIP MODEL AT FOOTBALL CLUBS

M. Fişne, S. Bardakçı, Y. Karagöz

Cumhuriyet University, Sivas, Turkey

Background. The foreign ownership has been undoubtedly an important model within some European countries over the last two decades. Interestingly there has been no general discussion about the applicability of this model in Turkish Football, even most of football clubs are in turmoil. The purpose of this study was to investigate what Turkish football fans opinions are about a possible purchase of their clubs by a foreign owner. **Methods.** The methodology employed was the measures of association. A total of 1173 participants who were selected with convenience sampling method among the fans of football clubs that was struggling in Sport Toto Super League of Turkey, completed a survey including open-ended and closed-ended questions. **Results.** The main findings reveal that 67.4% of participants declared that they were repugnant and 32.6% of participants declared that they supported a possible purchase of their clubs by foreign owners; 72.3% of those who were repugnant indicated that they did not support for the nationalist reasons and 25.6% indicated they were afraid of a loss of fan identity. 37.6% of those

who gave support indicated that they supported for financial reasons, 34.3% indicated they supported for success and 26.4% indicated they supported for better corporate governance. According to the findings, 55.9% of participants declared that they had adequate knowledge and 44.1% of them declared that they did not have adequate knowledge about the advantages and disadvantages of foreign ownership model at football clubs; 56.9% of those who declared that they had adequate knowledge and 80.5% of those who declared that they did not have adequate knowledge were repugnant of a possible purchase of their clubs by a foreign owner. The Pearson Chi-Square Test results showed a significant difference between adequate knowledge about foreign ownership model and supporting it ($\chi^2 = 72.492$, $p = .000 < .05$). **Conclusion.** This study demonstrates that most of Turkish football fans were repugnant of a possible purchase of their clubs by a foreign owner for several reasons. Furthermore, they had a prejudice against foreign ownership model; even they did not have adequate knowledge about the advantages and disadvantages of it.

Keywords: football, club ownership, Turkish football, Turkish fans.

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HIGH PERFORMANCE SPORT MANAGEMENT IN LATVIA: REVIEW OF HIGH PERFORMANCE ATHLETES VIEWS

A. Dombrovskā, S. Luika

Latvian Academy of Sport Education, Riga, Latvia

Background. There are numerous of studies in high performance sport management and factors which determine success in high performance sport (V.D.Bosscher 2015). Effective high performance sport development system has become an important aspect of national policy planning with the aim to achieve international success (S.S. Andersen, B. Houlihan, L.T.Ronglan, 2015). The main aim of this study was to clarify high performance athletes' view on sport management in Latvia. For the study as research subject were chosen high performance athletes. In total 103 athletes fill the questionnaire (64.1% male and 35.9% female). **Results.** Initial results of ongoing research shows that there is not sufficient national-level financial support for sports in Latvia. Just 29.1% of athletes think that there is (evidence of) long-term planning for high performance sport development in Latvia. In just 18.4% respondents view athletes are involved in the policy development. To statement that resources are targeted at relatively few sports through identifying those that have a real chance of success at world level agree 46.1% of respondents. The survey also showed that in athletes' view (54.4%) there is not an effective system for the identification of young talented athletes in Latvia. 30.1% of athletes

disagree with statement that there is nationally co-ordinated planning to increase the number of international high performance sport events that are organised in the country in a wide range of sports. At the same time results showed – 13.6% strongly agree and 46.6% agree that athletes can participate sufficiently in international (high-performance) competitions. It was also found out that 35,3% of high performance athletes disagree and 42.2% undecided to statement that sport science is provided at each level of high performance sport development. **Conclusions.** 1. There is not sufficient national-level financial support for sport. 2. There is strong co-ordination of all organizations involved in high performance sport and they have clear task descriptions. 3. There is not (evidence of) long-term planning for high performance sport development in Latvia. 4. Athletes are not involved in the policy development. 5. Resources are targeted at relatively few sports through identifying those that have a real chance of success at world level. 6. There is not an effective system for the identification of young talented athletes in Latvia. 7. Athletes can participate sufficiently in international (high-performance) competitions. Sport science is not provided at each level of high performance sport development.

Keywords: high performance sport management.

