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Dear Friends,

Welcome to Tartu (Estonia) for the First Baltic Conference in Exercise and Sport Sciences and for the First Baltic Conference of Young Scientists in Exercise and Sport Sciences.

We are happy to host you in our country and hope that the time will be unforgettable for all of you.

This is the first time to organize a scientific conference for sport scientists from Baltic States – Estonia, Latvia and Lithuania. We hope that the conference is in one side a good possibility to present a new experimental results and on the other side to develop a new contacts and new common projects between universities and research group. This meeting is especially important for young scientists.

This publication includes the papers of the keynote lectures and the abstracts both oral and poster presentations. The editors wish to thank all authors who contributed to the success of the conference.

Toivo Jürimäe
Mati Pääsuke
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INVITED SPEAKERS

DOES SPORTS SCIENCE RESEARCH INFLUENCE PRACTICE?

D. Bishop

Università degli Studi di Verona, Italy

As sports scientists, we claim to make a significant contribution to the body of knowledge that influences athletic practice and performance. Is this the reality? This presentation will focus on the question “does sports science research influence practice?” and provide some suggestions on how we can better ensure that sports science research does influence practice.

WHAT IS SPORT SCIENCE?

Sport science is a multi-disciplinary field concerned with the understanding and enhancement of human sporting performance. Sport science can be thought of as using the scientific process to guide the practice of sport with the ultimate aim of improving sporting performance (3). It is about using the best available evidence at the right time, in the right environment, for the right individual to improve their performance. In order to achieve at least some of these goals, it is necessary to use the findings of well-designed research studies and to translate them into everyday practice (8).

DOES SPORT SCIENCE INFLUENCE PRACTICE?

Research from other disciplines indicates that there is a widening gap between scientific knowledge and practice (13) and that, in general, the utilisation of research into practice is poor (17). For example, it has been estimated that it may take as long as one or two decades for original medical research to be translated into routine medical practice (14). In an analysis of articles published in six leading basic science journals (25 000 articles), it was reported that only 2% contained some potential claims to future applicability, 0.4% resulted in a clinical trial,

and only 0.004% led to the development of a clinically useful class of drugs in the 30 years following their publication (5). While it is easy to criticise such retrospective studies, even if the authors were to underestimate the frequency of successful translation into applied use by 10-fold, their findings strongly suggest that the transfer rate of basic research into practice is very low (6). Even though a similar study has not been conducted with respect to sports science research, it is likely that similar conclusions would be reached.

Despite these negative findings, there is evidence that some sports science research does influence practice. For example, biomechanical studies of speed skating led to the development of a new prototype skate (the “slapskate”) which increased the work done by the powerful knee extensors (15). While this research did not have an immediate influence on practice, nowadays, all top level long track speed skaters (and many amateur enthusiasts) use these skates. Biochemical analyses of sweat production in athletes provided the research base that led to the multi-billion dollar sports drink industry and certainly changed practice. In Australia, research into the biomechanics of low back injuries in cricket fast bowlers has provided concrete recommendations that have influenced coaching and reportedly reduced the incidence and/or progression of lumbar spine disk generation in young cricketers (7). Although these examples are encouraging, anecdotal reports suggest that the majority of published sports science research has little influence on practice.

WHY DOESN'T SPORTS SCIENCE RESEARCH BETTER INFLUENCE PRACTICE?

Numerous complex and still poorly understood factors probably contribute to the lack of transfer from research to practice (e.g., conservative coaching practices, outdated coach education and publication of scientific findings in highly-specialised scientific journals etc). One contributing factor is undoubtedly that coaches want a Yes or No answer; this type of training is good, that one is bad. Without a thorough understanding of the research process, coaches are therefore likely to reject science when they are faced with conflicting scientific results (from studies that appear similar). As such, the coach may not be able to appreciate the potential impact of what ‘science’ has to offer.

Another factor which undoubtedly plays a role in the extent to which scientific innovations are implemented in everyday practice is the structure of scientific inquiry itself (i.e., the way in which research is conducted) (10). For example, in the field of nursing, researchers have been criticised for failing to study problems relevant to practitioners and for disseminating findings that were largely incomprehensible to a majority of nurses (12). As a result, many nurses do not perceive research findings as relevant to their practice (4, 12). While a similar study has not been conducted for the sport sciences (and is needed), it is likely that similar views are held by many sport-science practitioners (i.e., coaches, athletes and conditioning staff) (3). In a related field, coaching science has also been criticised for conducting research that does not impact on coaching practice (1). This situation may be improved by the development of a model that guides the direction of research required to build our evidence base about how to improve performance.

AN APPLIED RESEARCH MODEL FOR THE SPORT SCIENCES

Recently, an attempt was made to provide a framework by which research efforts may be better integrated and directed towards improving sporting performance – The **Applied Research Model** for the Sport Sciences (ARMSS) (2). It was suggested that researchers should refer to this model in the initial design or concept stage of their research, in the analysis, interpretation and report preparation stages, and again when follow-up experiments are devised. While the model was presented as a linear, multiphase model, it is important for researchers and practitioners to keep in perspective that research is complex. The translation of research to practice rarely progresses neatly from one well-defined stage to the next and realistic models acknowledge the iterative, bidirectional nature of scientific discovery (10, 11). Any of the proposed phases of research could, and should, inform any other; sometimes stages may be performed concurrently in the one study. The model should also be flexible enough for serendipitous, but potentially important, findings to redirect the line of research when required.

The ARMSS model is based on previously described models for both injury prevention (9, 16) and health research (14). An important feature of the proposed model is the need for researchers to consider

issues that affect the implementation of research ideas from the very inception of the program. This is more easily said than done as the career progression of academic researchers often depends more on the number and quality of their publications, and not on the implementation of their research findings. However, to improve sporting performance the findings from research need to be accepted, adopted and complied with by the athletes, coaches and sport-science staff to which they are targeted. As such, negotiations and collaborations between academically-trained researchers and practitioners that have experience with field work are critical. Only research that leads to practices that can, and will, be adopted can improve sporting performance.

Some may question the number of phases proposed (more or less fine distinctions could be made). However, the key point is that sport-science research needs to move away from a tradition that has focused on outcomes that do not explicitly consider how that research will ultimately be applied. From the very inception, researchers need to consider how the research findings might ultimately be adapted to the intended population, in the actual sporting setting, delivered by persons with diverse training and skills, and using the available resources (11).

CONCLUSIONS

To date, little research has sought to specifically examine the implementation of available sport-science research or to develop research models that have the potential to lead to improvements in the way sport-science research is conducted. More research in this area is required to improve the acceptance of sport science by coaches and athletes. The current model proposes that the relevance of the subject population and study setting should be considered regardless of the study design (and stage of the model). It further suggests that the Impact of research should be considered as the product of Efficacy (E) and Implementation (I) ($\text{Impact} = E \times I$). It is not enough to produce a highly efficacious intervention. To affect sport performance, an intervention must also be implemented.

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SPORT AND EXERCISE SCIENCES IN FINLAND

K. L. Keskinen

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The modern history of Sport and Exercise Sciences is young with the roots deep in European and Minor Asian history. The greatest influences have come from the Greek physicians of antiquity. The influence of Nordic Countries has been great on this specific area. In 1800, Denmark was the first European Country to include physical training as a requirement in the public school curriculum. In 1820, Sweden made a system of medical gymnastics as part of the school curriculum. In 1834, Finland established the Department of Sports and in 1882 started an independent programme for PE Teachers at the University of Helsinki.

Research activities in Finland originally started in 1697 when a Doctoral Thesis was published on Pentathlon of the Antiquity. Professor Lauri Pihkala proposed in 1920's that a Society should be established to promote Sport Sciences and to carry on discussion over matters of Physical Education. Finnish Society of Sport Sciences was then established in 1933. In addition to Physical Education, also Physiology of Sport and Exercise as well as the Health benefits of Physical Activity and Sports Medicine were well represented in the activities of the newly born Finnish Society.

PE Teachers Training was removed from Helsinki to Jyväskylä in 1963. The University of Jyväskylä was established in 1966 and the Faculty of Sport Sciences in 1968. New Faculty with modern laboratories gave birth to a great story of success in Finnish Sport Sciences. Academic education and research was concentrated in sole

Faculty. The Faculty of Sport and Health Sciences is widely known of its three Departments and four Research Centers.

In addition to the Faculty several Research Institutes were established between the years 1965–1990 all over Finland. Their role is in applied research as compared to the University which is characteristically dedicated to basic research in the field. Finland also has a network of Sports Information Units in connection with the Finnish Society of Sport Sciences, University of Jyväskylä and the Research Institutes. These units form a National Network of Sports Information to serve Finnish authorities, researchers, teachers and public users with up-to-date knowledge on Sport and Health Sciences.

As for some individuals, Martti J. Karvonen is best known for a method to predict optimal exercise training heart rate; Karvonen formula (1957). He also conducted studies dealing with exercise performance and the role of exercise in longevity. Lauri Pihkala suggested (1952) that obesity was the consequence rather than a cause of unfitness. Ilkka Vuori and Pekka Oja were key persons behind the global concept of Health Enhancing Physical Activity, better known as HEPA. Paavo V. Komi is maybe the most famous Finnish scholar with numerous experiments published in the combined areas of exercise physiology and biomechanics. Eino Heikkinen, Risto Telama and Pauli Vuolle are well-known authorities in Finnish Sport Sciences.

A recent survey on the status of collaboration between the Nordic Countries within Sport Sciences revealed that individual research contacts rather than official agreements have been far more effective means of interaction for a successful collaboration. Interaction between the Nordic and Baltic Countries during the past decades has been very limited for obvious reasons. Today, when the doors are wide open, there is a growing need for multiple exchanges of ideas and people across the Eastern Sea.

THE ROLE OF BIOMECHANICS IN OPTIMIZING PERFORMANCE IN CROSS COUNTRY SKIING

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1. INTRODUCTION

The science of training will, more than ever before, be called upon to contribute to the optimisation of training methods in high-performance sport. Further improvements in achievement may be reached less by increasing the scope of training than by raising the quality of training. The quality of the top class athletes' training process can probably most efficiently be improved by following the principles of “specificity” and “individuality”. It is well known from literature of training science that both, sport specific skills as well as sport specific physical abilities, can only be improved efficiently by using highly specific means of training.

For the realisation of a training procedure which is highly oriented towards competition in a specific type of sport on the one hand and towards the individual needs on the other, the following conditions must be necessarily be given: (1) Knowledge of the specific parameters relevant to performance in the specific sport or discipline, (2) Tests which fully cover the sport-specific parameters, and which allow for the classification of test results in order to be able to determine individual, current performance levels and to examine individual performance progress, (3) Training methods and exercises, which fulfil the standard criteria for the specific means of training.

2. PERFORMANCE DIAGNOSTICS

Three main aspects have to be considered when biomechanical methods are used in technique analysis: (1) the precision of the parameters determined and the accuracy of the measurement system, (2) the parameters determined have to be as technique specific as possible and (3) the athlete should not be severely interfered by the measurement system (Müller et al., 2000). It is not always possible to achieve these partly contradictory aspects simultaneously during data

acquisition and compromises have to be made to get optimal solutions.

In cross country skiing complex biomechanical studies are rare. But to be able to understand the complex functional mechanisms of the numerous techniques used in cross country skiing competition biomechanical analyses including kinetic, kinematic and electromyographic parameters would be substantial. Analyses of double poling published by Holmberg et al. (2005; 2006) provide the latest complex data of elite skiers. In this study the double poling techniques of eleven elite cross country skiers were analysed. The very complex measurement systems included the determination of the ground reaction forces directed along the poles, of the ground reaction forces and the pressure distributions between the feet and the boots, of the joint angles of elbow, hip, knee and ankle and of the EMG activities of nine upper body and ten lower body muscles.

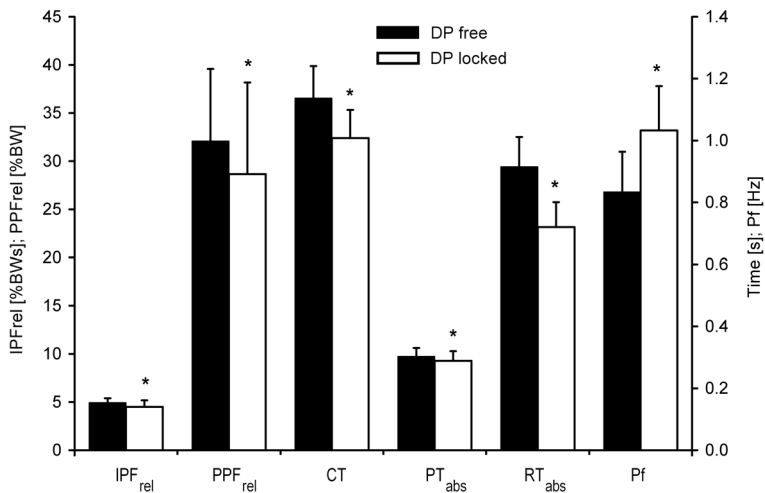


Fig. 1: Comparison of pole kinetics and cycle characteristics between “normal” DP (DPFREE) and DP with “locked” knee and ankle joints (DPLOCKED) at V85% FREE. The data are mean ± SD. * $P < 0.05$. *a* IPF_{rel} [%BWs], relative impulse of pole force; PPF_{rel} [%BW], relative peak pole force; CT [s], cycle time; PTab [s], absolute poling time; RT_{abs} [s], absolute recovery time; Pf [Hz], poling frequency (Holmberg et al. 2005)

2.2. Testing

The efficiency of the training also depends on the quality of performance tests available. If possible, valid and standardised tests should be built into the training process for all performance-relevant features of the sport in question. Within the framework of long-term cooperation with various sports associations, we have developed sport-specific test systems for cross country skiers. From the scientific point of view it has become important to validate the test exercises and to prove their biomechanical affinities with the competition exercise. Stöggl et al. (2005) published a biomechanical validation of a double poling imitation (DPI) drill on a rollerboard. The investigated movement patterns of the double pole imitation with the rollerboard show strong affinities to double poling on roller skies. The courses of the elbow angles indicate similar shapes, similar relative flexion and extension periods and angle amplitudes. The basic characteristic of the force curves and the EMG-activity (shape of the curves) of certain but not all muscles are similar in both situations. If we look at the intensities of muscle activation (EMGrms-Values), we can find similar activation intensities for *m.pectoralis maior*, *m.obliquus*, *m.triceps brachii*, *m.teres maior* and *m. rectus abdominis*. *M.biceps brachii* is 72% less active in double poling than in double poling imitation. *M. latissimus dorsi* is 22% less active in double poling. The temporal structure in both movement patterns is slightly different. The active phase (flexion and extension) during double poling was about half as long as during imitation, which is caused by the deceleration of the system towards zero (a kind of eccentric effect) and then accelerating it again. Regarding the aspect of performance-related validity of the test and training device, in particular for the 40-Repetition Test, we can say that there was a significant correlation between the results of the field test and the test on the rollerboard. The reliability of the 40-Repetition Test, concerning all of the various variables (maximum power, strength endurance index, etc...), was significantly high.

3. SPECIFICITY IN TRAINING

For the development of specific training exercises the principle of kinematic and kinetic correspondence has to be taken into consideration. This principle states that the special exercises must be in harmony with those parameters of movement which characterise the structure of competition technique.

Various training drills in cross country skiing have been developed and biomechanically validated by a working group of the University of Salzburg. In a paper by Stöggl et al. (2006) a test concept for cross-country (XC) skiing Sprint was introduced. The authors checked test reliability and validity of the sprint test exercise and proved the hypothesis that double poling (DP) short time sprint performance predicts DP Sprint performance over race distance. It was concluded that the high influence of maximal DP velocity on DP performance over Sprint race distance suggests to integrate short-time sprint tests into test concepts as predictors for XC skiing Sprint specific performance and to put more emphasize on the training of XC skiing specific agility to guarantee high performance in XC skiing Sprint.

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**FIRST BALTIC CONFERENCE
OF YOUNG SCIENTISTS IN EXERCISE
AND SPORT SCIENCES**

(ORAL PRESENTATIONS)

THE RESIDUAL EFFECT OF PRIOR DROP JUMPS ON EMG OF THIGH MUSCLES DURING HEAVY CYCLING EXERCISE

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The aim of the study was to assess the residual effect of prior eccentric-concentric load of the EMG parameters of m. vastus lateralis and m. vastus medialis during high intensity cycling exercise in female students. Methods. On four different days 7 female students performed one increasing (ICE) and three (control, 1 h and 24 h after 100 drop jumps) constant cycling (Ergoline-800, Germany) exercises (CCE). The intensity of CCE was set in the middle between first and second ventilatory thresholds which were determined using pulmonary gas exchange parameters (Oxycon Mobile, Germany) during ICE. The cadence was 70 rpm. Pulmonary gas exchange parameters and EMG (Biometrics Ltd, USA) of right thigh m. vastus lateralis and m. vastus medialis were continuously recorded during CCE. Results. No significant difference of EMG root mean square amplitude, integrated EMG and mean frequency of EMG power spectrum between testing conditions was observed. Ratings of perceived exertion were slightly elevated one (16.3 (1.9)) and 24 h (16.1 (2.6)) after drop jumps in comparison with control CCE (15.1 (1.3), $p>0.05$). After 24 h the subjects felt moderate muscle pain (5.0 (2.79)) according to Borg's CR-10 scale.

Conclusion. Prior drop jumps seem not to have significant residual (within 1–24 h of recovery) effect on EMG of thigh muscles during heavy cycling exercise in female students.

FORCE VARIABILITY INCREASES IN HYPERTHERMIA

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The main aim of the study was to investigate effects of hyperthermia (HT) on voluntary activation (VA) and force variation in quadriceps femoris muscle. Nine volunteers [mean SEM]; 21.7 (0.8) years of age] performed a 2-min maximal voluntary contraction (MVC) after 45-min passive body heating (HT experiment) and without the heating (CON experiment). After 30-s MVC, torque was lower in HT compared to CON experiment [52.6 (2.3) % and 69.0 (2.3) % MVC, respectively, $P < 0.001$]. During the second minute of the exercise, MVC torque remained lower, its variation was larger, VA was more depressed and muscle tetanic torque was less inhibited ($P < 0.01$) in HT compared to CON experiment. At the same time, there was no difference in muscle relaxation rate between the experiments. It is concluded that HT increases central fatigue and force variation during MVC, but these changes are often independent of changes in muscle relaxation rate.

MUSCLE PERFORMANCE BETWEEN MEN AND WOMEN DURING MAXIMAL ISOMETRIC AND DYNAMIC CONTRACTIONS

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The main aim of the study was to investigate the relation between the mechanical properties of the connective tissue and muscle performance in maximal isometric and dynamic muscle actions. Ten volunteers: five women and five men (19.0 ± 0.43 years of age) performed a hundred high jumps from 75 cm high platform “New

Test". The mechanical properties of the vastus lateralis and biceps femoris contractions were assessed by surface electromyography (EMG) Biometrics LT during all hundred high jumps from 75 cm high platform. Surface EMG parameters such as root-mean-square value (RMS) were used to assess the muscle activation level that is imposed by the central nervous system (CNS). However, RMS is influenced not only by motor control aspects, but also by peripheral properties of the muscle and recording setup. Dynamic and isometric muscle contractions were assessed by hundred high jumps from 75 cm high platform "New Test". From vertical ground reaction force, maximal jump high was obtained. Values of RMS were positively related to the stiffness of the muscle contractions during high jumps of women and men. Maximal jump high parameters obtained during the jumps were significantly correlated to stiffness of muscle contractions of both genders. Maximal jump high parameters were higher in men than women. But maximal jump high parameters of women showed higher quality of variability of motions during the jumps than men. These data indicate that muscle output in high force isometric and dynamic muscle actions is positively related to the stiffness of the muscle contractions, possibly by means of a more effective force transmission from the contractile elements.

BONE MINERAL DENSITY AND JUMPING ABILITY IN PHYSICALLY ACTIVE VERSUS SEDENTARY ADOLESCENT GIRLS

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Aim. The aim of this study was to investigate the relationships between two footed vertical jumping height (in counter movement jump (CMJ), 15- and 30-second series of jumps) and bone mineral density (BMD) parameters. **Methods.** In total, 142 13–15-year-old girls volunteered for the study. The subjects were divided into two groups: physically active (gymnasts, sprinters, and players of sport games) group (n=99) and non-athlete control group (n=43). The subjects'

body height and body mass were measured, and the body mass index (BMI) calculated (kg/m^2). Dual energy X-ray absorptiometry (DXA) measurements were used to define the parameters of body composition (lean body mass, fat mass and fat percentage) and BMD of femur and lumbar spine (L2-L4). Maximal height of two footed hands on the hips vertical single jump, and mean values of series of jumps with maximal intensity for 15 and 30 seconds were obtained using contact mat (Newtest OY, Finland).