COMPARATIVE ANALYSIS OF SOCIAL SKILLS IN TWO GROUPS: DANCESPORT DANCERS AND NON-DANCING PEOPLE

A. Armas

Lithuanian Sports University, Kaunas, Lithuania

Background. The contemporary society pays extraordinary attention to the development of socially oriented personality. Scientists pay considerable attention to person's social skills as for a background of social competence. Social skills are essential for a person achieving to adapt to certain social situations (Hall, Coats, & Smith, 2005); express oneself and understand others (Colombero, 2004), maintain relationships and avoid conflicts (Sukhodolsky & Butter, 2007). One of the most important fields of social life is sports; moreover, sport is one of the main measures for health maintenance and enhancement, which determines good mood and working efficiency. Dancesport's popularity has been growing during past decades. The dance helps in realizing dancers' potential, it enables dancers' self-education, makes them feel emotionally satisfied, also, body movements are being trained and developed; encompassing all the latter elements, the idea of the dance is being expressed (Ušpurienė & Čepulėnas, 2011). It can be stated that dance affects its creator and spectator in a very particular manner. According to the individual's sensitivity, sensation of aesthetics, the power of art and its impact might manifest in a different manner. The spirit and energy of the dance, expressed by the performer's feelings and emotions affects the people around. During the latter interaction, various social skills are obtained. Recent research on social skill development shows the existence of scholarly research in the area. Accordingly, this research aims at comparative analysis of social skills in two groups: dancesport dancers and non-dancing people. **Method.** Aiming to accomplish the research aim, the questionnaire survey was applied. **Results.** The research enabled the determination of differences in the structure of social skills specific to dancesport dancers and non-dancing people. The main differences were observed in manifestation of such social skills as interaction, communication, and emotional skills. Moreover, the skills of social cognition were more evident in dancers' group. **Conclusions.** The research enabled to determine the

impact of sports environment on social skill development. Based on research results it might be recommended for people aiming to develop social skills to engage in dancesport activity.

Keywords: social skills, dancesport.

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EFFECT OF PSYCHOLOGICAL STRESSORS TO MOTOR FUNCTION IN YOUNG MALES. PILOT STUDY

G. Jurgėlaitienė, A. Skurvydas, H. Paulauskas, J. Vveinhardt, D. Valančienė, R. Solianik

Lithuanian Sports University, Kaunas, Lithuania

Background. It is well established that psychological factors and stress can influence the hypothalamic–pituitary–adrenocortical (HPA) axis and can impair motor performance during low-intensity isometric tasks. In response to stressors, the central nervous system evokes physiological responses that ultimately result in activation of the HPA axis and the sympatho-adrenal axis that causes release of neuromodulators (norepinephrine and serotonin) and hormones (epinephrine and cortisol) that impact cognitive, cardiovascular, and motor functions. Strength is dependent on adequate voluntary command from supraspinal centers and activation of motor units that vary in contractile properties across motor-unit populations. Motor function influenced by an acute psychological stressor, but this has not been investigated for strength. **Methods.** The experimental trials comprised of a control trial (CON) and a “Trier Social Stress Test” (TSST) trial. CON and TSST experiments were performed in random order, at least 2 week apart. Induction of psychological stress in a laboratory setting created by the TSST in which the subjects have to deliver a free speech and perform mental arithmetic in front of an experts. Isometric maximal voluntary contraction (MVC) and active sustained (30s) muscle contraction at 5% and 30% from MVC of plantar flexors muscles measured using isokinetic dynamometer. Muscle stimulation was applied using current electrical stimulator, PTT100 stimuli was superimposed on the voluntary contraction. Bipolar electrode setup placed in the popliteal fossa over the posterior tibial nerve used to elicit the soleus H – reflex, M – wave and V – wave. **Results.** This pilot study showed a tendency of decreasing plantar flexion MVC and voluntary activation and soleus H-reflex and M wave recruitment curve is depressed in amplitude during experimental day. H-reflex and M wave recruitment curve latency was shortening according to obtained control and experiment days data. **Conclusions.** The present study establishes that

psychological stressors have predisposition to influence motor function, more accurately, strength in young males.

Keywords: Social stress, psychological stressor, psychological stress, hypothalamic–pituitary–adrenocortical (HPA) axis, motor function.

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HEAD AND NECK WARMING AND ITS EFFECT ON PHYSIOLOGICAL RESPONSES IN THE COLD

H. Paulauskas, M. Brazaitis, K. Pukėnas, A. Šatas, M. Vilčinskaitė, A. Skurvydas

Lithuanian Sports University, Kaunas, Lithuania

Background. Numerous studies have accumulated scientific evidence supporting the beneficial effects of head and neck cooling (HNC) in the heat, but there is a lack of studies focusing on head and neck warming (HNW) and its effect on physiological responses in the cold. HNC, in hot environment, delays voluntary exercise termination, allows to tolerate higher core temperatures (Tyler & Sunderland, 2011), decreases heart rate, oxygen consumption (Watanuki, 1993), reduces stress, alleviates unpleasant sensations (Nunneley & Maldonado, 1983; Cohen et al., 1989) and prevents from heatstroke (Katsuura et al., 1989; Sin et al., 2015). Furthermore, HNC could be useful as additional clinical setting for neuroprotection after brain injuries, concussions (Jackson et al., 2015) and cardiac arrest (Cabanias et al., 2011; Kallmünzer et al., 2011) when therapeutic hypothermia is necessary. HNW may also be potential beneficial technique in preclinical re-warming and re-warming in hospitalization after prolonged or accidental exposure to cold. **Methods.** HNW was performed to evaluate head and neck warming effect at rest. Warming device contacted head and neck at 45 ± 1 °C. Whole body cooling (WBC) was 14 °C cold water immersion until 170 minutes terminated or mild hypothermia ($T_{re} - 35$ °C) was reached. HNW with WBC (HNW-WBC) was performed to assess HNW in the cold. Rectal (T_{re}), tympanic (T_{ty}), skin (T_{sk}) and muscle (T_{mu}) temperatures were measured. Oxygen consumption (OC), heart rate (HR), subjective sensations (SS) and shivering (SH) were registered. Metabolic heat production (MHP) and cold strain index (CSI) were calculated. Blood samples by venipuncture were collected and stress hormones levels of cortisol, epinephrine and norepinephrine measured. **Results.** Six subjects exhibited fast cooling (FC) and 10 subjects slow cooling (SC) responses to cold water immersion. HNW in the cold had a similar effect for both (FC and SC) groups. T_{ty} significantly increased ($p < .05$), while other temperatures did not differ ($p > .05$). OC, MHP, HR, SH, CSI significantly decreased ($p < .05$) and SS significantly improved ($p < .05$). Stress

hormones level showed only a tendency of reduction ($p > .05$). **Conslutions.** HNW showed beneficial effects on physiological responses to cold in SC and FC groups and reduced cold stress without negative effect on central and peripheral body temperatures.

Keywords: head and neck warming; cold exposure; cold stress.

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THE EFFECT OF 30 AND 120 S CONTINUOUS MVCs ON CENTRAL AND PERIPHERAL FATIGUE OF DIFFERENTLY AGED MALES AND FEMALES

L. Kreivėnaitė, V. Streckis, J. L. Poderys, D. Mickevičienė

Lithuanian Sports University, Kaunas, Lithuania

Background. The changes in the structure and function of motor units that occur with ageing have significant impact on an individual's ability to control force, particularly in maintaining a steady muscular contraction (Knight & Kamen, 2004). The inability to maximally activate a muscle or muscle group during an isometric maximal voluntary contraction (MVC) may be an important factor in explaining the frequent observation of a greater loss of force with age relative to the loss of muscle mass (Kent-Braun, 2009). In young adults it seems that maximal voluntary activation can be realized in most muscles, however, in elderly results are controversial: some studies indicate that voluntary activation in old adults does not differ from that in young adults, whereas others report that adults and elderly differ in their activation ability during a MVC (Bilodeau et. al., 2001; Klein, Rice & Marsh, 2001). The aim of this study was to evaluate the effect of age and sex on central and peripheral fatigue of males and females, during continuous 30 and 120 s MVCs of the quadriceps muscle. **Methods.** We studied 24 adult (19–24 years of age) and 22 elderly (65–74 years of age) healthy, physical active males and females. The volunteers performed continuous 30 and 120 s (MVCs). Effects of 30 and 120 s continuous MVCs on electrically induced adult and elderly muscle properties, MVC and central activation ratio (CAR) were estimated. **Results.** Adult subject's MVC was higher, but muscle fatigability were greater than the one of the elderly, while CAR were similar between subjects of different age and sex. Moreover, muscle fatigability of males was greater than that of females. 30 s isometric load had a greater impact on adult female's peripheral fatigue and central fatigue of elderly males, while 120 s MVCs affected more adult's peripheral and central fatigability. **Conclusions.** 120 s continuous MVCs had greater impact on adult males and females electrically induced muscle properties, MVC and CAR than elderly, when 30 s MVCs impact was similar to subjects of different age and sex.

Keywords: elderly, gender, fatigue, isometric load.

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