Results. Mean jumping height was 26.1 ± 3.9 cm and 24.4 ± 3.7 cm ($p < 0.05$) for CMJ, 22.3 ± 3.4 cm and 21.3 ± 3.5 cm ($p > 0.05$) for 15-s jumping, and 21.3 ± 3.4 cm and 21.0 ± 3.3 cm ($p > 0.05$) for 30-s jumping in athletic and sedentary girls, respectively. There was a significant correlation ($r = 0.203$) between BMD at femur and mean value of 15-s jumps only in the physically active group. When checked by body composition parameters, the significance of this relationship disappeared. Stepwise multiple regression analysis indicated that mean value of 15-s jumping test influenced femur BMD 4.1% ($R^2 \times 100$) in the total variance in athletic girls. Conclusions. Our results indicated that BMD at femur is significantly influenced by 15-s jumping test results in physically active, but not in sedentary adolescent girls.

THEME OF THE OLYMPICS IN PRIMARY SCHOOL

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Olympism is the philosophy of life, the way of thinking, the willing to achieve the harmony of mind, flesh and soul.

The aim: to make the sections Olympic theme curriculum in Form 7 – 9

The methods of research: test; establishing experiment

Results and conclusions: according the objective, the sections of Olympic theme curriculum are made in Form 7 – 9:

1) Social science:

- health lesson (influencing factors of health, addiction influence to organism and personality, doping);
- ethics (sport's ethics, ethical principles, values of ethics);

- economics (work and career in sport's field).
- 2) Literature (poetry, mythology, epos).
- 3) History (Medieval ages, Renaissance, transformation from medieval ages to culture of new epoch, the creation of Latvia as a state, sport's organizations, basis of sport's, Latvian as a part of USSR and revival of IOC).
- 4) Geography (the Olympic cities – Australia, USA, Asia, Europe, Greece – Sparta, Athens, Sport facilities in Baltic States).
- 5) 5) Physical education – antique Olympic games, sport buildings and competition places in Ancient Olympia, the winners of the Ancient games, the development of disciplines, since antique Olympic games, the symbols of Modern Olympic games, traditions.

As a conclusion, the program has proved itself as effective and it has promoted the knowledge of student's about Olympic games.

SHOOTERS' MULTI-DESIGN INDIVIDUAL TRAINING: LONGITUDINAL STUDY

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Introduction. The aim of this study was to assess whether PerPot Metamodel could be implemented in shooters' longitudinal training and sport performance. Methods. Training models (dominant general training 44 weeks model in a year 2001–2002 and specific training 45 week model in a year 2002–2003) were applied. Further on the basis of findings multi-design individual training models were applied in a year 2003–2007. Sport performance was tested by Rika Home Trainer software. Multiple regression and correlation statistics were used. Results. Specific training, prolonged season nine last weeks specific load decrease model, general (1–13 micro cycles) and specific (14–26 micro cycles) training 26 weeks model, dominant integral training 26 weeks (2 years) model were carried out as optimal. Conclusions. The shooter macro cycle training and sport performance model unmeaningful concepts corresponded to the directions of athletes' training and sport performance, as an athlete (shooter) – is a dynamic system then the adaptation to a one year duration training would be

dynamic and managed difficultly. The interaction of the short-term training models with performance was different in different meso cycles. On the basis of determined individual optimal models two meta models might be used in shooting.

THE EFFECT OF PERCEIVED AUTONOMY SUPPORT FROM ADULTS ON SPORT MOTIVATION IN YOUNG ATHLETES

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The purpose of the present study was to retest peer motivational climate questionnaire in Estonian young athletes and to estimate how perceived autonomy support from the significant others (e.g. parents and coaches) is related with sport motivation types via perceived peer motivational climate. The participants were 749 young athletes aged 12 to 16 years from different sport clubs in Estonia. Athletes completed questionnaires assessing perception of the peer motivational climate and the autonomy-supportive behaviour of their coaches and parents. The motivation was estimated by Sport Motivation Scales. Structural equation modelling procedures were used. The fit indices of the structural equation model about the effect of perceived autonomy support from adults on sport motivational climate via perceived peer motivational climate were acceptable (NNFI=0.97, CFI=0.97 and RMSEA=0.04). The direct effect of perceived autonomy support from coach was stronger than the direct effect of perceived autonomy support from parents. Autonomy support from coach had an indirect effect on all types of motivation, except the introjection, via the dimension of improvement/relatedness support, effort and intra-team conflict. Introjected motivation was indirectly influenced by the perceived autonomy support from parents. From an applied perspective, these results highlighted beyond the role of the perceived autonomy support from the significant others (e.g. parents and coaches) also the perceived peer motivational climate of sport motivation types in young athletes.

SELF-PERCEIVED PHYSICAL AND HEALTH CONDITION OF OLDER PERSONS (65–75)

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Aim: Exercise is one such vital tool that can provide tremendous benefits to both body and soul at any age. This is particularly relevant in cases where the body faces additional challenges, including those appearing in the later years of life. The promotion of health through increased physical activity has become a national public health objective for both children and older. To study a habit with chained with the health is the way how to get information about population attitude and knowledge about health. This information promotes behavior risk analysis and shows how it changing in length of time. The latest 2006. FINBALT monitoring questionnaire contained full spectrum questions about health care in Latvia and Baltic region. The aim of the current review paper is to compare some FINBALT results between states and regions and find out new facts about older (65–75 years) attitude to physical activities. Methods: Data from two 2006. FINBALT Health Monitor for adults aged 55–64 years surveys were used to make comparisons in physical activities and health trends between Latvia and Finland. To find out new facts about older persons (65–75 years) we did survey of visitors of pensioner day center in Rezekne and Daugavpils town. Questionnaire includes the same 10 questions about health and physical activities as in FINBALT and 10 questions about attitude to physical activities. Results. Our survey shows that there are no major difference between results we got in pensioner day center and in Latvia during this research, but there is a dramatic difference with the results which were gotten in Finland. The people of Finland care a lot more about their physical condition in comparison to people of Latvia. As it shows more than three fourths of Finland people who participated in the survey exercises at least two or three times per week. To order to maintain the healthy body this amount of exercising is required. Latvia survey results show that most often answer is “some times per year”. In the survey of day center visitors at our view they misunderstand the meaning of question “How often do you make at least 30 minutes long physical exercises to easy breath lack or sweat during leisure hours?”, because their answers

dramatically differ from the answers from other regions of Latvia. In our opinion this happens mostly because in the second part of the question there are words “easy breath lack” which are recognized as key word. Also the self-assessment of health status in Finland is better than in Latvia. We include also some questions to investigate the attitude to physical activities of our respondents. Mostly of respondents agree that exercises can retain or improve health. But if we compare it with before gained results, we can conclude that they at some reasons don't do that. That shows us new aims and ways for investigations. Conclusions. The data of inquiry in Rezekne and Daugavpils pensioner day center don't shows relevant difference between facts of FINBALT Latvia. Latvian inhabitants self-perceived physical and health condition results are worse than in Finland (approximately 78% of elder respondents to indicate their condition as average or worse. In other hand in Finland 55% of respondents indicated health as good or very good). In Latvia for elder people sedentary life is common (persons who practice 30 minutes long physical exercise at least 2-3 times per week in Finland – 74% in Latvia – 25%). Elder persons in Latvia have understanding about physical exercises significances, but don't gain sufficient social assistance to realize it.

WHAT SPORT HISTORY HAS TO DO WITH THE NATIONAL HISTORY? SOME PHILOSOPHICAL AND THEORETICAL ASPECTS

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This presentation bases on theoretical and philosophical framework of my doctoral dissertation, which is to be defended autumn 2008. I analyze in my work relationship between Finnish sport and nationalism 1900–1952 from various angles. Essential part of my research are theoretical links to international research of nationalism. I also have compared sport-related nationalism in Finland and several other countries by using literature. So it is logical that in this presentation

sport history is placed in wider context of history and recent history-writing. Some examples – mostly Finnish but also some Baltic – are used in order to clarify content. It is important to understand that sport does not only mirror society but is part of it. It can even be said that some social phenomena are seen sharper in the sport than in the society as a whole. Sport has also been an important factor in nation-building for all kind of regimes. Sport has had an important role in historical conceptualising for the large part of population in various countries. Especially men are socialised into the society via sport. Analyzing these processes opens new visions to national identity. Sport history can also help to build self-understanding of sport sciences at least to some extent. “Objective” biomedical sciences often get their research impulses from the surrounding society. In this sense it is important to know for example, what kind of research has been considered essential in the past.

COGNITIVE PERFORMANCE AND PHYSICAL FITNESS OF ORIENTEERS DURING AN ANNUAL TRAINING CYCLE

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In attempt to observe cognitive performance and physical fitness during an annual cycle members of the Lithuanian national team have been tested. Cognitive tasks (visual attention, speed of perceiving information and visual memory), tests of physical development, psychomotor functions, functional capability, psychomotor functions and anaerobic capacity, statistical analysis, have been applied. The study investigated cognitive processes and physical fitness of eight elite orienteers (aged 19–31 years). The tests have been taken at the beginning and at the end of the preparation period, as well as during the competition period. The results show that the sportsmen cognitive performance has gradually improved. The tasks results of visual attention and memory have been significantly better at the end of the competition period than at the beginning of the preparation period ($p < 0.05$). The results of other tests have shown only a slight impro-

vement, even though they were better during the competition period. There has been no marked improvement in the values of physical development and anaerobic capacity. Psychomotor functions tend to improve. The adaptation of the sportsmen bloodstream and breathing functions show a slight rise in ($p>0.05$).

ESTONIAN KINDERGARTEN TEACHERS PREPAREDNESS TO TEACH DISABLED CHILDREN

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The aim of the present study was to analyse whether the Estonian kindergarten teachers are prepared to teach physically disabled children in ordinary kindergartens. The target group for the survey included 854 kindergarten teachers from 15 different counties in Estonia who taught children age 3 to 7. The study method was a questionnaire, which consisted of 19 questions. The result of the study showed that the last five years 68% of the kindergarten teachers in Estonia had not received special training for teaching special needs children. 94% of the teachers are convinced that there are not any physically disabled children in their kindergartens. Furthermore, 43% of the teachers are also convinced that there are not any children with developmental special needs. This study referred that only 32.2% of the respondents were most willing to teach physically disabled children. According to the 69% of teachers participated in the study there are dissatisfactory conditions in their kindergartens to teach physically disabled children. In this study 78% of the teachers are aware of necessity of physiotherapists in kindergarten. A considerable number (58%) of teachers are also aware of integration and they know how important it is for further development of disabled children. But 55% of the respondents were willing to have physically disabled children only in a special group. Estonian kindergarten teachers have insufficient preparation for teaching disabled children. In kindergartens there are dissatisfactory conditions to teach physically disabled children. But teachers accept the necessity of integration.

THE CONTROL MODEL OF PHYSICAL FITNESS AT THE NATIONAL ARMED FORCES OF LATVIA

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Introduction. Properly worked out physical fitness norms motivate every soldier to go in for sports activities regularly in order to maintain physical condition on adequate level. It is an essential precondition for successful performance of military service duties. Aim: The research of soldiers' physical fitness tests. Methods: Testing of physical fitness, Methods of mathematical statistics: descriptive statistics; adequate evaluation to normal division (asymmetry, excess); "jumping out" variation excluding; uniting of database of results; result approximation of all practical tests for cumulative function of normal division. Results: Evaluating physical fitness tests (PT) and comparing the evaluation according today's standard system we found out differences. It confirms the necessity to do changes in the testing system according to the test results we have. To analyze the evaluation system of physical fitness tests we drove graphics for each test. We adjusted more objective evaluation system to the results showed by the soldiers. This is S-type scale. This type of scale fortifies to cumulative function of normal division – two numbers are used – the arithmetical mean and standard deviation. Conclusions: 1. A new project of physical fitness tests has been developed. 2. The developed physical fitness model is planned to be included in the new "Regulations of physical fitness in the Ministry of Defense and National Armed Forces" with the transition to the professional service.

PHYSIOLOGICAL AND BIOMECHANICAL PARAMETERS INFLUENCE SWIMMING PERFORMANCE DURING BIOLOGICAL MATURATION IN MALE SWIMMERS: A LONGITUDINAL STUDY

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The aim of the study was to examine the development of specific physiological and biomechanical parameters in young male swimmers and assess the influence of these characteristics on swimming performance during biological maturation. Twenty-nine male swimmers participated in the study and data were measured annually for two consecutive years, for the total of three times. During the 400-m front crawl swimming was assessed the energy cost of swimming and stroking parameters. Peak oxygen consumption ($VO_{2\text{peak}}$) was assessed by backward-extrapolation technique recording VO_2 during the first 20 s of recovery period after the maximal trial over the 400-m distance. Performance time, energy cost (Cs) and VO_2 of the 400-m front crawl swim improved significantly during each year. Mean swimming speed (v), stroke length (SL), stroke rate (SR) and stroke index (SI) values of the swimming test were significantly improved only at the third measurement. Stepwise regression analysis revealed that SI ($R^2=0.898$; $p<0.05$) and VO_2 ($R^2=0.358$; $p<0.05$) were the best predictors of 400-m front crawl swimming performance from the measured biomechanical and bioenergetical parameters at the first measurement time, respectively. At the second and third measurement points, SI ($R^2>0.726$; $p<0.05$) from the measured biomechanical parameters and VO_2 ($R^2>0.223$; $p<0.05$) from the measured bioenergetical values were the best predictors of 400-m front crawl swimming performance. The interperiod Spearman correlation coefficients for most of the measured 400-m front crawl swimming biomechanical and bioenergetical values were relatively high: time ($r=0.867-0.984$), v ($r=0.768-0.950$), SI ($r=0.773-0.943$) and Cs ($r=0.781-0.839$). The tracking of the SL ($r=0.645-0.915$), SR ($r=0.609-0.928$), VO_2 ($r=0.635-0.810$) and ΔLa ($r=0.581-0.727$) were slightly lower. Our results indicate that the improvement in swimming performance during biological maturation was related to the improve-

ment in sport-specific VO_2 value from physiological characteristics and improvement in SI value from biomechanical parameters. In addition, biomechanical factors characterized best the 400-m swimming performance followed by physiological factors during the 2-year study period. SI was the best predictor for swimming performance, being an indicator of swimming economy since it describes the swimmers ability to move at a given velocity with the fewest number of strokes. Accordingly, it is important to pay attention to improving biomechanical skills.

INTERFACE BETWEEN KAUNAS MIDDLE-AGED PEOPLE'S LEISURE-TIME PHYSICAL ACTIVITY AND SOCIO- DEMOGRAPHIC FACTORS

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The aim of the research: To assess interface between Kaunas middle-aged people's leisure-time physical activity and socio-demographic factors. The research was held in 2001–2005. Exploratory sample included 916 respondents (392 men and 524 women) who were selected using random assignment from Kaunas citizens. Respondents aged 35–64 took part in the research. Interview method was applied to survey respondents' attitude towards leisure-time physical activity and sport, in addition, they were asked about the subjective health self-assessment, frequency and duration of physical activity during their leisure time. People who exercised or went in for sports during their leisure time once a week, once a month or even more rarely and ones who exercised one hour or less a week were classed as insufficiently active. People who exercised or went in for sports during their leisure time every day, 2–6 times a week or 2–3 up to 7 hours a week were classed as physically active. Research data shows that, in terms of frequency of physical activity, 23.8 per cent of Kaunas citizens aged 35–64 years were physically active, whereas 76.2 per cent were physically passive. In terms of duration of physical activity, 29.2 per cent of respondents were physically active and 70.8 per cent were

passive. The respondents of the youngest age group (35–44) were less active compared with older ones. Men were more physically active than women did (59.2 per cent and 40.8 per cent respectively, $p < 0.001$). The main reasons that were indicated by respondents for insufficient physical activity were laziness and lack of time and money. The subjective health of physically active respondents was better than health self-assessment among physically passive ones (75.8 per cent of physically active respondents and 61.8 per cent of physically passive ones assessed their health as good and very good, $p < 0.05$). Health self-assessment among the youngest group of respondents was significantly better compared with the oldest one (35.7 per cent and 15.5 per cent respectively assessed their health as good and very good, $p < 0.001$). There were significantly less women who assessed their health as good and very good compared with men (21.4 per cent versus 29.8 per cent, $p < 0.05$). The comparative analysis of leisure-time physical activity and socio-demographic factors showed that white-collar workers, blue-collar workers, and businessmen were more physically active (in accordance with both frequency and duration) than pensioners, the unemployed, and the disabled were.

PRE AND POSTCOMPETITION ANXIETY OF AMATEUR BRAZILIAN JIU-JITSU PRACTITIONERS AND THE PREDICTED VARIANCE OF THE FINAL RESULT

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The main aim of the study was to assess the features of one of the most popular questionnaires for assessment of pre- and postcompetition anxiety – Competition State Anxiety Inventory 2 Revised (CSAI-2R: Cox, Martens 2003) on Brazilian Jiu-Jitsu (BJJ) athletes. The study was conducted throughout five competitions of Estonian BJJ competition league in 2004/05 and all competing athletes participated in the study. The mean age of the competitors was 23 years ($SD=4.4$). The athletes completed the CSAI-2R shortly before and immediately after (adapted version) competition. Prior to compe-

tition the athletes also predicted the outcome as a range of places they would finally attain. The index of variance was calculated as a percentage from the total number of competitors. According to CSAI-2R score, the athletes experienced a significant drop only on somatic anxiety subscale postcompetition but no significant changes occurred on the cognitive anxiety and self-confidence subscales. The index of variance correlated positively with somatic anxiety and negatively with self-confidence subscales precompetition. CSAI-2R is usable in its adapted Estonian version in the context of BJJ pre- and post-competition. The index of variance can be an interesting single-item measure to assess the athletes' pre-competition mindset and needs further research.

ANTHROPOMETRICAL PARAMETERS INFLUENCING THE BIOMECHANICAL ECONOMY OF MIDDLE- AND LONG-DISTANCE RUNNERS

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Biomechanical and functional economy is considered to be one of the most important parameter of present-day long- and middle-distance runners' capacity. The aim of this study is to analyse Estonian long- and middle-distance runners' anthropometrical parameters which could influence the economy of running and to compare it with data about world top runners. In the study, 23 male long- and middle-distance runners were examined. The subjects were 21.2 ± 4.9 years old, 180.3 ± 5.8 cm long and weighed 68.7 ± 7.1 kg. 42 anthropometrical parameters were measured. The runners' body consumption was measured with DXA method which enabled to determine the legs mass. To evaluate the proportion of *trochanterion* to height a formula was used: $\text{trochanterion (cm)}/\text{height (cm)} \times 100$ (Vuorimaa, 2008). The results showed that an average *trochanterion* proportion to height was $52 \pm 1.6\%$ (max 56%, min 50%). Top runners with high economy have this parameter usually over 54% and the girth of their calf does not exceed 30 cm substantially. Our subjects had this parameter on an

average 36.8 ± 2 cm. Body mass index (BMI) is another important parameter influencing the economy. World-class runners BMI is close to 20, our subjects' 21.1 ± 1.4 (max 23.9, min 18.6). Also greater proportion of proximal leg muscle mass in relation to their body mass is important (Myers and Steudel, 1985; Nevill, 1994). Results can be used for selecting long- and middle-distance runners and to evaluate their biomechanical and functional economy.

MOTOR PERFORMANCE AND INTELLIGENCE CHARACTERISTICS IN 5-YEAR-OLD CHILDREN WITH SPEECH DISORDERS

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This study examined the vertical jumping performance, leg extensor muscle and hand-grip isometric strength, fine-motor skills and intelligence in 5-year-old speech-disordered (SD) children. A group of SD girls ($n=12$) and SD boys ($n=20$) were compared with groups of normal (control) girls ($n=24$) and boys ($n=21$). The study was conducted in the Laboratory of Kinesiology and Biomechanics of the University of Tartu. Vertical counter-movement jump (CMJ) was tested on the force platform. Bilateral (BL) and unilateral (UL) maximal isometric strength of the leg extensor muscles was measured by custom-made electromechanical dynamometer. Maximal isometric hand-grip strength was determined by standard mechanical hand dynamometer. The fine-motor skills were measured by Complete Minnesota Manual Dexterity Test. Raven's Coloured Progressive Matrices were used for the measurement of children's intelligence. No significant differences in anthropometrical characteristics (body height, body mass and body mass index) were found between the measured groups. Normal children demonstrated higher ($p < 0.01$) vertical jumping height as compared to SD children. SD girls had lower ($p < 0.05$) UL maximal isometric strength of the left and right leg compared to normal girls, and SD and normal boys. Differences in UL maximal isometric strength of the leg extensor muscles between other measured groups were not significant ($p > 0.05$). BL maximal isometric

strength of the leg extensor muscles was less ($p < 0.01$) in SD girls compared to SD boys and normal boys. In SD girls, BL strength deficit was smaller ($p < 0.01$) compared to normal girls and boys, and in SD boys smaller ($p < 0.05$) than in normal girls. The isometric hand-grip strength was significantly greater ($p < 0.05$) in normal boys compared to all other measured groups. No significant differences in hand-grip strength were observed between normal girls, SD girls and boys. Fine-motor performance and intelligence did not differ significantly ($p > 0.05$) in the measured groups. It has been concluded that in 5-year-old SD children, the vertical jumping performance was considerably lower as compared to the control group. In SD girls, the BL and UL maximal isometric strength of the leg extensor muscles was lower as compared to SD boys and boys and girls of the control group. Boys of the control group demonstrated significantly higher maximal isometric hand-grip strength compared to all other measured groups. SD children and control children had no significant differences in the characteristics of fine-motor skills and in common intelligence.

THE ADEQUACY OF BODY WEIGHT EVALUATION IN WOMEN INVOLVED IN LEISURE FITNESS ACTIVITY

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Women exercising in fitness centres are observed to raise significant requirements for their appearance, and sometimes have inadequate body weight perception. It was revealed that promotion of fitness and physical activity besides its primary positive effect, also has a secondary negative effect, i.e. an increased drive for thinness among women. The aim of present study was to determine the adequacy of body weight evaluation in women involved in recreational physical activity in fitness clubs ($n=352$). Methods. The attitude of participating women was evaluated according to 41-item questionnaire consisting of variables as weight related body image. Results. It was determined that 26.1% of women evaluated their weight incorrectly:

the bigger part (22.2%) of women tended to overweight themselves, while only 3.9% of respondents tended to underweight themselves. The bigger part of women (64.4%) were dissatisfied with their body weight. The younger women (under 22 years) demonstrated higher overestimation of their weight perception and expressed higher dissatisfaction with body weight. The highest misperception of body weight have demonstrated women of low body weight. 75% of women reported their ideal body weight was lower than actual. Even 10% of women with low BMI wished to reduce it. Conclusions: The most misperception of body weight was related with younger age and lower BMI.

CHANGES IN KINEMATICS OF CYCLIST PEDALLING TECHNIQUE WITH WORKLOAD INCREASE FROM AEROBIC TO ANAEROBIC LEVEL

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Aim of this study was to determine if and what kind of changes are in pedalling technique kinematics when workload increases from aerobic threshold level to anaerobic level in cycling at constant cadence and hand posture. Methods: Sixteen U-18 and U-23 Estonian national team level cyclists performed incremental Conconi test with their own road bicycle in precalibrated cycle ergotrainer Taxc Cosmos. The cadence (90 rpm) and hands placement in handlebar (drops) was same during the test. 3D kinematics of the cyclist and the bicycle crank arms was measured in aerobic (228 ± 30 W) and anaerobic (321 ± 39 W) level workload conditions. The differences in group means of body segments and joints extension/flexion angles and angular velocities and amplitudes were compared ($p < 0.05$). Results: The data showed that in sagittal plane motion with workload increases the upper body lean-angle was lowered (1.2°). In maximal extension (plantarflexion) and (dorsi)flexion angles were increasing in hip joint (right: 0.5° and 1.0° ; left: 1.0° and 0.9°) but decreasing in ankle joint (2.8° and 1.8° ; 2.9° and 1.5°) and in foot lean angle to horizontal plain (9.7° and 7.6° ;

9.2° and 9.6°). Also was found an increase in a knee maximal flexion and extension angular velocities (5.4 and 9.4; 7.0 and 6.6°/sec) and those peak moments were earlier in pedalling cycle. Conclusion: This study suggests that, nevertheless the constant sitting posture and pedalling tempo, there will be some changes in cyclist kinematics when the work intensity increase from aerobic threshold level to anaerobic level.

BEHAVIOUR OF TESTOSTERONE AND CORTISOL DYNAMICS OF HORMONAL LEVELS DURING INTENSITY-CONTROLLED HIGH- VOLUME TRAINING IN MALE ROWERS

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The aim of the study was to investigate the changes in stress hormones testosterone and cortisol after task-specific exercise during high-volume endurance training cycle in male rowers. Eight highly trained male rowers were investigated during a high-volume, low-intensity training period. Two-hour low-intensity long distance rowing (LDT) test was conducted at baseline, after the high volume period and after the recovery period. Training and performance intensities were obtained at the graded incremental test, were preset individually and remained the same during all LDT. Fasting blood samples were taken during the same days as LDT. Exercise-induced blood samples were taken before, five minutes after and 30 minutes after the completion of LDT. There were no significant changes in fasting cortisol and testosterone values during the whole study period, as well as in cortisol and testosterone concentrations during the LDT. However, testosterone concentration was significantly decreased at post 30 minutes compared to the post-test value during the second LDT, conducted after the two-week high training volume period. During LDT 2 post 30' values of cortisol tended to decrease compared to the post-test values ($p=0.063$). In conclusion, changes in the concentrations of testosterone and cortisol after long distance rowing indicate the decreased adaptivity following the training-specific performance test.

ANALYSIS OF DISCUS KINEMATICS DURING MULTIPLE TRIALS BY ELITE DISCUS THROWERS

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The aim of this study was to investigate the relationships between discus release velocity and selected kinematics parameters during multiple trials by elite discus throwers. The subjects of the study were the competitors in the man's discus throw event at the 2006 V. Alekna' World Discus Throw Competition (Vilnius, Lithuania). They included V. Alekna, G. Kanter, Z. Kovago, I. Waltz, A. Tammer, J. Rome, P. Malachowski, M. Mollenbeck. Two Canon-XM1 camcorders, operating at a sampling frequency of 25 Hz, were used to record the performances of the subjects on each trial. One camcorder was placed to the rear of the throwing circle and the other was placed to the side of the midline of the circle. Six throws by each athlete were recorded. The centre of the discus was digitized at a sampling frequency of 50 Hz. Three-dimensional coordinate data for each trial were obtained using SIMI Motion 3D computer programme. The discus release speed, height and angle of release were computed for every trial. Mean values for the speeds and heights of the discus at the end of the five phases for each athlete was analyzed separately. Stepwise multiple regression analysis were performed for each athlete to determine the relationships between discus speed of release and selected technical parameters. This study suggest that longitudinal design of analysis of the techniques of elite male discus throwers permits to identify factors that influence the discus release parameters recorded by a given thrower.

EXTRA CURRICULUM PHYSICAL ACTIVITY: REASONS OF JUNIOR ADOLESCENTS BEING ABSENT AND THEIR NEEDS

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The aim – to identify the main reasons of junior adolescents (5th–6th form pupils) being absent from extra curriculum physical activity (ECPA) and reveal their needs. Methods: 1. Scientific literature analysis. 2. Questionnaires. 3. Statistical analysis. Anonymous questionnaire poll was carried out in May 2007 with the participation of 672 junior adolescents. During this research the number of junior adolescents taking part in ECPA was determined. Moreover, the reasons of pupils being absent from ECPA have been detected and the needs of 5th–6th form pupils revealed. Results: 5th–6th form pupils (81.8%) are aware of the usefulness of the participation in ECPA, however very few pupils (5.7%) actually participate in this activity. It is worth mentioning that one fifth of the pupils (19.1%) are participating in the after school physical activities outside school and at school. The main reason of not participating in ECPA was the lack of time (54.4%), although was not able to state any manifestations of their occupations. The respondents (11.0%) also mentioned that ECPA do not fit their needs or some of them (13.9%) do not like doing sports. Junior adolescents wish to get the ECPA that fit their needs, e.g. interesting and diverse activities (54.9%), where friendly and sincere relationships would dominate (18.7%) and the educator would be professional and kind (15.1%). Conclusion. Very few pupils participate in ECPA as this activity does not fit the needs of junior adolescents.

ANALYSIS OF ELECTROMYOGRAPHY OF GYMNASTS DURING PERFORMANCE OF BASE AND MAIN EXERCISES

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Aim. Success of a sport career in gymnastics directly depends on the quality of mastering of specific exercises. Among a great variety of gymnastic exercises the most significant are base and main ones, their mastering is the core of technique training of gymnasts. **Methods.** To establish the interrelation of electric activity of gymnasts' muscles we analyzed such base exercises as: a handstand, a push off in a handstand and such main acrobatic elements as forward and back handsprings. The research included recording of surface electromyography from the electrodes placed onto the gymnasts' shoulder girdle muscles. **Results.** Electric activity of the gymnasts' shoulder girdle muscles at the stage of pushing off during performance of main exercises is similar to the activity during performance of base ones. The data of the electromyography vary – 0.3–1.594 mV at performing the base exercises, and 0.694–1.7 mV at performing the main ones. **Conclusions.** The received results confirm the idea that base skills are a basis for performance of the main exercises in gymnastics. So, to master the main exercises there should be selected the simplest exercises having similar motor structure with the main.

SHOULDER FUNCTION IN PATIENTS WITH FROZEN SHOULDER SYNDROME BEFORE AND ONE MONTH AFTER MANIPULATION UNDER GENERAL ANESTHESIA

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One treatment method for frozen shoulder syndrome (FSS) patients is manipulation under general anesthesia, the so-called “Friday evening” operation. In the present study were investigated the role of physio-

therapy in FSS patients following manipulation under general anesthesia, and the functional condition of FSS patients before and one month after manipulation under general anesthesia and one month physiotherapy. Eleven patients with unilateral FSS lasting 6 months or more and a $\geq 50\%$ decrease in passive joint mobility compared to the uninvolved side, on whom was performed manipulation under general anesthesia, were enrolled in this study. Standard goniometric measurements were used to assess active range of motion (ROM) in flexion (FL), internal (IR) and external rotation (ER). Isometric maximal voluntary contraction (MVC) force of the shoulder flexors (FLs), internal (IRs) and external rotators (ERs) was measured by hand-held dynamometer. The patients performed isometric endurance test till exhaustion. Pain was measured by visual analogue scale by day and at night. Physiotherapy in patients with FSS began immediately after manipulation under general anesthesia and consisted of individualized exercise therapy with elastic band and home exercises. Before the physiotherapy, patients' involved side had less ($p < 0.001$) ROM in FL, IR and ER compared to the uninvolved side. MVC in the involved side muscles was less ($p < 0.01$) in FLs, IRs and ERs and endurance test time was shorter compared to the uninvolved side. After one month ROM in FL, IRs, ERs in the involved side increased ($p < 0.001$) compared to the condition before manipulation under general anesthesia but was less ($p < 0.05$) compared to the uninvolved side in FL and IRs. MVC in FLs, and endurance test time increased ($p < 0.01$), in IRs the increase was ($p < 0.05$) compared to the condition before manipulation under general anesthesia, but endurance test time remained shorter ($p < 0.05$) compared to the uninvolved side. The pain was decreased ($p < 0.001$) by day and at night compared to the condition before and one month after manipulation. It was concluded that in patients with FSS, 4 weeks after manipulation under general anesthesia shoulder pain decreased and ROM, MVC and endurance of shoulder muscles improved. The patients need longer recovery period than 4 weeks achieve full shoulder function.

THE EFFECT OF PRECEDING STEP EXERCISE ON EMG OF LEG MUSCLES DURING INCREASING RUNNING TEST: A PILOT STUDY

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The aim of this study was to evaluate the effect of prior step exercise on the EMG parameters of leg muscles during increasing ramp running test in female students. Methods. Four healthy moderately trained female students performed increasing ramp running test (IRT) on treadmill (LE 200 CE, HP Cosmos) under three different conditions (control, one hour and 24 hours after prior exercise (24 min of interval step exercise). Pulmonary gas exchange parameters (Oxycon Mobile, Germany) and EMG (Biometrics Ltd, USA) of right leg m. vastus lateralis, m. vastus medialis, lateral and medial heads of m. gastrocnemius were continuously recorded. The subjects were asked to evaluate perceived exertions at the end of each minute of IRT. Blood creatine kinase was determined before and 24 hours after step exercise (Spotchem EZ SP-4430, Japan). Results. During IRT root mean square amplitude of EMG and integrated EMG were increased and median of EMG power spectrum was decreased one and 24 hours after step exercise. Greater changes of these parameters were observed in gastrocnemius lateralis and vastus lateralis muscles as well as at higher running speeds. Conclusion. The preceding step exercise seem to have residual effect (within 1–24 hours of recovery) on EMG of leg muscles during IRT in female students.

RELATIONSHIPS BETWEEN JUMPING TIME AND BLOOD LACTATE AFTER JUMPING SERIES WITH DIFFERENT REST INTERVAL

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The aim of this study was to investigate the influence rest intervals of different duration between jumping series to the blood lactate concentration in 15–17 year old sprinters and jumpers. In total 11 15 to 17 year old adolescent boys were studied. After standardized warm-up jumps over 10 hurdles of 10 series were used. In three different days different duration rest intervals (1,3 and 5 minutes) between series were used. Jumping time for each set was measured. Blood lactate was measured during 3 and 5 minutes of recovery. Mean blood lactate concentration immediately before the series (before warm-up) was from 2.24 ± 0.59 to 2.67 ± 0.98 mmol.l⁻¹. During the recovery blood lactate was higher at the third minute compared with fifth minute ($p>0.05$). Mean values were from 5.20 ± 2.40 to 6.25 ± 2.01 mmol.l⁻¹. The mean jumping time was from 7.14 ± 0.54 to 7.67 ± 1.92 s. There was not any significant relationships between jumping time and blood lactate concentration.

CHARACTERISTICS OF MUSCLE TONE, ELASTICITY AND STIFFNESS OF LOWER EXTREMITIES' MUSCLES IN PATIENTS PRIOR THE TRANSTIBIAL AMPUTATION

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In Scandinavia, as well as in the rest of the western world, peripheral vascular disease with or without diabetes mellitus constitutes the reason for an amputation in about 80–90% of cases. The aim of the present study was to evaluate the crural muscle tone, elasticity and stiffness in patients prior the unilateral transtibial amputation. Twelve patients with peripheral vascular disease or

diabetes mellitus aged 61 to 89 years (mean age 75.8 years, BMI 26.7) were examined. Bilateral estimation of muscle tone (characterized by frequency of muscle oscillation, Hz), elasticity (characterized by logarithmic decrement of oscillations damping) and stiffness (N/m) of tibialis anterior (TA), gastrocnemius *c. mediale* (GM) and *c. laterale* (GL) in MultiScan mode (20 times in each muscle point with interval of 1 s between measurements) was performed using myometer MYOTON-3 in lying position at rest. Measurements in five points of each muscle beginning from one third of calf length distally with interval of one centimeter between points were performed. The value of stiffness significantly increased ($p < 0.001$) for most points when more distal points were compared with proximal in all three muscles of both legs and it was 9.0–14.9% greater in the last distal point as compared to the proximal point. Tendency to increasing muscle tone was noted (8.6–12.5%) for most distal points as compared to proximal.

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LINKS BETWEEN PHYSICAL ACTIVENESS, PHYSICAL FITNESS AND HEALTH AMONG PRESCHOOL AGE CHILDREN

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Aim of the research – to make analysis of physical activeness among children of preschool age (5–6 year old), its links with health state and physical fitness. Methods of the research: identification of physical activeness, fitness, health state, pedagogical experiment, mathematical statistics. Results of the research. It was found that physical activeness of children, attending preschool institutions, makes only 24.3% of daily wakeful time. Average number of locomotions, accomplished each day by 5 year old children from group E₁, was 16 049: girls – 12 502, boys – 13 639. In the sixth year children's physical activeness increased in all groups: physical activeness of boys from group E₁ increased averagely to 12.13%, that of girls – to 14.43%, in group E₂ correspondingly – 9.93% and 10.9%. Physical activeness of children from control group increased less considerably: among boys – 5.73%, among girls – 5.13%. Boys and girls are more active from morning till noon. Their activeness increases about 35%, when the number of children in groups is smaller. Differences in data about span of physical activeness among children in autumn-winter and spring-summer periods were identified. Children from experimental groups were less sick than those from control group. Children's physical activeness, physical fitness and health are closely interrelated. Conclusions. 1. Physical activeness of preschool age children has individual character. A properly motion regime and activeness stimulating educational environment helps to increase children's physical activeness. 2. Education system makes impact on physical activeness, physical fitness and health of those trained. Important role in this process belongs to pedagogues and family.

EFFECTS OF PRODUCTION-REGULATION OF SENSORY EXERTION DURING EXERCISE

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Productive aspect of the concept of perceived exertion has the direct attitude to training of athletes (G. Borg). The aim of this study was to find the physiological and mechanical effects during production-regulation of exertion (PRE) based exclusively on rate of perceived exertion (RPE). Methods: 27 person (23yr, 171cm, 70kg) were tested on Monark 828E (40W/3min) with the scale 50–100, which has 11 selected numbers and 5 signs: 50, 55-very light, 60, 65-light, 70, 75-middle, 80, 85-hard, 90, 95-very hard, 100 (Alekseev, 2006). Then 3 groups worked 3 times at 3 different days: gr.1 (n=10)-PRE 75 (10 min); gr.2 (n=9)-PRE 75-85-75 (15 min); gr.3 (n=9)-55-95-75 (15 min). Levels were varied every 5 min in last 2 groups. HR (Polar S610i) and VE (volumeter SV3000) registered at all times, power (kp, f) – every 30 s. These parameters were hiding and person could change kp and/or f at will at any moment.

Results: In different days PRE with constant or modified levels provide reliability and stability of cardiorespiratory and mechanical effects. During exercises in a mode of increase or decrease of PRE, parameters of power were established and adjusted solely at the expense of efforts (kp) but not frequencies (f) of movements. %HRmax during PRE with constant or growing levels of RPE was close to meanings of a scale 50–100 in a wide range. After of decrease of the level of PRE the reduction of HR and VE have great time of lag, which reflects natural inertness of cardiorespiratory system. Conclusion: Conscious using of PRE based on a scale of perceived exertion can apply as independent method for prescription of relative intensity of aerobic exercise.

COMMUNICATIVE COMPETENCE IN A FOREIGN LANGUAGE AS PRECONDITION OF SUCCESSFUL CAREER IN SPORTS

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Fluent communication in a foreign language determines success in any professional career. The aim of the study was to establish the role of communicative competence in a foreign language in the professional careers in sports, which is relevant preparing a sports specialist. The research method applied was questionnaire survey and interview. Research results indicated that 95.7 percent of the research participants perceived the necessity of improving communicative competence in foreign languages. It is not only the social order of the community, but also a successful means of facilitating professional trends of a specialist. The respondents emphasized the following aspects of the need to communicate in foreign languages: possibility to read professional literature on sports in a foreign language, higher acceptance as specialist in sports, better perspectives to function in a community and to find a job, possibility to obtain the latest information, sports literature, use the internet, communicate with peers from foreign countries, participate in student and specialist mobility programs. In the institutions of higher education preparing sports specialists foreign language teachers play a significant role in developing communicative competence by teaching to summarize professional literature, prepare presentations, developing academic and business writing skills, etc. The main conclusion of our research is that successful career in sports within and outside the boundaries of Lithuania is possible if athletes manifest high level communicative competence in foreign languages.

TRAINING INFLUENCE TO 5–7 YEAR OLD CHILDREN UPPER-LIMB SPEED AND DEXTERITY RESULTS

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Research aim – to examine changes of 5–7 year old children's upper-limb speed and dexterity results stimulating their physical maturing for school. The following research methods were applied: educational experiment, testing, statistical analysis. Research organization. The educational experiment lasted for 20 months. 120 children from Klaipėda kindergartens participated in the experiment. The children from the experimental group were educated according our created program. Three control researches were conducted (8 tasks). The results. During the first research obtained upper-limb speed and dexterity results from groups experimental (E) an control (C) 5 year old girls and boys were very similar. Significant individual result differences are observed. Both E and C groups girls' results in some tasks were better than boys'. During the 6th year E group girls and boys' results statistically significantly improve in 7 tasks. While C group girls and boys' results improve in three (different) tasks ($p < 0.05-0.01$). Comparison of E and C groups' second research results shows that E group girls were better in 7 tasks ($p < 0.05-0.01$) than C group girls, while E group boys were better in 6 tasks ($p < 0.05-0.01$) than C group boys. During the 7th year the results of all groups ($p < 0.05-0.01$) except of two tasks of group C girls were improving. E group girls' all tasks results in the third research, however, were statistically significantly better than C group girls' ($p < 0.001$), accordingly E group boys were better in 7 tasks ($p < 0.05-0.001$). Conclusion. At the end of the experiment E group's, to which fine motor training program was applied, children's upper-limb speed and dexterity results were better than C group's.

THE ALTERATION OF YOUNG BOXERS' ATHLETIC AND SPECIAL PHYSICAL FITNESS DURING THE FIRST YEAR OF THEIR PHYSICAL TRAINING

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The goal of this study was to analyze the alteration of young boxers' athletic and special physical fitness during the annual cycle of their initial training. Methods: literature review, experiment, testing, comparative analysis, and mathematical statistics. The sample consisted of 14 persons, who were training boxing for one year. The average age of the boxers was 14.9 ± 0.6 years. Results. During the annual cycle of the initial training the indexes of the young boxers' body composition: their height, body weight and Kettle index increased ($p < 0.05$), while the amount of the fat within the body and the body weight index changed very little ($p > 0.05$). The strength of the sportsmen's right hand palm was always bigger than the strength of the left hand palm. The boxers' athletic and special physical fitness, speed, explosive strength, anaerobic glycolytic endurance, hand strength endurance and flexibility indexes increased ($p < 0.05$). The strength of the single side thrusts with the front hand and the strength of the single side thrusts with the straight hand to the boxing bag increased ($p < 0.05$). The amount of the thrusts of the examined boxers during the period of 8 sec increased ($p < 0.05$) in each testing period. Conclusions. The training program, determined for one alternative experiment significantly improved the preparation of young boxers and did not harm their health. During the annual preparation cycle the athletic and special physical fitness of the boxers improved. The implementation of this experimental program made a positive influence on the alteration of the body composition indices of the young boxers.

THE PECULIARITIES OF PHYSICAL FITNESS OF CHILDREN AGED 5–7 YEARS IN KAUNAS KINDERGARTENS

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The aim of this study was to evaluate the physical fitness of children aged 5–7 years in Kaunas kindergartens. Methods – 176 kindergarten children participated to assess the peculiarities of their physical fitness. Body mass index (BMI), waist circumference (WC) and percent body fat mass (PFM) was evaluated. The physical fitness tests included 5-m shuttle-running, 20 m distance running, standing long jump and throwing 1 kg ball were performed. Results: The relationship between BMI and waist circumference was highly significant in boys and girls. Running tests was significantly correlated with body weight and percent body fat, showing that as body weight or percent body fat increased run performance times were slower. Conclusions: This study shows that BMI and WC are negatively correlated with physical fitness. Data from physical fitness tests indicated that physical fitness of children aged 5–7 years is low or right enough, but not good or excellent.

IMPACT OF AGE AND SENSORY SYSTEMS ON WEIGHT BEARING SYMMETRY DURING QUIET STANCE

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The ability to distribute body weight equally on both legs during quiet stance is one of the main goals in balance rehabilitation. The weight bearing symmetry is perturbed while standing and depends on motor reaction type and time, integration of sensory information. The goal of the study: to assess the impact of age and sensory systems on weight bearing symmetry during quiet stance. Subjects and Methods: I group – n=13, female, age 22.5 ± 5.5 y.; II – group n=13, female, age

43.5±3.5 y.; III group – n=13, female, age 72.5±4.5 y. Subjects had no neuromuscular disorders. Static posturography was applied. The posturogram was recorded 120 sec. while subjects maintained balance with open and closed eyes standing on force platform (Kistler). Each subject underwent 4 trials. The weight bearing symmetry was calculated. Data processed using mathematical statistics. Conclusions: The weight distribution of I group appeared more symmetrical than II and III group. The impact of proprioceptive and vestibular systems on weight bearing symmetry during quiet stance is greater in young subjects than in elderly and middle age.

STRUCTURAL CHANGES IN THE POST-SOVIET NATIONAL SPORT ORGANIZATIONS: THE STUDY OF BASKETBALL FEDERATION OF LITHUANIA (LKF)

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Aim. The principal aim of the study presented in this paper was to examine organizational changes that have occurred in the Basketball Federation of Lithuania (LKF) throughout the period of 1991–2006. **Methods.** The research focused on the period between 1991 and 2006. The study design incorporated two main approaches to data gathering including document analysis and structured interviews, involved speaking with 10 individuals who worked or were currently working with the LKF. Each interview ranged from 1 to 2 hr. **Results.** Using Slack and Hinings (1992) frameworks as a guide, patterns of the organizational change in the LKF were uncovered. The main findings of the study were focused on organization's internal structural arrangements – specialization, formalization and centralization. LKF's organizational categories ranged significantly from 1991 to 2006. Stark contrast is noticeable in specialization. Also, the governance of the LKF passed from volunteers to professionals. Formalization appeared to be the most no factor category during all three periods of our research. Written rules and regulations were minimal, evaluation criteria were mostly informal and no programs were prepared. The level of hierarchy in decision making has also remained high

throughout all three periods. Conclusions. Completed study enabled us to make comparisons and describe the direction of structural changes that took place in the LKF.

EFFECT OF PULSED ELECTROMAGNETIC FIELD EXPOSURE (BEMER-3000) PROCEDURES ON MORPHOLOGICAL, BIOCHEMICAL AND IMMUNOLOGICAL INDICES OF ATHLETES' BLOOD

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Aim of the study was to research the effect of the 14-days-long application of procedures using pulsed electromagnetic field emitting apparatus BEMER-3000. Methods. The experimental (E) and control (C) groups comprised 14 healthy, physically active men aged 20–21 years (PE students). Testees from group E for 14 days were exposed to dosed electromagnetic fields emitted by BEMER-3000. Members of the C group were lying on a turned-off mat for the same time. Before, after the 14 days application of the BEMER-3000 and in after the next 2 weeks we have taken venous blood sample and conducted measurements to establish morphological and biochemical composition of the blood, indices of immune state of the blood. Results. Positive changes were noticed in leukocyte formula. While leukocyte count decreased, percentage of monocytes increased statistically reliably, and increase of lymphocytes count was not reliable statistically. Under the effect of pulsed EM field, cholesterol concentration decreased in blood of testees. After the pulsed EM field procedures of 14 days duration, count of lymphocyte subtypes characteristic for immune response, especially $CD3^+$ (T lymphocytes) and $CD19^+$ (B lymphocytes) had tendency to increase. Conclusions. During the experimental period, positive changes were noticed in leukocyte formula. While leukocyte count decreased, percentage of monocytes increased statistically reliably, and increase of lymphocytes count was not reliable statistically. Under the effect of pulsed EM field, cholesterol concentration decreased in blood of testees.

INFLUENCE OF SPORTS GAMES AND CYCLIC EXERCISES TO CARDIOVASCULAR, MOTOR AND SENSOMOTOR ABILITIES OF YOUNG ATHLETES

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The aim of this study – to compare the effect of regular exercising in sports games and cyclic sports events on development of cardiovascular system, motor and sensomotor abilities for the boys of 11–14 years old. Methods. Dynamometry, Finger-Tapping Test, Rouflier Test, vertical jumps Test, measurements of ABP and ECG and measurements of body mass components was used for assessment of adaptive changes. Results. Intersectional comparison revealed that cyclic sports events athletes' muscles power was higher than non-athletes and sports games athletes. Statistically significant differences of dynamometric indices were observed among all age groups estimating both right and left sides. Evaluating of heart rate values (HR) registered during exercise tests showed that the lowest HR values were in a group of 13 years of age sports games athletes and significantly differed from the non-athletes and cyclic sports events athletes' values. Evaluating of JT interval of ECG showed that various sports events had no influence in the range of 11, 12 and 14 years of old groups, but JT interval of 13 years of age in sports games groups was statistically significantly higher compared to non-athletes and cyclic sports events athletes. Conclusions: 1. The improvement of muscles performance indices depends on physical load type: muscles power increased in cyclic sports events groups mostly. 2. There was a strong tendency of reducing of HR at the rest and while performing dosed and all-out workloads HR significantly decreases and recovery rate of most of ECG and ABP indices increases. 3. CNS functional mobility and functional stability indices evaluated by Finger-Tapping Test were significantly improved, and there is a tendency that the indices of general efficiency and anaerobic efficiency improve.

PHYSICAL LITERACY AND SPORT PROFICIENCY

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Aim. Development of a model for enhancing the integral working capacity of orienteering athletes, creating a humanism-based trans-disciplinary approach in the training process that would promote the enhancement of physical literacy and sports proficiency. **Methods.** The research methods are quantitative (laboratory experiment, pedagogical experiment, M. J. Mahoney test (PSIS R-5), analysis of competition documentation, mathematically statistical methods) and qualitative (narrative interview). **Research basis:** 135 orienteer, 300 students (athletes from different sports), 6 experts. **Results.** The model of the orienteering athletes' integral work capacity enhancement, including physical literacy components, is based on transdisciplinary approach to the orienteering athletes' physical literacy component connection with sports proficiency development, substantiated in humanism. The physical literacy criteria: self-confidence, motivation ($r_s=0.41$, $p<0.05$), and physical competence ($|r|=0.69$, $p<0.05$) influences the activity of competition during all competition season. The physical literacy indices: knowledge and understanding ($r=0.90$, $p<0.01$), self-confidence ($r=0.65$, $p<0.05$) and physical competence ($r=0.62$, $p<0.05$) – correlate with the sum of the physical literacy indices. The lack of physical literacy is caused by the lack of knowledge and understanding ($r=0.93$, $p<0.01$) and the lack of physical competence ($r=0.77$, $p<0.05$). **Conclusions.** Orienteering athletes' integral work capacity develops in personality involvement centred model, enhancing their understanding about the possible cognitive strategies, substantially increasing the development of their physical literacy and sports proficiency.

INFLUENCE OF THE PRACTICE OF THE PREPARATIVE PERIOD ON THE BODY MASS OF FOOTBALLERS

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General and physical stress caused by the environment of a sportsman and by the training and competition activity, emotional tense makes appear functional and adaptative changes (B. Ekblom 1986, T. Reilly 1994).

The tasks of the work given were: 1. analyzing adaptation changes of the components of the body mass; 2. analyzing some parameters of physical of football-players within 10 weeks; 3. determining the grade of interrelation and interconditionality between indicators analyzed.

The methodology of the researches: the length of the body was determined with the anthropometer; the body mass was determined on the electronic scale of the firm „Tanita” (Japan). The rate of the fatty body mass and the rate of water was determined according to the analysis of bioelectric impedance after determining an individual programmer for each researched person.

Conclusions: 1. Within the period of the research the general body mass of the footballers decreased in 3,2 kg, mainly because of the decrease in the amount of water; 2. The body mass index without fat hardly changed while the body mass index without water decreased in 0,57 kg/m.; 3. A positive correlation coefficient was established between the body mass indexes without water and fat and separate factors of the physical preparation.

INFLUENCE OF TWO WEEKS TRAINING PROGRAMME IN POST-COMPETITION PERIOD TO SPECIFIC FITNESS OF ICE-HOCKEY PLAYERS AGED 15–16

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Introduction. The aim was to assess influence of two weeks strength training programme in post-competition period of high-performance ice-hockey players aged 15–16 years to specific fitness. Methods. Players had 6 training units for strength and 6 for technical. Strength abilities of legs, arms, shoulders, trunk, and legs muscle power, speed in 10, 20, 30 m running, agility, specific skating with hockey and without were tested pre and post experiment. Results. While muscle strength increased the speed and power of legs muscles, agility, skating indices decreased in such a way: 10 m flying running 6.79%, 10 m standing running 4.76%, 30 m standing running 2.67%, 20 m standing running 1.94%, 20 m flying running 0.68%, counter movement jump 3.64%, length jumping 1.02%, skating with hockey 2.02%, skating without hockey 1.87%, agility 0.64%. Conclusions. The interaction between power of legs muscles and speed, skating abilities were not regular. It is two complex interaction in order to apply regression analysis. Further research needs in order to find out what training programme could be optimal for for high-performance ice-hockey players during season aged 15–16.

EFFECT OF TWO WEEKS TRAINING PROGRAMME IN POST-COMPETITION PERIOD TO STRENGTH FITNESS OF ICE-HOCKEY PLAYERS AGED 15–16

G. Girdauskas, K. Pukėnas, A. Skarbalius
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Introduction. The aim was to assess influence of two weeks strength training programme in post-competition period of high-performance

ice-hockey players aged 15–16 years to specific fitness. Methods. Strength training of 6 exercises in 1 session during 2 weeks divided in separate 3 strength training and 3 technical training sessions per week were applied. Strength abilities of legs, arms, shoulders, trunk were tested pre and post experiment. Subjects used 70% resistance of maximal efforts and made 4–6 repetitions. Weights of 5–10% were added when subjects could execute more than 6 repetitions. First week subjects had 2 sets and second week 3 sets. Results. It was found out the significant strength dynamic changing depended on muscle groups. Essential increasing were found of arms strength ($34.3\pm 10.4\%$) and legs ($25.4\pm 4.7\%$). Conclusions. Although the athletes used the same time of repetitions but strength of muscle groups increased different which caused different interaction between muscles. Significant interaction between muscles demonstrates necessity of universal training of youth muscle strength.

THE ATTITUDES TO OWN HEALTH AND PHYSICAL ACTIVITY AMONG URBAN AND RURAL SCHOOLCHILDREN

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The aim of research is to determine attitude toward health among 15–17 years old urban and rural schoolchildren and their physical activity. The methods. In the survey conducted in 2006, there were questioned 200 urban and 178 rural schoolchildren. The anonymous and closed-ended questionnaire used in the survey was made according HBSC standardized questionnaire. Results. More urban schoolchildren indicated that they are in perfect health than rural (91% and 82%). The study revealed that female more often indicate being off-color or unhealthy (22.8%) than male (2.7%). The urban and rural schoolchildren indicate having various psychosomatic complains (7.9% and 8.1%). The urban children more often indicate head ache, nervous stress, back ache, but rural more often indicate weakness, head ache, were bad moods ($p<0.05$). They were learning about health more often in urban schools during nature discipline (54.1%), in rural schools – during physical exercise lessons (57.6%) than in other

lessons ($p < 0.05$). 84.5% urban and 66.5% rural schoolchildren indicate, that would like more to be in motion, however were doing sport more than 4 hour during week only 9.5% urban and 11.6% rural. Respectively 43.5% and 44.9% of children didn't do sport. Urban schoolchildren more often sport in the clubs-40.5%, so rural-sporting stand-alone-41.1%. Sport school attended respectively 16.7% and 14.6%, schools sports circle – 10.7% and 18.7%. Boys were sporting more than girls. The results of correlation analyses indicated that knowledge about health obtained during lessons and participation in sports had the biggest influence on the schoolchildren's attitude to their own health. Conclusions. The urban and rural schools must pay more attention for school-children health; permit more to be in motion and condition to exercise.

PRELIMINARY TEST OF ESTONIAN VERSIONS OF THE SPORT COMMITMENT SCALE AND ACHIEVEMENT GOAL QUESTIONNAIRE

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The purpose of this study was to test the psychometric properties of preliminary versions of two sport motivation questionnaires in Estonia. Method: Estonian translations of the Sport Commitment Scale (SCS; Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) and the Achievement Goal Questionnaire (AGQ; Elliot & McGregor, 2001) were completed by 81 young athletes (53 boys and 28 girls) aged 7-12 years, representing karate ($n=45$), soccer ($n=19$), and swimming ($n=17$). Results: Goals focused on achievement of intra-personal competence were positively related with the decision to continue sport participation, positive affective response to sport experience, personal investments into the activity, and perceived social expectations from others, whereas goals focused on achievement on normative competence were positively related with personal investments; social expectations and valued incentives that are present only through continued involvement in sport ($p < 0.05$). The two latter components of sport commitment were positively related to the goals

focused on avoidance of normative incompetence. Conclusions: Preliminary analysis of Estonian versions of SCS and AGQ demonstrate satisfying psychometric properties and confirm their validity. Further research, based on this preliminary test, is needed to increase the psychometric quality of these instruments.

TRANS-CONTEXTUAL MODEL OF MOTIVATION PREDICTING CHILDREN'S PHYSICAL ACTIVITY OVER TWO-YEAR PERIOD

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This study aimed to examine whether the extended version of trans-contextual model of motivation, in which the perceived autonomy support from parents and peers are incorporated, is valid to predict physical activity over two-year period. A supplementary aim was to compare the components of the trans-contextual model measured with interval in two years. The participants (37 boys and 57 girls) aged 14–19 years completed measures of the components of the motivational model on two occasions over a two-year period. The fit indices of the path models measured with interval in two years were acceptable (first time – NNFI=0.97, CFI=0.98 and RMSEA=0.062; second time – NNFI=0.95, CFI=0.98 and RMSEA=0.08). The model for younger children accounted for a greater proportion of the variance in physical activity than the model for older children. The results of the path models showed that only perceived autonomy support from parents influenced attitude, subjective norms and perceived behavioural control in younger students, whereas the influence of the perceived autonomy support from peer on the same components emerged for older students. Statistically significant decrease was followed in the types of intrinsic motivation in physical education context and increase in external motivational type in leisure time context during the two-year period. The results support the use of the extended version of trans-contextual motivation model to examine the children's physical activity behaviour over time.

INTERRELATIONS OF 11–13 YEARS OLD PUPILS' PHYSICAL DEVELOPMENT AND PHYSICAL CONDITION IN LATVIA

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Aim. To state the interrelations between the 11–13 years old pupils' physical development and the parameters of their physical condition. The research was carried out in the framework of the project "Implementation of sports education at school – to promote pupils' health in a long-term period in Latvia". **Methods.** Testing (push ups against the bench (girls); pull-ups (boys); hanging from the lying position (girls); hanging with bent arms (boys); sit-ups (legs flexed, arms on the chest) 30 s; standing long jump; shuttle run 3 × 10 m; 30 m running; endurance run 6 min; bending while standing on elevation), anthropometry. 12 Riga schools with 371 pupils (196 boys, 175 girls) involved. **Results.** A great dispersion of the results is observed in all parameters of the pupils' physical development and the physical condition. Mostly there are correlative connections between the parameters of the pupils' physical development and physical condition, and it shows the dependence of the physical condition parameters on pupils' peculiarities of physical development. There are weak correlative connections between the boys' parameters of physical development and physical condition ($r_s=0.14 - 0.26$, $p<0.01$), except the results of the exercise – sit ups 30 s. There are weak correlative connections between the girls' parameters of physical development and physical condition ($r_s=0.15 - 0.29$, $p<0.01$), except the results of the exercises – push ups against the bench, standing long jump and shuttle run 3×10 m. **Conclusion.** The results show that it is necessary to reconsider the assessment criteria of the sports classes, to promote the choice of control exercises adequate to pupils' age group, physical activities and their health.

TRAINING METHODOLOGY OF KETTLEBELL LIFTING AND JERKING FOR SPORTS MASTER CLASS ATHLETES

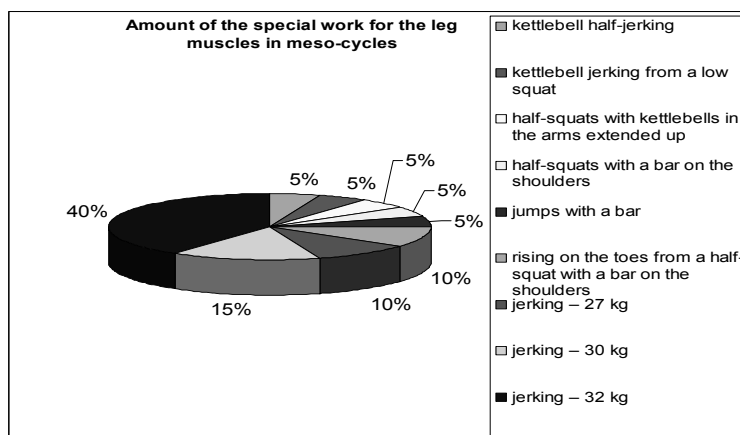
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Research aim is to prove the influence of the training methodology including special exercises for the leg muscles on the kettlebell jerking result of sports master class athletes. Research methods: analysis of the literature, testing (REV 9000), stating experiment, and methods of mathematical statistics. Research results: The average increase of the group result is three points. It means that the result increase is statistically significant.



Conclusions: Three methods are used in the training process to increase endurance of the sports master class athletes – the repetition method ~60%, continuous method ~20%, and variation method ~20%. In the preparation meso-cycle of kettlebell jerking special exercises were executed with kettlebells: kettlebell half-jerking ~50% (of the total exercising time), kettlebell jerking from a low squat ~50%, kettlebell holding on the chest ~70%, and standing with kettlebells in the arms extended up ~30%.

RELATIONSHIPS BETWEEN THE EXERCISE MOTIVATION AND RISK OF EATING DISORDERS

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Though physical activity has a major beneficial effects on most chronic diseases, the studies show that extrinsic motivation to exercise has been associated with the lower psychosocial health. The aim of the present study is to examine the relationship between aspects of exercise behaviour, exercise motivation and the risk of eating disorders in the sample of women involved in leisure time physical activity. The sample⁷ (n=174) mean (SD) age was 31.5 (9.59). Methods. The survey was carried out by submitting the questionnaire consisting of demographic questions, Motives for Physical Activity Measure – Revised, MPAM – R (Frederick, Ryan, 1993), and Eating Attitude Test, EAT-26 (Garner, 1982). Results. Extrinsic exercise motivation was significantly related with the risk of eating disorders. The tendency was found that previous involvement in achievement sports and high athletic level was related with higher risk of eating disorders among leisure time exercisers of fitness centres, but higher leisure time exercise experience was inversely related with increased risk of eating disorders, though the frequency of exercising (times per week) was directly related with the higher risk of eating disorders. Conclusions. The results confirm the relationship between extrinsic motivation and the higher eating disorders risk among leisure time physical activity involved women in this sample. The relationships between eating disorders and the aspects of exercising should be examined in further studies.

INTERRELATIONS OF 14–16 YEARS OLD PUPILS' PHYSICAL DEVELOPMENT AND PHYSICAL CONDITION IN LATVIA

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Research aim. To state the interrelations between the 14-16 years old pupils' physical development and the parameters of their physical condition. The research was carried out in the framework of the project "Implementation of sports education at school – to promote pupils' health in a long-term period in Latvia". Methods. Testing (push ups against the bench (girls); pull-ups (boys); hanging from the lying position (girls); hanging with bent arms (boys); sit-ups (legs flexed, arms on the chest) 30s; standing long jump; shuttle run 3 × 10 m; 30 m running; endurance run 6 min; bending while standing on elevation), anthropometry. 12 Riga schools with 172 pupils (83 boys, 89 girls) involved. Results. Mostly there are correlative connections between the parameters of the pupils' physical development and physical condition, and it shows the dependence of the physical condition parameters on pupils' peculiarities of physical development. There are weak ($r_s=0.27 - 0.39$, $p<0.01$) and medium close ($r_s=0.51 - 0.63$, $p<0.01$) correlative connections between 14-16 years old boys' parameters of physical development and physical condition, except the results of the exercises – push ups and bending while standing on elevation. In form 8 girls there are weak ($r_s=-0.22 - 0.36$, $p<0.01$) and medium close ($r_s=0.51 - 0.63$, $p<0.01$) correlative connections, except the results of the exercises – push ups against the bench, sit ups 30 s and bending while standing on elevation. Conclusion. Results suggest that there is a need to select adequate exercises for evaluation of the effect of a physical activity promotion program at school on national level.

PHYSICAL FITNESS AND DEVELOPMENTAL AGE OF SCHOOL CHILDREN EXPOSED TO ZOONOTIC PARASITE -*TOXOCARA* IN RURAL ENVIRONMENT

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Toxocara is common gastrointestinal nematode of dogs and cats and a causative agent of zoonotic disease in humans. Soil contaminated with eggs of the parasite is the source of infection. Toxocarosis in people usually proceed without symptoms but sometimes causes danger clinical manifestations connected with larva migration. In Kołaczkowo village (Wielkopolska district) the comprehensive studies were performed. The degree of soil contamination with *Toxocara* eggs, prevalence of toxocarosis in school children and their physical fitness, developmental age and school achievements were examined there. Out of 200 soil samples collected from the rural area, 14.5% contained *Toxocara* eggs. High contamination was recorded on the household backyards and the school playground (21.7% and 4.6% positive samples respectively). Examination of 242 children (aged 13–17 years) for *Toxocara* antibodies (ELISA test) revealed 14.5% seropositivity, with higher prevalence among boys (16.5%) than among girls (12.8%). The biological age determined by the electrophoretical mobility of nuclei (EMN) showed, that in both sexes, EMN index among seropositive was significantly higher ($P \leq 0.05$) than among seronegative. The level of physical fitness (speed, muscular strength, aerobic endurance, agility) measured with the test of motor abilities (Wachowski et al. 1987) did not differ irrespective of the exposure to *Toxocara* infection. Seropositive boys had significantly lower school marks than uninfected ($P \leq 0.05$).

PHYSICAL ACTIVITY AND HEALTH POTENTIAL IN SECONDARY SCHOOL GRADUATES IN LITHUANIA: CHANGES DURING 2000–2006

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Aims: To investigate time trends of physical activity and health potential in Lithuanian schoolchildren graduating from the secondary school. **Methods:** The study sample represents Lithuanian schoolchildren aged 16–18 years who attended 11–12th form of secondary schools (1401 adolescences at 2000, and 1035 at 2006). The study was based on anonymous questionnaire. **Results:** In the survey at 2006 40.2% respondents pointed out they exercise at least 2–3 times a week to sweat out and to increase breathing rate (omitting physical culture lessons at school), the rest of the study population reported lower physical activity. The same indicator at 2000 was 50.0%. Low physical activity were more characteristic to girls than boys (73.4% and 36.6%, $p=0.0001$), and 12 grade schoolchildren compared to 11 grade (64.0% and 55.1%, $p=0.003$). The incidence of frequent morbidity was found 16.1% at 2006 and 9.9% at 2000, and the rate of students who suffered from frequent ailments respectively 73.3% and 65.0%. Both health problems were more characteristic to girls, and also higher grade students. Risk of frequent morbidity/frequent psychosomatic ailments were 1.7 higher to those who exercise sometimes or never compared to those who exercise 2 and more times per week. **Conclusions:** Physical activity of schoolchildren graduating from secondary school in Lithuania decreased during the period of 2000–2006. Sedentary life style increases the risk of frequent morbidity and frequent psychosomatic ailments.

EFFECT OF PUBERTAL DEVELOPMENT AND PHYSICAL ACTIVITY ON PLASMA GHRELIN CONCENTRATION IN BOYS

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The aim of the present study was to assess the influence of regular physical activity on plasma ghrelin concentration in prepubertal and pubertal boys. In addition, the impact of ghrelin concentration on bone mineral density (BMD) was examined. In total, 56 healthy schoolboys aged between 10 and 16 years were divided into the swimming (n=28) and the control (n=28) groups. The subjects were matched by age and body mass index (BMI), generating 9 matched pairs in pubertal group I (Tanner stage 1), 11 pairs in group II (Tanner stages 2&3) and 8 pairs in group III (Tanner stages 4&5). Swimmers in pubertal groups II and III had significantly (both $p < 0.05$) higher mean ghrelin levels than the controls (group II: 1126.8 ± 406.0 vs 868.3 ± 411.2 pg/ml; group III: 1105.5 ± 337.5 vs 850.8 ± 306.0 pg/ml, respectively), whereas no differences emerged in the pubertal group I (1230.8 ± 386.0 vs 1272.7 ± 424.4 pg/ml). Ghrelin was the most important hormonal determinant for total BMD and lumbar apparent volumetric BMD (BMAD) ($R^2 = 27.2\%$ and $R^2 = 19.8\%$, respectively) in swimmers, whereas in control boys, plasma insulin-like growth factor-I (IGF-I) was the most important hormonal predictor accounting for 41.8% of the variability of total BMD and 20.4% of the variability of lumbar BMAD. In conclusion, ghrelin concentration decreased during puberty in physically inactive boys, while in regularly physically active boys it remained relatively unchanged. Ghrelin appears to be an important hormonal predictor for BMD in physically active boys, while BMD is mostly determined by IGF-I in physically inactive boys.

EXERCISE-INDUCED MUSCLE DAMAGE IS DECREASED AT INITIAL PART OF STRETCH-SHORTENING EXERCISE BY MEANS OF REPEATED BOUT EFFECT

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Aim. To test the hypothesis that adaptations induced by a bout of stretch-shortening exercise (SSE) would protect against impaired muscle function during the initial part of a subsequent SSE and this protection would be less effective as the subsequent SSE progressed. **Methods:** Healthy untrained men (n=7) performed 100 maximal drop jumps immediately followed by maximal jump vertically at 30 s intervals. After 10, 25, 50 and 100 jumps as well as at 1 and at 24 h after exercising quadriceps muscle force evoked by electrical stimulation at 15 (P15) and 50 (P50) Hz frequencies and maximal voluntary contraction force (MVCF) was measured. The muscle soreness and creatine kinase activity in the blood were measured at 24 h after exercising. **Results:** The decrease in MVCF was limited and there was no difference between the two bouts in this respect. A similar decrease in P50 was observed immediately after both bout 1 and bout 2. However, the first 10 and 25 jumps induced greater decrease in P50 in bout 1 than in bout 2 ($p < 0.05$, bout 1 versus 2). The time-course of changes in P15 during bout 1 and bout 2 was similar to that observed for P50. Muscle soreness and plasma CK activity were significantly ($p < 0.05$) greater at 24 h after bout 1 than bout 2. **Conclusion.** The muscle performance at initial stage of muscle damaging exercise as well as within 24 h recovery period is protected by means of repeated bout effect.

STUDENT'S SPORTS ACTIVITIES AS DETERMINANTS OF THEIR EMOTIONAL RESPONSE TO THE INSTITUTION OF HIGHER EDUCATION

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The majority of students at the Lithuanian Academy of Physical Education are actively engaged in sports. The aim of the study was to establish if students' sports activities at the institution of higher education preparing specialists of physical education and sports impact their emotional identification with the institution. The research participants were 622 first to fourth year students – would be specialists of physical education and sports. The research method applied was questionnaire survey. Research results showed that students who were more apt to their sports activities felt better at the academy. More of them were proud that they studied at the Lithuanian Academy of Physical Education, and more of them would choose the same higher school if they had to. They also more cared about the image of the Academy, were inclined to associate their success with the success of the Academy. More of them did not hesitate to tell others that they studied at this higher school. They were sure they did not waste time at the Academy and they felt safe there. They were more satisfied with the conditions to learn, their relations with teachers and other students. More of them believed that the Academy was the place to be engaged in serious research. Research results let us conclude that students' sports activities and aspirations at their higher school are determinants of their emotional response to the higher school, which in turn impacts their academic aspirations and learning success.

STUDIES OF WOULD-BE TEACHERS OF PHYSICAL EDUCATION: CHANGES IN THE ATTITUDES TOWARDS THEIR PEDAGOGICAL COMMUNICATION

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The aim of the present research: to reveal characteristics of the change of attitudes of would-be specialists of physical education and sports towards their pedagogical communication in the lessons. The research method was applied the questionnaire. The sample in the longitudinal research of cohort type consisted of students from the Faculty of Sports Education at the Lithuanian Academy of Physical Education: 89 second year students and 60 fourth year students. The changes in the attitudes towards pedagogical communication of would-be specialists of physical education and sports revealed that the research participants upheld the stereotypical view towards language expression in the physical education activities: "Children's language is not the business of physical education teachers". Besides, though the future specialists paid more and more attention to the opinions of other people about their language qualities during their studies, they read fewer publications that could help them deepen their linguistic sub competence of pedagogical communication, and they more seldom had consultations with linguists. It is worth noting that in the academic community there were changes in the attitudes towards pedagogical communication of would-be specialists of physical education and sports in the aspect of gender: self-evaluations of male students compared to female students indicated that male student were more impellent. It should be emphasized that native language abilities of would-be specialists could be treated as an instrument prognosticating them as effective specialists of physical education and sports.

STRESS FRACTURES IN ATHLETES

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Stress fractures account for 0.7 to 20% of all sports-related injuries in patients who are active at high recreational and competitive level. Therefore, the corresponding risk factors should be identified and prevention emphasized. Prevention or early intervention is the preferable treatment. However, it is difficult to predict injury because athletes vary with regard to biomechanical predisposition, training methods and other factors, such as diet, muscle strength and flexibility, etc. The aim of this study was to get an overview of stress fractures using literature sources and to carry out research among athletes to find out their opinion about the origins of injury. Methods. Different literature sources were used and research was carried out among athletes to find out their opinion about the initiation of injuries. A questionnaire designed to observe factors known to increase the incidence of stress fractures was distributed to subjects in the current study (12 self-reported bone injuries: mean age=24.3±2.0; 7 females and 5 male athletes). Results. Origins of stress fractures are related to personal characteristics as well as environmental factors (extrinsic and intrinsic risk factors). Injury is caused by a combination of inadequate preparation, inappropriate equipment, poor technique and overuse. Track-and-field athletes have the highest incidence of stress fractures compared to other athletes. Stress fractures of the tibia, metatarsals and fibula are the most frequently reported sites. The sites of stress fractures vary from sport to sport. Treatment of stress fractures is justified according to risk factors and stress fracture complications. The fracture is usually diagnosed using Image Techniques and observation. Non-surgical management may include rest, non-steroidal anti-inflammatory drugs, corticosteroid injection, ice, reduction in training intensity, orthotics, night splints and physical therapy. Occasionally surgery treatment is necessary. Athletes participating in the study gave similar answers about the origins and treatment of stress fractures as pointed out in literature sources. The only difference between theoretical material and research results appeared while comparing data about healing time (the timing of the athletes who return to sport), which in the experience of athletes was much longer than pointed out in literature sources. A stress fracture was a reason

for ending a career in competitive sports. Conclusion. A stress fracture is a bone fracture that results from repeated application of stress lower than the stress required to fracture the bone in single loading. This specific injury appears more frequently due to a higher training weight. Many injuries are preventable and risk factors should therefore be identified and prevention emphasized. It is important to inform athletes and instructors about risk factors and necessary extensive treatment and rehabilitation for stress fractures.

SELF-ASSESSMENT OF ATTITUDES OF THE LITHUANIAN AND EUROPEAN JUDO COACHES AND ATHLETES TOWARDS SPIRITUAL AND MORAL TRAITS OF THEIR PERSONALITY

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The aim of the research was to identify the self-assessment of the attitudes of the judo coaches and athletes possessing different levels of mastership towards their own spiritual traits and moral behaviour. The main method of research was an anonymous interview in writing. Conclusions: The majority of the Lithuanian and European judo coaches and athletes included diligence (60–80%) and persistency (60–90%) into their Self-image. The majority of the Lithuanian judo coaches ($p < 0.05$) distinguished courageousness as their common trait, whereas the European judo coaches ($p < 0.05$) distinguished dutifulness and fellow-feeling; a significant part of the European judo elite athletes ($p < 0.05$) accentuated friendliness and attentiveness. The European respondents (both coaches and athletes) included dutifulness, responsibility and forgiveness into their Self-image more often than the Lithuanian respondents (both coaches and athletes) ($p < 0.05$). The Lithuanian and European coaches distinguished tolerance, fellow-feeling and patience more often than the athletes. Contrarily, the athletes distinguished fellow-feeling more often than their coaches ($p < 0.05$). The European judo elite athletes distinguished responsibility, dutifulness, friendliness, attentiveness, piety, merci-

fulness and forgiveness more often than the Lithuanian athletes ($p < 0.05$). The Lithuanian and European judo coaches and especially their athletes preferred to include the moral traits rather than the spiritual ones into their Self-image.

ENERGY COST OF SKATING TECHNIQUE IN CROSS-COUNTRY SKIING AT UPHILL SKIING

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Introduction: In high-level cross-country (CC) skiing are often used techniques that are based more on upper body working capacity. This means that the V2 technique is extensively applied in ski-skating races at uphill parts of the track. However, young skiers may not possess sufficient upper body working capacity to maintain speed in uphill parts of the track and the offset technique may be more beneficial to use. The aims of this study were to compare the aerobic energy cost of two different CC skating techniques (V2 and V1) during uphill racing and to examine the relationships between laboratory and field testing of the aerobic capacity. **Method:** Ten high-level male CC skiers with a mean $\text{VO}_{2\text{max}}$ of $65.4 \pm 3.9 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ aged 15 to 17 years performed 1.2 km bouts at exercise intensity corresponding to 80% and 90% of maximal heart rate (HR), and to HR_{max} on a 5.2% incline while physiological measurements (VO_2) were made. The fingertip lactate was taken three minutes after each attempt. **Results:** The average $\text{VO}_{2\text{max}}$ in rollerskiing was $68.8 \pm 4.9 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ against 65.4 ± 3.9 in laboratory test. No statistically significant differences emerged in VO_2 and La values ($p > 0.05$). However, VO_2 at 90% exercise intensity was lower in V1 compared to V2. La was lower in V1 at intensities 80 and 90%, but higher at HR_{max} compared to V2. **Conclusion:** The present study showed that at submaximal intensities there are no differences in VO_2 between different skating techniques. At maximal intensities, when using the V2, slightly lower La levels are achieved compared with V1.

THE ROLE OF PERCEIVED TEACHING BEHAVIOURS ON MOTIVATION IN PHYSICAL EDUCATION

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The aim of the present study was to test the main premise of self-determination theory that various dimensions of perceived teaching behaviours influence students' self-determined motivation in physical education through the satisfaction of psychological needs for competence, autonomy, and relatedness. In order to test these hypotheses, an alternative model was tested in which all dimensions of perceived teaching behaviours predict students' self-determined motivation also directly. This was done to demonstrate whether the effects of perceived teaching behaviours are completely or partially mediated by the psychological needs. 498 students aged 12–17 years completed questionnaires assessing perceived teaching behaviours with dimensions of democratic versus autocratic behaviour, teaching and instruction, social support, situation consideration, positive general feedback, and both positive and negative nonverbal feedback, as well as their perceptions of competence, autonomy, relatedness, and self-determined motivation. The hypothesized model exhibited poor fit to the data (CFI=0.92, NNFI=0.77, SRMR=0.10, RMSEA=0.13). An alternative model, however, had much better fit to the data: CFI=1.00, NNFI=0.98, SRMR=0.02, RMSEA=0.04. An alternative path-analytic model revealed the indirect positive effect for perceived positive general feedback (i.e., complete mediation), whereas both indirect and direct negative effects were found for negative nonverbal feedback (i.e. partial mediation). Perceived autocratic behaviour, and teaching and instruction demonstrated only direct negative and positive effect, respectively.

POLYMORPHISM IN THE PROMOTER REGIONS OF IGF-I GENE IN ATHLETES OF REGIONAL TEAM

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IGF-I (insulin-like growth factor) is a protein with wide range of activity. It affects many functions of human body such as: regulation of growth and differentiation of skeleton muscles, influence on metabolism of muscular proteins and glucose as well as regeneration of muscles cells. Such features make IGF-I to be involved in adaptation of human body to physical activity and to be commonly used as a doping substance. The aim of the study was searching the genetic determinant of achieving success in sport connected with IGF-I gene expression. The promoter region of the gene, which was recognized to be polymorphic, was analyzed. Searching group was 207 athletes representing: basketball, handball, volleyball, wrestling, weightlifting and control group – 100 sedentary students. The material was DNA isolated from epithelial cells obtained from mouth. Three regions of P1 promoter were analyzed using PCR, SSCP and sequencing. In all 5 disciplines examined third promoter region had nucleotide sequence changes but it was not observed in control group. In first or second promoter region polymorphism was observed in sportsmen representing 3 disciplines while the control group shows point mutations only in the first promoter region. The results suggest that one of the genetic factors, which determine sport success, can be nucleotide sequence change in the promoter region of IGF-I gene.

TRUNK MUSCLE TONE, INTERVERTEBRAL DISC HEIGHT AND NEUTRAL SPINE POSTURE IN YOUNG RHYTHMIC GYMNASTS

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The aim of this investigation was to assess the function of vertebral column in elite rhythmic gymnasts in order to establish the characteristic features of the spine that is under considerable stress, resulting from adaptation. Gymnasts aged 13–15 years without ($n=12$) and with ($n=12$) idiopathic low back pain (LBP) (mean Oswestry index 20%) participated in this study. The spinal curvature in the sagittal plane was recorded radiographically by Gobb. All subjects underwent magnetic resonance imaging (MRI). Intervertebral disc morphology for segments from T7–T12 and L1–S1 was recorded. The tone of the trunk flexor and extensor muscles was monitored with myotonometer. In gymnasts without LBP, the difference in tone between trunk flexor and extensor muscles was minimal, angles of thoracic kyphosis and lumbar lordosis were in the normal range, whereas the difference of these angles was not significant. The positive correlations ($r=0.58-0.73$, $p<0.001$) between measured angular parameters were observed in gymnasts without LBP. In gymnasts with LBP, the tone of trunk extensor muscles was higher ($p<0.001$) than of flexor muscles, spinal curvatures were imbalanced, whereas difference between the angles of lumbar lordosis and thoracic kyphosis was significant ($p<0.001$). In present study it appeared that gymnasts with LBP have reduced disc height in thoracic and lumbar spine in comparison with asymptomatic gymnasts ($p<0.001$). This showed that the more rigid spine is disbalanced and prone to injuries.

THE CHANGE OF THE GIRLS' PHYSICALLY ACTIVE AND NON-ACTIVE LEISURE ACTIVITIES UNDER THE INFLUENCE OF EDUCATIONAL FACTORS

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The aim of this research is to analyze the effect of educational factors applied in physical education classes on the change of the 7–8 grade school girls' physically active and non-active leisure activities. Pedagogical experiment has been taking place during the whole academic year. During the physical education classes the control of physical training process and the means of physical features' training in the groups differed. Two experimental groups were organized: 1) E1 – 43 girls from 7–8 grades, who were trained by introducing independent training factors during the physical education classes (the girls themselves search for more entertaining exercises, read literature about physical features and their training, body shape and health improvements, the significance of physical activities; participated in the process of the class preparation); 2) E2 – 39 girls from 7–8 grades, whose physical training process during the physical education classes was controlled by their teacher. The research showed that educational factors applied in the group E1 during the physical education classes gave positive changes in teenage girls' active leisure activities in proportion to non-active (at the beginning, passive work in the group E1 occupied 64.6% and active work – 35.4% of all leisure time, whereas in the group E2 – 62.6% and 37.4% accordingly; the proportion after the experiment in the group E1 has improved and each, active and passive work, occupied 50% of leisure time, meanwhile, it has fallen off in the group E2 – passive work comprised 73.6% all leisure time($p < 0.05$).

HEALTH BEHAVIOUR AMONG TARTU UNIVERSITY STUDENTS

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One of the goals of the national health reform is to promote healthy lifestyle in the whole population. Relationship between lifestyle choices and health outcomes has been an area of interest for many health professionals. Health promotion among studying youth is one of the most important aspects of maintaining the creative and developing human potential of the society. Health scientists are working consistently in order to detect the risk factors in children's and adolescents' health behaviour, and are preparing programmes for health promotion and its appliance. University years offer opportunities for new experiences, personal freedom, and identity development; however, this period is also noted for the emergence of risky health behaviour that place students at risk. The aim of the present investigation was to determine the prevalence of health behaviour risk factors among Tartu University students. Besides, the opinions of students on their health and lifestyle were analyzed. Methods. The proportionate random sample of the study consisted of students (male and female full-time students in Bachelor and Master programmes from all faculties of the University of Tartu. The participants completed anonymous questionnaire that included socio-demographical and health behavioural aspects, physical activity and participation in training groups organized by Tartu University Academic Sports Club. Results. The reasons for the emergence of risk factors are the following: due to busy schedule students have no spare time to go in for sports; most of the students do not live at home with their parents (hence, little or no surveillance); there is shortage of finances to participate in training sessions for a fee, since the students' income is low and living on one's own is expensive; students have little choice between different types of training sessions or the suitable one is located inconveniently; during this new stage of life one pursues various interest and temptations; religious beliefs and rituals/traditions, etc. Conclusions. Students' health and the related risk factors have been thoroughly investigated and results have been widely published. Throughout decades the factors affecting one's health have been mostly the same: irregular lifestyle, insufficient physical activity,

social and economical issues, health-threatening habits, etc. The health behaviour of the studying youth has not improved with years. The risk factors affecting health have a greater prevalence among those students who are physically less active. Therefore, it is crucial to educate the youth how to maintain their health and in case of need to promote it.

INTEGRATION OF PEDAGOGY AND SPORTS BIOMECHANICS IMPROVING THE STUDY AND TRAINING CONTENT

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The aim of the research: improvement of the study content, working out the models of sports movement technique, teaching and training methodology. Methods: stereofotogrammetric, Simi Motion Analysis System, tenzodynamographic, electromiographic methods, linear and nonlinear correlation, factor and regression analysis were employed for data analyses. A lot of research has been devoted to sports throwings, including biomechanical study and analysis. However, less attention has been paid to the questions of control and acquisition of sports technique, even forgetting the fact that sport biomechanics has also significant pedagogical tasks: 1) perfecting of sports technique and working out technique's rational variation; 2) techniques control with an aim to avert mistakes and increase technical proficiency; 3) formation of effective special exercises; 4) working out biomechanically substantiated training and movements' teaching means. One more important pedagogical problem what we have researched, comes into the foreground: who from the athletes, starting to train, will be able to achieve top sport results? Sports performance depends not only on the level of technical proficiency but also from the physical possibilities of the athlete and in what extent the athlete can realize (change into sports result) his preparedness potential, using one or other variant of movement execution. We have researched the biomechanics of physical qualities and realization effectiveness of technical means. Report will be about our research main results.

CULTURE AS CONTEXT OF PHYSICAL EDUCATION IN SCHOOL

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The Aim of Study: to discuss dialogues and interactions of cultures and sub-cultures taking place in physical education as a sub-system of education. In the industrial society social mobility of the community members increases rapidly. Family and traditional communities loose their power of absolute control in regard to their members. Already in an early childhood the conditions are created for a person to change his or her social and cultural environment, where socialisation obtains a rather formal learning character. The education system in a certain period becomes the most important educational institution with ever increasing requirements being attached to it. Children in school must not only acquire a certain amount of knowledge, but they also have to receive the basic moral values, obtain certain professional skills, prepare themselves for future parenting, etc. The school became their second home, a place where they work, rest and play. In the post-modern society centralised management becomes impossible due to the increase of decentralisation processes and importance of sub-cultures as well as the increasing influence of globalisation in educational processes and a need for the development of international standards. Another challenge for the education system comes from more intensified cultural exchange which arises from the intensive development of media. Preconceived stereotypes, acknowledged authorities in education and science are loosing their exceptional role. Education becomes more like a process having its main parameters determined by suppliers and consumers of education services.

THE ANALYSIS OF CAUSES FOR PHYSICAL INACTIVITY OF YOUNG PEOPLE

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Most scientific research has confirmed that regular physical activity improves health, physical and psychic condition of children and adolescents (Faulkner et al., 2001; Louie et al., 2003). Physical activity from early years of age improves metabolism, regulates blood pressure in the arteries, prevents the causes for chronic non-infectious diseases (helps to control weight, blood pressure, hypercholesterolemia, etc). Consequently, this reduces the risk of chronic non-infectious diseases, overweight (Hernandez et al., 1999; Guan-Sheng et al., 2002), heart and cardiovascular disorders (WHO, 1990; Berenson, 2002), and other health problems in adulthood. Physically active school-aged children are also of higher self-esteem (Strauss et al., 2001; Hagger et al., 2001; Kirkcaldy et al., 2002) and learn better (Symons et al., 1997; Wang et al., 2002) than the passive ones. However, physical activity can be dangerous to young people's health either. There is a risk of traumas when physical activity is far too intensive or monitored poorly (Sallis et al., 1992; Flynn et al., 2002; Davis, 2004). The result of the HBSC research carried out in the countries-participants shows that half of the traumas experienced by adolescents take place during their sports or other physical activities (Williams et al., 1998; Currie et al., 2000). Yet, after considering all the pros and cons of physical activity, the positive aspect of it is undeniable. It is essential to increase the intensity of physical activity and thus improve the health and quality of life of children and adolescents (Sallis et al., 1999). The research of Lithuanian scientists complements the international data about the significance of physical activity.

SOMATIC AND FUNCTIONAL DIFFERENCES BETWEEN FALLING AND NON-FALLING MEN AGED OVER 75

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The aim of the study was to find physical fitness factors and somatic elements, which differentiate fallers and non-fallers men aged over 75. In total 27 generally healthy men aged over 75 years took part in the study. The participants were divided into two groups – those who fell (fallers, 9) and those who did not fall (non-fallers, 18) in the period of one year before the study. Their height and body mass were measured and BMI index was calculated. Using the electric bioimpedance method the value of fat mass was assessed. The value of sway area posturographic platform was established. Reaction time was measured by Vienna Test System. Functional fitness was measured on the basis of selected tests from The Senior Fitness Test. The BMI and FM do not differentiate fallers from non-fallers. No differences were found in terms of reaction time between the groups. The men who fell in the year preceding the study were characterised by a lower strength of the lower body part and a lower level of aerobic endurance ($p < 0.05$). No relationship was found between the falls and joint mobility. The sway area does not differentiate between the fallers and non-fallers.

The complexity of the multiple mechanisms underlying postural control does not allow for clear indication of the risks of stability loss.

PUPILS' ATTITUDE TOWARDS OLYMPIC MOVEMENT AND "FAIR PLAY"

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Purpose of the research: to analyze the pupils' attitude towards olympic movement and noble behaviour. Methods: literary analyze, questionnaire survey, mathematical statistics. Results: After performing the research, it became clear 88.24% of respondents knew the first modern Olympic Games took place in Athens. 81.8% of the res-

pondents think the modern Olympic Games are different from the Olympic Games to take place in the ancient times. More boys 52.16% than girls 23.92% indicated they had heard of the Paralympic Games. 57% of the respondents indicated correctly the last winter Olympic Games took place in Turin, 76% know the summer Olympic Games take place in Pekin in 2008. 87% of the schoolchildren think it is possible to win by playing fair. 11.4% of the respondents would use drugs to win an olympic medal, 25% of the girls and 32.3% of the boys indicated if their rival played unfair, they would requite like for like, 46% of the girls and 32% of the boys indicated it was acceptable if someone tried to break sport rules. Conclusions: The results of the research showed the schoolchildren knew not only the history of Olympic movement but they were also interested in the Olympic Games which had just happened or were going to happen. The schoolchildren have bad knowledge about the Parolympic games because in our state the media, political characters and the society pay too little attention to them. The respondents know "Fair play", however, it became clear some of them would not respect the principles of "Fair play" principu in a true-life situation.

ATHLETES' PERCEPTIONS OF SOCIAL SUPPORT PROVIDED BY THEIR COACH BEFORE INJURY AND AFTER IT

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Aim of the study was to evaluate athletes' perceptions of social support provided by their coach before injury and after it. Participants were 29 athletes with minor to severe injuries who were forced to sit out of practice or competition for at least 3 days due to their injury. Team sport and individual sport athletes (17 male and 12 female) ranged in age from eighteen to twenty five years. 29 college athletes completed a modified version of the Social Support Survey (Richman, Rosenfeld, Hardy, 1993). Data were collected on who provides each of six types of social support (listening support, task appreciation support, task challenge support, emotional support, emotional

challenge support, reality confirmation support), how satisfied the higher school athletes are with the amount and type of support they received, and the perceived effect of support on their well being. A series of ANOVAs indicated no sex differences. With two exceptions, results indicated no differences between pre-injury and post-injury satisfaction with the support provided by coaches. The exceptions were for task challenge support and emotional challenge support: satisfaction with task challenge support and emotional challenge support provided by coach before injury was rated significantly higher ($p < 0.05$) than satisfaction with the support provided after it (during rehabilitation). Results indicated no differences in the perceived importance to their well-being of support provided by coaches before injury and after it. The exceptions were for listening support and emotional support. These findings confirm the possible positive effects of coaches' listening and emotional support on injured higher school athletes' recovery efforts.

HEMATOLOGICAL PARAMETERS AND SYMPATHOVAGAL BALANCE IN YOUNG SKIERS DURING A COMPETITIVE SEASON

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Aim. Hematological parameters play a significant role in exercise performance. The aim was to study red blood cell parameters in young skiers during a competitive season: in autumn (training period), in winter (competition period), and in spring (a recovery period). **Methods.** Venous blood was analyzed in 26 young skiers (14–16 y) and 18 young controls. The blood was analyzed using haemato-autoanalyser BT 2100. Sympathovagal balance was assayed by power spectral analysis of heart rate variability as index LF/HF. Aerobic performance was measured by a ramp test on a cycle ergometer. **Results.** In autumn skiers have lower values of RBC and Ht ($p < 0.05$). Hb, MCV, MCH and LF/HF were similar compared to control. In winter Hb increased ($+2.6 \pm 2.0\%$, $p < 0.01$) via an increase in MCH ($+1.2 \pm 2.7$, $p < 0.05$) and Ht increased ($+4.0 \pm 4.1\%$, $p < 0.01$) via an

increase of MCV ($+1.8\pm 2.4\%$, $p<0.01$) in skiers. All alterations suggest a release of young red cells from bone marrow in circulation. LF/HF index increased ($+232\pm 393\%$, $p<0.02$) in athletes too indicating sympathetic dominance. In spring almost all hematological parameters returned to autumn level in skiers. However, all changes in the periods were not different from the change in control. Conclusion. We suggest that in competition period activation of sympathetic nervous system play a role in accelerating erythropoiesis and release red cells with higher MCV and MHC from bone marrow. However, except for exercise loading cold temperatures in winter season play a significant cofactor role in both groups.

SPECIAL CHARACTERISTICS OF ADAPTATION TO VARIOUS PHYSICAL LOADS IN THE ORGANISMS OF TALL HIGH PERFORMANCE ATHLETES

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In sport, the vital role generally belongs to muscular functions determined by the operation of a number of other organs and systems (e.g. control or service). It is especially urgent to examine specific organic qualities characterizing the so-called strongmans, or mighty men engaged in a specific yet increasingly popular branch of sport; and to carry out a corresponding comparative analysis involving high performance athletes who, showing height parameters without any essential differences, practice other sports. The aim – to investigate the specific qualities of physical development, muscle power and definite vegetative functions demonstrated by high performance tall athletes. Methods. We examined Lithuanian Olympic Team members: 12 rowers, 12 swimmers, 12 basketball master team players and 1 World Champion strongman recognized to be the mightiest man of the world. Results. The body mass and the muscle mass exhibited by a World Champion strongman were very big, exceeding the group means shown by the representatives of other sports. Athletes practicing different sports did not differ significantly in terms of short

work power index. It was only the rowers who demonstrated reliably lowest values because of their single muscular contraction power. The strongman demonstrated very impressive power in actions excluding abrupt muscle contraction. It was found that rowers whose sport is characterized by aerobic activity showed less powerful functional capacity of their circulation system, compared to basketball players. Examination of the strongman indicated a small-scale agility of sympatheticus.

HOW DO REACTION TIME AND MOVEMENT SPEED DEPEND ON THE LEVEL OF EXERCISE COMPLEXITY?

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Aim of the research – to identify the reaction time and movement speed dependence on the level of exercise complexity. Subjects of the research – 20 healthy, actively and inactively engaged in sports men and women with the average age of 26.6 ± 8.07 years, body mass – 70.1 ± 9.38 kg., body weight – 177 ± 6.81 cm. The studies were executed in the Laboratory of Human Movements Control at the Lithuanian Academy of Physical Education using analyzer DPA-1 (Patent No. 5251; 2005 08 25) for the analysis of dynamic parameters of human arm and leg movements. The subjects carried out “reaction” (simple task), “quickness” (simple task) and “accurateness” (complex task) tasks. Results of the research show, the reaction time by carrying complex task were longer then on the simple task. Variation indices shows, that carrying the “accurateness” tasks the reaction’s time is controlled more stabilized then maximum movement speed. Conclusions – on a complex (fast and accurate) task the reaction time is longer and maximum speed is slower then on a simple task. In addition, the complexity of the task influences the speed rate more then reaction time.

THE INFLUENCE OF INCREASED TRAINING VOLUME ON SELECTED CYTOKINES IN HIGHLY TRAINED MALE ROWERS

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Aim. The aim of the study was to investigate possible changes in plasma interleukin 6 (IL-6), tumor necrosis factor- α (TNF- α), and leptin concentrations, during high-volume training period in male rowers. **Methods.** Eight highly trained male rowers (age 20.2 ± 1.6 yrs, experience 6.5 ± 2.2 years, body height 183.9 ± 4.6 cm, body mass 81.0 ± 5.4 kg) participated in 4-week high-volume, low-intensity study. Training load was increased about 100% during weeks 2 and 3 and was decreased in week 4 to the baseline level, with no significant changes in training intensity. Two-hour rowing at aerobic threshold was performed at baseline (T1) after high volume (T2) and after recovery period (T3) to study training-induced changes in the cytokines. Blood samples were obtained before, POST and POST 30' exercise. **Results.** Leptin concentration was significantly decreased at POST and POST 30' exercise compared to PRE test at T2. At T2 POST 30' leptin concentration was significantly lower compared to the corresponding value at T1. IL-6 was significantly increased during all three testing times. TNF- α was significantly increased POST exercise only at T2. **Conclusion.** High-volume training period causes alterations in post-exercise concentrations in leptin and TNF- α .

THE EFFECT OF RITHMOCOR ON THE STATE OF ERYTHROCYTE MEMBRANES AND ATHLETE'S ADAPTATION TO INTENSIVE TRAINING LOADS

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Aim. Oxidative stress with alteration of homeostatic balance and functional possibility of cardio-vascular system, accompanied with

intensive training process, follow to decrease of oxygen transport and tissue's hypoxia. The tissue hypoxia and increase of active forms oxygen's level worse a parameters structural and functional status of erythrocyte membranes that led to temporary anaemia. The correction these alterations by use "Rithmocer" medical as well as increased adaptation of sportsmen to intensive training loads (increase of endurance) in a purpose of our work. Methods. We used new anti-hyarrythmic drug "Rithmocer" ("PharKos", Kiev, Ukraine), which was tested on athletes-runners. Methods of investigation – biochemical, haematological, pedagogical. Results. Using of "Rithmocer" made an improvement of erythrocyte membranes status essentially determined the increase content of intracorpuscular haemoglobin, one of main parameters of anaemia. It has been established that "Rithmocer" medical causes an increased of endurance of sportsmen to intensive training loads. Conclusions. "Rithmocer" is a drug which may be recommended in this situation.

ALTERATION OF HEART RATE INTENSITY DURING MATCH OF HIGH-PEAK PERFORMANCE PLAYMAKER IN HANDBALL

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Introduction. The aim of the study was to determine the alteration of heart rate intensity during match of high-peak performance playmaker in handball. Methods. During ten matches of the Lithuanian female championship in 2006/2007, the heart rate of the playmaker was recorded in a period of 5 second by pulse meter "Polar S610i" (Finland) and analyzed further with Microsoft Excel program. Results. Total heart rate of subject averaged 9354 ± 884 beats during the match, the highest was during the first half (from 147 to 193 beats min^{-1}), less during the second half of the game (from 141 to 192 beats min^{-1}) and the lowest during warm-up (from 82 to 191 beats min^{-1}). Conclusions. The intensity change limits of the heart rate were alike to that were determined twenty years ago and remained in such a way for over a ten years later on (in 1996), but the change amplitude decreased from

± 60 beats \cdot min $^{-1}$ to the ± 46 beats \cdot min $^{-1}$. Findings suggests that physiological demands in modern handball for playmaker during all the match are highly emphasized and has tendency of increasing intensity. Then intensity of loads were decreased at the end of warming-up the matches were successful. Further research needs in order to find out this phenomenon.

OFFENSIVE SPORT PERFORMANCE OF LITHUANIAN MENS' HANDBALL TEAM IN THE YEAR 2004–2005

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Introduction. The aim of the research was to determine peculiarities of Lithuanian National Mens' Team (LNMT) of offensive sport performance in the year 2004–2005. **Methods.** Computer based program was used in order to regist and analyse 6 matches at qualification World handball championship '2005 and 3 matches at qualification European handball championship '2006. The originality of this research is that actions in the zone of 6–9 meters were registered. **Results.** LNMT attacked 59.9 ± 5.1 times per game in average, efficacy of attacks were $51.0 \pm 4.6\%$. The most efficiently LNMT attacked than duration of attacks were 50–60 seconds. LNMT players played more efficiently than they did not used actions in the zone ($58.2 \pm 7.8\%$) and achieved less success they doing actions in the zone ($48.2 \pm 10\%$). **Conclusions.** In nowadays the duration of elite teams attacks are less than 30 seconds. The advantages of LNMT were: positional actions ($42.6 \pm 5.2\%$), actions in majority (80%), team counterattacks ($73.3 \pm 33.2\%$), and the disadvantages: less efficacy of individual ($65.8 \pm 40.1\%$) and group ($61.9 \pm 37.4\%$) counterattacks, not effective positional attacks of 20–30 seconds duration (58.3%), not enough effective attacks using 6–9 m zone ($48.2 \pm 10\%$), and less efficacy of throws than elite handball teams.

PECULIARITIES OF DEFENSE SPORT PERFORMANCE OF LITHUANIAN MEN'S HANDBALL TEAM IN THE YEAR 2004–2006

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Introduction. The aim of the research was to carry out the peculiarities of sport performance in defense of the Lithuanian Men's Handball Team in the year 2004–2006. Methods. Using computer based programme of registering and analysing actions of sport performance in handball were analysed 13 qualification matches of European and World Championships. Results. Efficacy of team defense actions were $58.7 \pm 9.5\%$, the most efficiency defense were than the duration af attacks were less as 30 seconds ($52.7 \pm 13.7\%$). Conclusions. It was carried out strength and weakness of defense actions. The weakness features were: less efficiently sport performance of goalkeepers ($29.7 \pm 7.4\%$) as elite ($>35\%$), less efficiently in majority ($53.4 \pm 34.1\%$) comparing to minority of elite teams ($>40\%$), and defense from counterattacks ($41.4 \pm 20.2\%$). The exceptional features were that qualified excelent interaction skills of players than opponents used to play in the zone of 6–9 metres ($51.3 \pm 9.1\%$), efficacy of positional defense actions ($61.9 \pm 8.2\%$), active individual actions which allowed to steal the balls (4.1 ± 3).

HABITUAL PHYSICAL ACTIVITY AS DETERMINANT OF FUNCTIONAL AND SELF- SUFFICIENCY FITNESS AMONG ELDERLY MEN

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The aim of the study was to assess the rfaelations between habitual physical activity (HPA) and self-perceived functional fitness and self-sufficiency fitness among men over 60 years of age. The participants of the study were 137 men (60–88 years, average= 72.6 ± 5.8) living in Poznan (Poland). HPA was measured by "Caltrac" accelerometer and expressed as a value of weekly energy expenditure related to physical

activity (PA-EE). The value of PA-EE calculated per kg of weight (PA-EE/kg) was also used. Self-perceived functional fitness and self-sufficiency fitness were estimated using the questionnaire, fulfilled during the individual interview. The Spearman correlation (R_s) was used in statistical analysis. Significant and positive relations of self-perceived functional fitness with PA-EE ($R_s=0.378$; $p<0.001$) and PA-EE/kg ($R_s=0.439$; $p<0.001$) were noticed. Also the self-sufficiency fitness level was positively related with PA-EE ($R_s=0.510$; $p<0.001$) and PA-EE/kg ($R_s=0.547$; $p<0.001$). Obtained results allow the conclusion, that HPA has the significant relationships with maintaining functional independence and optimal quality of life of elderly men. However, the interpretation of confirmed phenomenon has to be mutual. Undoubtedly, higher levels of functional fitness and self-sufficiency fitness are favorable in undertaking wider range of activities related not only to HPA. The precise estimation of “cause-effect” relation is very difficult to explain.

RELEARNING OF SHOULDER'S AUTOMATIC MOTION STEREOTYPE

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In the practise we often meet different systemic functional disorders which influence bearing motion system, especially wrong motion stereotypes which must be corrected during motor relearning. Analysis of motor learning process is widely reflected in literature. Different theories are used for analysis of motor learning process. During motor learning it is proposed that this process contains three stages – cognitive, associative and autonomous. The third stage is poorly described in literature. It is predicated that during motor learning the biological feed-back is important. Aim: We study possibility to relearn automatic motion patterns using exercises with biological feedback. Methods: somatoscopy, applied kinesiology, exercises. Results: We select our contingent – 23 patients in age 21–23 years (11 men and 12 women) with functional disorders which characterises with somatoscopically detected neck hyperlordosys, thorax hyperkifosys and functional motion disorders in the neck. Testing all

our participants with applied kinesiological methods we verify wrong scapula-humeral rhythm, restricted motions in the level of C4–5 and functional weakness of m. supraspinatus. Using complex of manual therapy we obtain normalisation of function state of neck motion and m. supraspinatus, but scapula-humeral rhythm remains unchanged. For relearning of shoulder's automatic motion stereotype we use exercises for neck shoulder muscles with large amount of repetitions and special tactile bio-feedback. Conclusions: Applying our exercises during 2 week session, we normalise scapula-humeral automatic motion stereotype.

ADAPTATION DYNAMICS AND CORRELATION OF PHYSICAL AND FUNCTIONAL CAPACITY OF THE LITHUANIAN NATIONAL ROWING TEAM OVER AN ANNUAL TRAINING CYCLE

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The aim of this research was to analyze the adaptation dynamics of physiological and functional systems of rowers of the Lithuanian national team over an annual training cycle and to analyze correlation among various indices of rowers. Methods. Ten Lithuanian elite rowers participated in the research. They were examined at the beginning of the preparation period and at the beginning of the main competition stage of the competition period. Results. The average values of height, body mass, muscle mass have hardly changed during the period of research. Fat mass was surely lower during the main competition stage than at the beginning of the preparation period. The indices of very short work, i.e. the single muscular contraction power and anaerobic alactic muscle power, changed insignificantly. The indices of aerobic capacity in the limits of anaerobic threshold (AT) increased significantly. The indices of aerobic endurance when performing work at the limits of critical intensity (LCI) progressed very much. The indices displaying functional capacity of circulatory and respiratory system progressed insignificantly and showed the tendency to improve, though changes are statistically unreliable. After

significant increase of work time at the LCI lactate concentration in blood increased insignificantly. The correlation research displayed that muscle mass correlation with aerobic power indices in AT is weak. Special 10s work power has a reliable correlation with LCI work endurance indices though correlation with aerobic work power at AT is unreliable.

FINGER TAPPING TEST IN ASSESSMENT OF FUNCTIONAL STATE AND INTERPERSONAL INFLUENCES

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Multiple physiological and psychological factors can impact the regulation strategies in interpersonal problems which are topical for sports professionals as well. The idea of a two-way effect is essential in the concept of interaction between two or more subjects performing effect upon one another. The aim of this study was to attempt assess the interpersonal influences by allometric analysis of the Finger Tapping Test (FTT). The FTT, originally developed as part of the Halstead Reitan Battery of neuropsychological tests, is a simple measure of motor speed and motor control and is used in neuro-psychology as a sensitive test and in sport as well. Quantitative analysis of Tapping frequency can distinguish patients with motor dysfunctions of cerebellar, basal ganglia, and cerebral origins from normal subjects. The participants of the study 10 athletes' middle distance runners in pairs underwent five testing procedures by performing FTT alone and together with the task to win the trial. Each finger movement cycle was measured in milliseconds and allometric analysis (relation, which defined by dependence between average and variance) of obtained data was performed. The results obtained during the study showed changes of index of allometric relation towards increase of complexity in cases when the competitor hope to win and complexity decreased in cases when the competitor expected to loose the trial. In conclusion, the Finger Tapping Test offers a useful means

for more detailed assessment of CNS functioning even during the interpersonal influences.

MECHANISMS OF LEG MUSCLES EFFERENTS EXCITABILITY CONTROL

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Most researchers study the peculiarities of the spinal control of excitability of leg muscles in the athletes specializing in cyclic sports requiring endurance. Reflex excitability of the motoneurons *m.rectus femoris*, *m.gastrocnemius* (caput mediale), *m.tibialis anterior*, *m.soleus* was investigated. Bipolar surface electrodes were mounted over 8 leg muscles bilaterally – on the muscle belly. We placed the cathode over the skin between T12-L1 spinous processes and two large anodes bilaterally over the anterior spine of the iliac crest. The thresholds of each of the researched muscles and the maximal MMRs amplitude were registered. It is established, that the first MMRs were registered in these athletes at the strength of the current at the 20.1–26.5 mA range, whereas in the cyclists the thresholds were revealed at the greater stimulating strength. The threshold reflex motor responses of the right leg muscles in the cyclists are comparable with the test results of the corresponding muscles of the ski-racers and are registered at 24.9–26.8 mA strength of the current. The threshold strength of the stimulation for the left leg muscles made 33.5–37.6 mA; the differences of the results of the ski-racers and the corresponding parameters of the right leg are reliable at $p < 0.05$. The analysis of values of the reflex motor response maximal amplitudes, to a certain degree, specifies great reflex excitability of high threshold shin muscle efferents of the researched subjects. It is necessary to note, that the maximal MMRs amplitude bilaterally *m.soleus*, *m.tibialis anterior* and *m.gastrocnemius* is positively higher in the racing cyclists, than in the ski-racers. Besides, it is the cyclists who have big maximal MMRs amplitudes of the left leg *m.tibialis anterior*, *m.gastrocnemius*.

THE INFLUENCE OF REGULAR PHYSICAL ACTIVENESS ON HEALTH AND LIFESTYLE

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The aim of the research – assessment of the influence of regular physical activeness on the students' health and lifestyle. Methods. 657 students of Vilnius Pedagogical University were questioned in 2007 by means of an anonymous questionnaire, 103 of these students worked on physical culture and sports systematically. Obtained data has been processed with statistical package SPSS/PC 8.0. Results. The research showed that those students who worked on physical culture and sports systematically gave higher self-assessment to their health, they had fewer complaints on their health, tried more often to live healthy, eyesight and posture disorders were less frequent among them ($p < 0.001$). Almost all respondents were aware they had to take care of their health themselves, but only 1/2 of the respondents had sufficient knowledge for healthy living. The students' lifestyle was not healthy – 1/3 of the respondents smoked, the same number had been intoxicated with alcohol for many times, about 1/5 had used illegal narcotics. More than a half of the respondents had serious sleep disorders, 1/5 had anxiety disorders, high blood pressure. Conclusions: 1. Systematic physical activeness had a positive influence on health self-assessment and various indicators of physical health; however, no reliable differences were detected when comparing psycho-emotional condition indicators and occurrence of addictions. 2. More attention shall be paid to development of healthy lifestyle during training of future teachers.

EFFECT OF LONG TERM STRENGTH AND POWER TRAINING ON HUMAN SKELETAL MUSCLE

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Human skeletal muscles are composed of a mixture of distinct type of muscle fibres the properties of which vary greatly between individuals. It is well known that suitable fibre type composition is one precondition for effective training. The differences of muscle adaptation depending on muscle fibre composition have been insufficiently examined.

We investigated the effects of long-term strength and power training on myosin heavy chain (MHC) isoform composition in middle-aged men with fast twitch (FT, n=8) or slow twitch (ST, n=9) muscle fibre predominance in m vastus lateralis. Training 3 times a week for 54 weeks improved vertical jumping height only in the FT-group while no changes were found in ST- or control (n=9) groups. Interaction by training group was significant in MHC I and MHC IIb/x isoform proportions and training effect was significant in MHC IIa proportion. In the FT-group MHC IIb/x isoform population decreased and percentage of MHC IIa population increased significantly. In the ST- group only MHC I isoform decreased. We concluded that long-term strength and power training changed the MHC isoform composition of middle-aged men and these changes seem to depend on the initial muscle fibre composition.

PLASMA GHRELIN RESPONSES TO PROLONGED SCULLING IN MALE COMPETITIVE ROWERS

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The aim of the present investigation was to investigate plasma ghrelin responses to a single endurance rowing training session in male competitive single scull rowers. Nine national standard male rowers (20.1±1.5 years, 183.9±4.3 cm, 81.0±5.0 kg, body fat%: 10.8±3.3%) volunteered for this study. The participants completed two 2.5 h trials (exercise or control) on separate days. The exercise trial involved a prolonged rowing training session lasting about 2 h (7373±129 s, distance covered 20.7±1.4 km, heart rate 133±4 bpm, intensity 80.2±1.6% of anaerobic threshold) followed by 30 min rest. The control trial consisted of 2.5 h of rest. Venous blood samples were obtained at 0, 2.0 and 2.5 h. No differences were found between baseline values for measured plasma ghrelin and leptin concentrations at exercise and control trials. Plasma ghrelin concentration was increased (+12.2%; $p<0.05$) and leptin concentration decreased (-20.0%; $p<0.05$) after the first 30 min of recovery at exercise trial. No differences in plasma ghrelin or leptin concentrations over time were observed during control trial. There were no relationships between basal ghrelin concentration and the measured body composition, energy balance, physical performance, or blood biochemical data. Plasma ghrelin ($r=0.75$) concentration measured immediately after the training session was related ($p<0.05$) to the distance covered, but no such relation was observed for post-exercise leptin concentration ($r=-0.16$; $p>0.05$). In conclusion, these results suggest that acute negative energy balance induced by a single prolonged endurance rowing training session elicits a metabolic response with opposite changes in ghrelin concentrations in competitive male rowers.

EFFECT OF PERCUTANEOUS ELECTRICAL STIMULATION OF HUMAN SKELETAL MUSCLES ON NEUROMUSCULAR PERFORMANCE

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This study examined the acute effect of a brief high-frequency submaximal percutaneous electrical stimulation (PES) of the skeletal muscles on neuromuscular performance. We tested the hypothesis that the induction of posttetanic potentiation in skeletal muscles by a conditioning submaximal tetanic contraction evoked by direct PES would increase the concentric power output (PO) and isokinetic peak torque (PT). Two studies were performed. In the first study, the effect of PES of pectoralis and triceps brachii muscles on average and maximal PO attained in bench press throwing was measured in 12 men aged 22–33 years. Three PES regimens were used: (1) a 7-s and (2) a 10-s trial at 100 Hz, and (3) an intermittent trial with eight 1-s tetanic trains at 100 Hz with rest periods of 20 s. The results indicated nonsignificant ($p > 0.05$) increase in average PO at 8 min and in maximal PO at 5, 8 and 11 min after tetanus after 7-s trial, and in maximal PO at 5 and 8 min after tetanus following an intermittent trial. In the second study, the effect of a brief high-frequency submaximal PES of the knee extensor (KE) muscles on isokinetic torque and power production performance was measured in 18 men aged 20–25 years. Maximal voluntary isokinetic and isometric unilateral knee extension force production characteristics were measured using Cybex II isokinetic dynamometer. The subjects performed maximal voluntary concentric isokinetic knee extensions at angular velocities of 60 and 180 deg/s in control (CON) trial (without prior PES application), followed by a PES trial after 30 min rest period. In PES trial, a conditioning submaximal (25% of the maximal voluntary isometric contraction force) isometric tetanic contraction of the KE muscles was induced by a 7-s direct PES at 100 Hz, interspersed after 3 min with testing of voluntary isokinetic performance. The results indicated no significant differences in isokinetic knee extension PT and average PO between PES and CON trial at 60 deg/s. However, a

significantly greater ($p < 0.05$) isokinetic PT (8.9%) and AP (8.2%) were observed in PES trial compared to CON trial at 180 deg/s. Therefore, our first study demonstrated that a conditioning submaximal tetanic contraction of triceps brachii and pectoralis muscles induced by high-frequency PES did not significantly change bench press throw performance. However, a great inter-individual variability was observed in this study. Our second study indicated that the application of submaximal PES prior to maximal voluntary isokinetic knee extensions (kicks) can have a positive effect on performance primarily under the lower torque production conditions associated with the faster velocities, but not the higher torque production conditions at the slower velocities. Interpretation of any performance measurement has to consider the measurement error; this is equally essential in case of isokinetic dynamometry (Dvir 2004). In our study, the increase in muscular output was 9 and 8% for knee extension PT and AP, respectively, at 180 deg/s following submaximal PES. Consequently, this is a borderline enhancement pointing to a tendency rather than a decisive change.

SOCIAL AND SPORT FACTORS MOTIVATING YOUNG TRACK & FIELD ATHLETES FOR TRAINING

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The aim of the research. Analyse preferences and factors motivating 13–17 years old Lithuanian Track & Field Athletes to practise sports and do the comparative pedagogical analysis of all possible variations. The subject-matter of the research. The factors stimulating 13–17 year old Lithuanian athletes to choose and practice training in Track & Field. The research methods: 1. Analysis of literature recourses. 2. Questionnaire survey. 3. Mathematical Statistical Analysis. Conclusion. 1. The major factors stimulating 13–17 year old schoolchildren to choose and practice training in Track & Field were based on their need to socialize with training partners and coach, to travel and gain new experience, skills and knowledge, to strengthen self-confidence.

The preference for the sports discipline was influenced and strengthened by teachers of Physical Education, Coaches of Track & Field as well as parents. The influence of friends and exposure of the recognized Athletes as well as press and TV advertising had a minor impact for the preference. 2. The major factors stimulating 13–17 year old schoolchildren to choose and practice training in Track & Field were as follows: 1) a wish to seek better sport results (83.7%); 2) a wish to become healthy and strong (74.1%); 3) a wish to participate in sports events (73.3%); 4) a wish to become a member of a National Team (62.7%); 5) a wish to become an Olympian (58.3%); 6) a wish to fill in the leisure time with interesting activities (53.7%). All the other stimulating factors comprised of: the interesting training, sincere and friendly relationship with the coach, need to have more friends. The minimal stimulating factors for training are associated with material benefits (18.3%) and wish to become a recognized and honourable person (30.0%).

CHANGES IN PHYSICAL ACTIVITY IN ADOLESCENT GIRLS: A LATENT GROWTH MODELLING APPROACH

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The aim of the present study was to examine the stability of physical activity in adolescent girls and to determine the developmental trajectory of physical activity as well as the influence of BMI and friend support on initial physical activity and changes in physical activity patterns. Participants were 193 urban adolescent girls and their best friends. Physical activity was measured using the 3-Day Physical Activity Recall. Best friend social support was assessed using a questionnaire. Body mass index (BMI) was calculated, based on body height and body mass of the participants. Data was collected on four occasions over a 1.75-year period. The stability coefficients for moderate, vigorous, and total physical activity (METs) were statistically significant and ranged from 0.25 to 0.62. There was a curvilinear decrease in physical activity and a curvilinear increase in

BMI and friend social support across four measurement occasions. Latent growth modelling (LGM) revealed that initially higher level of friend social support was associated with initially higher physical activity, and higher level of BMI was associated with lower levels of physical activity. With the physical activity change factor, there was statistically significant and positive direct effect from friend social support change factor, and statistically significant and negative direct effect from BMI change factor. In conclusion: change in friend social support was positively and change in BMI was inversely associated with the changes in adolescent girls' physical activity.

CAUSAL ORDERING OF PHYSICAL SELF-CONCEPT AND PHYSICAL ACTIVITY PARTICIPATION IN ADOLESCENT GIRLS

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This study examines cross-lagged relationships between physical self-concept, general self-worth, and physical activity participation in adolescent girls over a 24-month period. Participants ($n=231$) completed questionnaires of physical self-concept, general self-worth, and physical activity participation. The results generally support a reciprocal effects model in which prior physical self-concept influences subsequent physical activity participation, and higher levels of prior physical activity leads to higher level of subsequent physical self-concept. The perception of body attractiveness had the strongest effect on physical activity participation two years later. The reciprocal effects model was not supported by relations between perception of strength competence and physical activity participation and perception of general self-worth and physical activity. However, a higher initial level of physical activity led to a higher general self-worth two years later. In conclusion: this study supports the use of reciprocal effects model in gaining an understanding of the causal relationship between physical self-concept and physical activity participation in adolescent girls.

AFFECT AND PERFORMANCE OF AN EXPERT BEACH VOLLEYBALL PLAYER INCORPORATING AN IDIOSYNCRATIC PROBABILISTIC METHOD

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This study tested idiosyncratic probabilistic model in order to determine the Individual Affect-related Performance Zones (IAPZs) of an international-level male beach volleyball player. It was expected that the beach volleyball player who participated in this study would exhibit IAPZs that differ among his matches, which is in line with idiosyncratic approach of linking emotions and athletic performance. IAPZs of the international-level beach volleyball player are defined for the attack and serve performance using the probabilistic method. IAPZs are defined as the range of affective intensity within which an individual has the highest probability of performing at a specific performance level (e.g. poorly, moderately, or optimally). The findings of the present study illustrate the player's unique IAPZs and affective state fluctuations among the IAPZs during competitions. The player's optimal IAPZ for arousal and pleasure dimensions in performing the volleyball attack were higher than in performing a serve. In conclusion: the idiosyncratic probabilistic method can be applied for describing affective states and arousal levels associated with execution of different technical elements in an open motor skill. IAPZs can be applied to individual athletes for designing psychological interventions with the goal of stabilizing the athletes' affective responses in a desirable fashion.

THE EFFECT OF UNLOADING AND RELOADING ON THE EXTRACELLULAR MATRIX IN SKELETAL MUSCLE: CHANGES IN MUSCLE STRENGTH AND MOTOR ACTIVITY

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The aim of the study was to examine the effect of three-week unloading and following two-week reloading on the synthesis of collagen I and III and changes in muscle mass and strength and motor activity. The rats were assigned to control, hindlimb-suspended for 1 and 3 weeks and hindlimb reloading group for 1 and 2 weeks. After the experimental procedures, the animals were weighed, anesthetized and sacrificed. The muscles were removed, weighed and stored until further processing. The expression of collagen I and III mRNA was used to assess the synthesis of collagen. The force and hindlimb grip strength were measured with Grip Strength Meter and motor activity by the screening of movements by Opto-Varimex-Mini. During the unloading period the body mass did not increase as fast as in control group. Muscle mass decreased during suspension period 36% ($p > 0.05$) in m soleus and 17 % ($p > 0.05$) in m gastrocnemius. Motor activity decreased significantly during 3 weeks of suspension and did not recover totally even after one week of reloading. Muscle strength decreased gradually during the unloading period and stayed on the same level in 1 week of reloading. The expression of collagen I and III mRNA decreased after the unloading and recovered during reloading period. We conclude that the disuse period causes impairment both in motor function and extracellular matrix of the skeletal muscle.

STUDENTS' ATTITUDE TOWARDS PHYSICAL EDUCATION LESSONS, THEIR ATTENDANCE, AND HEALTH INDICATORS

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The aims of the research were to evaluate the correlation between the student's attitude towards physical education (PE) classes, PE classes' attendance and separate parameters characterizing students' health. Research methods: students' inquiry, anthropometry, analysis of missed PE classes. To evaluate the BMI Cole et al (2000, 2007) growth references were used. Results. The students' attitude towards sports is generally positive if they have good relationships with their classmates and interesting sports lessons or an interesting teacher. The emotionally positive evaluation of sports lessons by students creates a negative dynamics decreasing from 67.7% in grade 5 to 46.4% in grade 7 and 37.8% in grade 9. There is a medium close correlation between the health self-assessment "very good" and the number of the missed classes (Spearman rank coefficient $-0,628$). Statistically significant correlation is between the missed PE classes and complaints about disturbances concerning physical and mental health- headache, nervousness, regular fatigue, unwillingness to do something. Conclusions. The attendance of sports classes correlates with the health self-assessment and subjective complaints. It is necessary to improve the quality of sports lessons by listening to the pupils' suggestions and taking into account the psycho-emotional processes characteristic for the age in order to create a positive students' attitude towards them.

TWO MONTHS LASTING JUMP TRAININGS INFLUENCE TO GIRLS SPRINGS RESULTS

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This study is about the improvement of junior school age girls' spring by training it for two months. The aim of the research was to test the dynamics of the spring improvement. Seventeen 10 years old schoolgirls (attending the fourth form) have taken part in the research exercising their jumps 8 weeks 2 times a week. During the exercises after the not intensive 10 minutes warming-up schoolgirls used to make 50 jumps every 30 seconds. It was recommended to jump as high, as possible. Height and duration of the jumps were measured by using contact platform, which was connected to the electronic meter. Results of each schoolgirls' jumps were recorded into the personal jumps-protocols. Afterwards, all the results were processed using methods of mathematical statistic. It was found, what exercises have influenced (improved) schoolgirls' jumps considerably. Besides, this improvement was gradual and observable since the seventh training. On the other hand, exercises have raised the dispersal of schoolgirls' results in jumping. So, the conclusion is that exercises may influence the results; however large amount of important influencing factors makes it impossible to predict the level of this improvement.

THE QUALITY OF DEVELOPING LASE (LATVIAN ACADEMY OF SPORT EDUCATION) STUDENTS AND GRADUATES' SPORT ENGLISH COMPETENCE

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Aim: Aim of the article is to outline main problems connected with developing sports specialists' competence in Sports English. **Methods:** We have questioned 48 students who have finished their course in Sports English about the quality of the course and 39 graduates about

the quality of their Sports English. The questionnaire consisted of 12 questions, free answers were coded. Wilcoxon test was used for determining differences between 4 language skills required in labor market and developed in HEI (higher education institution). Results: Although the students answer that the quality of Sports English study course is high, the graduates consider it being average, not fully corresponding to the demands of labor market. Statistical analysis confirms that in general the development of language skills in HEI corresponds to the needs of labor market. Still higher level sport specialists, e.g., sport managers need higher level language competence, which present course of Sport English at LASE cannot provide. Conclusions: The investigation reveals different level sport specialists' Sport language needs in labor market and the level of their development in LASE, which are not statistically different. The estimation of the quality of Sport English study course by year 1 students and graduates is different, which can be the result of different scales used in estimation, as well as it may result from the fact that the quality of Sport English study course really increases, or that graduates see better that the course does not fully meet the demands of labor market.

OPTIMIZATION OF TRAINING 11–12 YEAR OLD ATHLETES IN RHYTHMIC GYMNASTICS

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The aim of this work was to establish the preconditions of training optimization of 11–12 years old athletes in rhythmic gymnastics. Methods. During macrocycle was recorded the structure of the content of 5 the different training programs, as well as athletes' sports performance (technical, athletic, mental fitness) and anthropometric features. Results: Athletes in different training programs trained diversely – significant differences ($p < 0.001$) occurred in the indices of training loads (from 8.3 to 14.7 hours a week), days of training (from 207 to 295 days a year) and training content. Statistically significant differed ($p < 0.05$) the indices of athletic fitness. Conclusion: Effective sports performance of 11–12 years old athletes in rhythmic

gymnastics was greatly affected by all indices of technical fitness ($r=0.723\div 0.883$), integral index of athletic fitness ($r=0.881$), explosive strength ($r=0.739$), and endurance ($r=0.700$). Significant changes of results could be explained not only by the changes in choreographic training, but also in the components of specific training, especially the time for mastering competitive routines ($r=0.717$) and optimal training loads (11.5 ± 2.8 hours per week). The impact of body compositions indices, compared to other factors, was not great ($r=0.478\div 0.557$) on the sports performance of athletes at this age.

PHYSICAL EDUCATION, SPORTS IN LITHUANIA IN 1920–1940 AND V. PETRONIS

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The XXth century, the most destructive century in the history of humanity, ended. The topicality of history has been more controversial than ever. Lithuanian history teaches that pragmatism and idealism can be harmonized. This can be illustrated by the practical, academic and research activities of Vincas Petronis (1897–1981), one of the most significant persons in physical education and sports, and his initiative to make and implement decisions understanding the meaning of the times, ability to harmonize personal and social needs and the forms of their expression in the life of the community and the state. Referring to the archives of the Lithuanian State, Kaunas district and family, periodicals, V. Petronis can be called the participant of the restoration of the European physical education and sports system: his work expressed in figures in time and space of Lithuanian physical education is the heritage – lessons, experience, results, etc. Thus, the past forms the present. V. Petronis and the intelligentsia of his times had an ambition the wording of which sounds as follows: educating all the young people as cultured, respectful young generation, and physical education and sports has always been the means of maintaining and improving health.

A CORRELATION AND COMPARATIVE ANALYSIS OF THE PHYSICAL AND FUNCTIONAL ABILITIES OF LITHUANIAN SKIERS AND BIATHLETES

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The indices of skiers' and biathletes' bodily performance and functional abilities may correlate with physical development indices. Analysis of an interrelation between these indices highlights the features that are highly significant in skiers and biathletes striving for high results. The aim of the work was to investigate the characteristics of physical development, physical abilities and certain functions of Lithuanian skiers and biathletes, to perform their comparative analysis and to elucidate their interrelation. Methods. The basic indices of physical development were determined, physical capacity was assessed according to the absolute and relative single muscular contraction power, anaerobic lactic power, anaerobic glycolytic and aerobic capacity. Mathematical statistics methods' were applied for data processing. Results. A close correlation was found among the athletes' total body mass, muscular mass and muscular power under physical loads of different duration. Muscular mass showed a reliable direct correlation with absolute SMCP ($r=0.70$) and AAMP ($r=0.64$). Our data revealed also a close correlation between SMCP and AAMP ($r=0.70$) and a very close relation of AAMP to 10-s working capacity ($r=0.85$). There was a strong correlation between $VO_2\text{max}$ and VO_2 at the anaerobic threshold limit ($r=0.74$). The summarized data revealed that the physical and functional capacity indices of Lithuanian skiers and biathletes were mostly of the medium level as compared with the respective indices of their top-class counterparts.

THE RELATIONSHIPS BETWEEN THE SWIMMING VELOCITY AND SELECTED TECHNICAL PARAMETERS OF NATIONAL LEVEL BREASTSTROKE SWIMMERS

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The aim of this study was to determine relationships between swimming velocity and selected technical parameters of breaststroke swimmers. Three Lithuanian male and one female well-trained swimmers were simulated the 50 and 100m paces swims starting in the water in a 25-m pool. All swimmers filmed from side view underwater with one video camera moving parallel to the swimmer on a tracking system and one panning video camera above water. Moments defining begin-end phases were determined from video analysis using a 50 Hz video player of SIMI Motion 2D software. In addition, four body landmarks: pelvis, hip, knee and ankle were digitized. Dropped scale lines suspended from the lane cable were used for calibration. The breaststroke cycle was divided into five arm and leg phases. The duration of each phase was expressed as a proportion of the whole stroke cycle. Three measures of the arm-leg coordination were calculated. The intra-cycle pelvis velocity and displacement, hip and knee angles of the swimmers were obtain by video analysis. An index of velocity fluctuations, distance covered during each stroke phase and an acceleration-deceleration time ratio were computed. Average swimming velocity was calculated from the video recording over a 10-m distance. Stepwise multiple regression analyses were performed to determine the relationships between average velocity of swimming and the breaststroke technical parameters for each swimmer separately.

SPORTS PREPARATION OF WOMEN AND ITS MEDICAL-BIOLOGICAL BASIS

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Introduction. World community is highly interested in growth of participation of women in the Olympic movement. An adaptive processes in the sportsman's organism is known to lay on the basis of achievement of high sports results and their growth. Adaptation implications in sports are diverse. It is necessary to face adaptation to exercise stresses of a various orientation, coordination complexity, intensity and duration in training. Materials and methods. Female athletes of high qualification have being investigated for more than 20 years (physiological, biochemical, psychological, pedagogical tests). This complex research is directed to studying the interrelation of specific biological feature of a female organism – the recurrence of functions of system of their organism in connection with change of concentration of sexual hormones during a menstrual cycle (MC) and their working capacity. Results. Cyclic changes of the general and special working capacity, the psychological status of female athletes in different MC phases are established and proved. These data scientifically prove specificity of sports preparation of women, proving a role of female sexual hormones in adaptive-trophic reactions of a female organism to training and competitive loads. For female athletes the morph-functional reorganization of an organism during the adaptation to long-term heavy physical and psychological loads makes specific changes in function of systems of their organism, including reproductive one, both in their active sports career, and after its end. Probably therefore among the women who are engaged in professional sports, with the big frequency, than in population, there are implications of reproductive disorders – a puberty delay, sterility, noncarrying of pregnancy, hyperhadrogenia. Conclusions. The principle of “equality” of men and women in the course of sports preparation, unfortunately, does not consider functional capacities of female athletes in dynamics of MC, specificity of their adaptation to the heavy physical and mental loads that also can cause a sports traumatism, disturbance of health of female athletes.

INTENSIFICATION OF A TRAINING PROCESS OF GYMNASTS AT THE STAGE OF SPORT SPECIALIZATION AS THE FACTOR OF THE FUTURE SKILL

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Aim. The stage of sport specialization is a significant phase of the athletes mastery. Its further development, in many respects, will depend on effectiveness of the stage. The training process at the sport specialization stage is supposed to be more productive if the selection of means and methods of the gymnasts training is based on the analysed results of kinematic parameters and peculiarities of the muscle bioelectric activity, registered during performance of gymnastic exercises. **Methods.** The gymnasts were mastering the main exercises of the specialization training stage in combined events (handspring and back flip in acrobatics, giant circles on a horizontal bar, handspring vault, etc.). The quality of the main exercises performance was assessed by comparison of the characteristics, registered in the process of biomechanical researches, of the gymnasts participating in the investigation and those of high qualification. To reveal the extent and sequence of various muscle groups, performing the main exercises, to join in the work, a method of surface electromyography was used. **Results.** In the process of the tests a support programme of physical fitness training was worked out. The gymnasts level of the physical fitness after the investigation increased in average by over 30%. The number of successful attempts of handstand exercises (4 tests) increased after the test in average by 2.8 times; the increase of push-off exercises (2 tests) made 2.45 times, a take-off exercise (1 test) made 1 time increase. **Conclusions.** Good basic skills (handstand, dynamic posture and push-off) made the most contribution into the quality of the performance of the main exercises mastered during the investigation. The score for the performance of the main exercises increased in average by over 0.9 points.

INFLUENCE OF AGE, HEIGHT, WEIGHT, AND EXPERIENCE TO SPORT PERFORMANCE IN MODERN MENS' HANDBALL

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Introduction. The aim of research was to determine peculiarities of interaction between the indices of anthropometric (height, body mass), experience, age and possibility to win in the World (2005, 2007) and European (2006, 2008) championships. Methods. The indices of age, height and body mass, and the international matches played from official statistics documents (International Handball Federation, European Handball Federation) World (2005, n=369; 2007, n=270) and European (2006, n=378; 2008, n=233) mens' Championships (n=1521) were analysed. The data were analysed by means of the variance (ANOVA) method. The value of $p < 0.05$ was accepted as significant. Spearman correlation method was used for assessing influence of mentioned indices to win. Results. Athletes of European championships were higher ($p < 0.05$) by 1 cm in height, by 3 kg greater ($p < 0.05$) in body mass, by 1 year more older ($p < 0.05$) but had the same experience as athletes of World championships. Conclusions. Opposite to previous findings that handball players of greater height and body mass have better possibilities of winning the match where were not found such a tendency in modern mens' handball. Further research need in order to find out interaction between mentioned indices and sport performance.

LEG IMMERSION IN WARM WATER BEFORE STRETCH-SHORTENING EXERCISE REDUCES EXERCISE-INDUCED MUSCLE DAMAGE

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Aim. To determine the effect of leg immersion in warm water before stretch-shortening exercise on the time-course of indirect markers of exercise-induced muscle damage. **Methods.** Healthy untrained men (n=11) (mean \pm SD: age 21.5 ± 1.7 years, body mass 74.2 ± 4.7 kg, height 179.7 ± 3.5 cm) took part in this study. The same subjects performed intermittent 100 drop jumps from a platform 0.5 m high immediately followed by maximal jump vertically in two conditions: first – without muscle warming, the control (C condition) and the second – with muscle warming (W condition) before exercising. The subject's legs were immersed into a bath filled with water at $44 \pm 1^\circ\text{C}$ for 45 min in W condition. **Results.** Leg immersion in warm water decreased creatine kinase activity and muscle soreness as well as enhanced maximal voluntary contraction force and jump height recovery. Muscle warming did not bring about any changes in the dynamics of low frequency fatigue registered at both short and long muscle length within 72 h after stretch-shortening exercise. **Conclusion.** Leg immersion in warm water before stretch-shortening exercise reduce most of the indirect markers of exercise-induced muscle damage.

MECHANISMS OF ONTOGENETIC DEVELOPMENT OF MUSCLE PERFORMANCE

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Ontogenetic model opens unique opportunities for studying the mechanisms underlying development of human physical abilities. Results of 30-years research have allowed to generate representation

about the general mechanisms of age evolution of muscular working capacity from birth to achievement of a biological maturity. Hystochemical methods reveal the major stages of differentiations in human skeletal muscles: 1. Miotube formation (2–3 month of antenatal period (a.p.)); 2. Preformation of motor units (5–6 months a.p.); 3. Differentiation of primary fibres (7–8 months a.p.); 4. Differentiation of II type fibres (4–6 years); 5. Prepubertal redifferentiation (6–11 years); 6. First pubertal (hypophysial) redifferentiation (12–15 years); 7. Second pubertal (testicular) redifferentiation (16–18 years). The age increase in working capacity from 7 till 17 years is shown in significant (3x–5-times) increase in anaerobic power, in violent (5–10-times) increase of capacity of energetic systems, and also in increase of resistance to exhaustion at muscular work. Such increase in working capacity is defined by tissue differentiations, maturation of anaerobic energy supply mechanisms, perfection of mechanisms of regulation of vegetative functions and increase of efficiency of physiological reactions. Individual rates of development define specificity of functionalities at each stage of ontogenesis. Efficiency of training process essentially depends on a degree of our understanding of specific individual features, and also from the account of specificity of an ontogenetic stage on which there is a training influence.

MORPHOLOGICAL AND METABOLICAL CONSEQUENCES OF HABITUAL PHYSICAL ACTIVITY AMONG ELDERLY MEN

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The aim of the study was to assess the relations between habitual physical activity (HPA) and morphological and metabolical factors of health-related fitness among men over 60 years of age. The participants of the study were 137 men (60–88 years, average = 72.6 ± 5.8) living in Poznan (Poland). HPA was measured by “Caltrac” accelerometer and expressed as a value of weekly energy expenditure related to physical activity (PA-EE). The value of PA-EE calculated per kg of weight (PA-EE/kg) was also used. Several somatic characteristics

were established. Metabolical factors were marked in blood plasma. Direct relations (irrespective of age) of a higher level of PA-EE/kg with a more beneficial distribution of fat tissue were found. Lower values of waist circumference ($r=-0.29$; $p<0.01$) and WHR ($r=-0.31$; $p<0.001$) were related with higher level of HPA. The remaining results of the study do not indicate a significant direct role of HPA in optimalization of body weight or improvement of body composition. Also the concentration of metabolical factors in blood plasma directly does not co-occur significantly with the level of HPA. In conclusion, the significant role of HPA in more beneficial distribution of fat tissue was proved. These observations indicate that we should appreciate the significance of HPA for the health of elderly men. It was also showed the necessity of using the relative value of HPA, when expressed by energy expenditure, it must be calculated per kg of weight.

PECULIARITIES OF MUSCULAR FITNESS OF WOMEN'S OF HEALTH AEROBICS

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Aerobics is a form of exercise that comprises rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness. Comprising a number of different dance-like exercises a lot of plyometric muscular contractions during the training session are performed. The purpose of this study was to assess the peculiarities of muscular fitness of women's taking part in health aerobics. Three women's cohorts (12 participants of non-sportsmen, 10 participants of track and field athletes and 12 aerobics) underwent the testing procedure by use of various vertical jumps from the force plate, i.e. a vertical jump; static jump; various drop jumps and 30s vertical jumping test. Height of jumps, contact time during the push-off (ms), relative muscular power (W/kg) and sum of height of jumps was registered. Assessment of results obtained during the study was performed by normalization of obtained values in comparison to the height of vertical jump. The results obtained during the study showed that adaptation to regular aerobics are in jump performance gains. The cohort of track and field athletes demonstrated greatest

results in vertical jump and 30s vertical jump tests. The aerobics cohort differ from non-sportsmen's by greater muscular power and shorter time of muscular contraction during the drop jumps while the difference between the heights of these jumps are smaller and there was no significant differences in muscular elasticity assessed by the ratio of the height of static and vertical jumps. In conclusion, jump performance gains under regular aerobics training and plyometric training as well could be attributed to changes in the new properties of muscle-tendon complex, rather than to the muscle activation.

IS WOMEN' SPRINTERS START REACTION TIME SLOWER THAN MEN SPRINTERS'?

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The purpose of the investigation was to determine if the women sprinters are slower in the start reaction times than men swimmers. Organization of investigation. The investigation was provided after 2008 European swimming championships. We analyzed reaction times of the women who took part at the competition. All participants of these swimming distances and styles were divided in to several groups depending on swimming style. The averages, σ , correlation coefficients, were calculates in all investigation groups. We used T tests for calculating differences among groups' data. Male and female start reaction times averages were compared between the groups. Received data. Received data shows that there were significant differences in start reaction times depending on swimming style in preliminaries 2008 European swimming championships heats. The slowest start reaction times were for women who competed in butterfly. There were no significant differences between women swimming freestyle and breaststroke ($p=0,37$). There were no significant differences in start reaction times among women swimming in finals depending on swimming styles. There were significant differences in start reaction times between men and women sprinters at 2008 European swimming championships. Conclusion. The 2008 European swimming championships sprinters men had significant faster start reaction time (0.78 ± 0.06 s.) than women (0.80 ± 0.06 s.) ($p=0.006$).

INVESTIGATING START REACTIONS TIMES OF SPURTERS' AT THE 2008 EUROPEAN SWIMMING CHAMPIONSHIPS

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The objective was to determine if the swimmers' start reaction times participating in the 50 m free style, butterfly and breast stroke differ depending on the swim style and finish placement. Research methods: document analysis, literature review and summary of the 2008 European Swim Championship. Organization of investigation. The investigation was provided after 2008 European swimming championships when the distances 50 m freestyles, butterfly and breast-stroke HAD ENDED. We analyzed reaction times of the swimmers who took part at the competition in 50 m freestyle, butterfly, breast-stroke. The averages, σ , correlation coefficients, were calculates in all investigation groups. We used T tests for calculating differences among groups' data. In addition to all swimmers were divided in to groups depending of their places in the competition. We were calculating the differences between data of the groups. Received data. Received data shows that there were no significant differences in start reaction times for male depending on swimming style. There were no differences among the swimmers reaction times who took the first 3 places. Conclusion. There were no significant differences in the start reaction times of the sprinters at 2008 European swimming championships regardless of swimming styles and their taken places. This is possible to determine that start reaction time could be AN indicator for determining possibilities of sprinters features for athletes.

ATTITUDES OF PUPILS PARTICIPATING AND NOT PARTICIPATING IN SPORTS TOWARDS THE RULES OF THEIR BEHAVIOR AT SCHOOL AND THEIR RESPONSIBILITIES

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The study deals with the problem question if there is a difference in the attitudes of pupils participating and not participating in sports towards the rules of behavior and their responsibilities. Thus, the aim of the present research was to reveal the attitudes of pupils engaged and not engaged in sports towards the rules regulating their behavior at school and their responsibilities. In this study we raised the hypothesis that there would be no differences in the studied qualities between the two groups of research participants. In order to verify this hypothesis, the independent random sample of the research represented the population of pupils of various ages (sixth – eleventh grades) was formed. It consisted of 1382 pupils (382 actively participating in sports and 986 not participating in sports). Pupils' participation in sports and attitudes towards the rules of their behavior at school and their responsibilities were established using a questionnaire. The questionnaire survey confirmed our hypothesis, i.e. there were no statistically significant differences between the two groups of research participants. Although pupil-athletes better knew the rules of their behavior, they evaluated them similarly to the pupils who do not participate in sport. We observed a tendency that pupil-athletes had more difficulties in describing their responsibilities as schoolchildren. No statistically significant differences were established comparing the data of boys and girls separately. We only noticed a tendency that girls athletes compared to other girls emphasized the fairness of the rules more. Such tendency was not established between the boys.

CONTRACTILE PROPERTIES OF QUADRICEPS FEMORIS MUSCLE IN CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY

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The majority of studies assessing neuromuscular function in children with spastic CP have indicated lowered isometric maximal voluntary contraction (MVC) force or isokinetic peak torque of different muscle groups. Motor disabilities in CP are caused not only by primary impairment but also by secondary deterioration in muscle contractile properties resulting from muscle fiber atrophy, whereas this appear to be more selective in type II (fast-twitch) muscle fibers. Understanding the contractile properties in children with CP may have clinical significance for designing methods of neuromuscular electrical stimulation. The purpose of this study was to compare contractile characteristics of the quadriceps femoris (QF) muscle in children with cerebral palsy (CP) and age- and gender-matched healthy children as controls. Ten children with mild-to-moderate spastic diplegic CP (5 girls and 5 boys) and 10 healthy children (also 5 girls and 5 boys) aged 10–12 years participated in this study. Isometric MVC force and rate of isometric force development (RFD) during MVC of QF muscle was measured using custom-made dynamometer. Voluntary activation (VA) of QF muscle was assessed by twitch interpolated technique. Half-relaxation time (HRT) of submaximal tetanic contraction of QF muscle was measured in combination with dynamometric and electrical stimulation techniques. Submaximal tetanic contraction (25% MVC) with 1-s duration was induced by percutaneous electrical stimulation with 1-ms impulses at 50 Hz. The results indicated that in children with CP, the MVC force and RFD during MVC of QF muscle were significantly ($p < 0.05$) lower (38 and 48%, and 66 and 73% for right and left leg, respectively) than in healthy controls. VA for left leg was lower ($p < 0.05$) in children with CP (25%) compared to controls. In children with CP, HRT of submaximal tetanic contraction was significantly ($p < 0.05$) prolonged (375 and 388% for right and left leg, respectively) compared to healthy children. It has been concluded that children with spastic diplegic CP aged 10–12 years had significantly lowered voluntary isometric force-generation capacity

and voluntary activation of QF muscle, and prolonged time-course of muscle relaxation in electrically evoked tetanic contraction compared to age- and gender matched healthy children.

ENDURANCE TRAINING AND ATHLETES' HORMONAL STATUS

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The aim of the present study was to assess the response of endocrine system to incremental test exercise (ITE) in two Estonian top triathletes (TA1 and TA2). The athletes were systematically studied in different stages of their year-round training cycle during 3 consecutive years using a complex of physiological (VO_2max measurement on treadmill) and biochemical (measurement of the blood levels of 9 hormones) methods. The lowest level of VO_2max ($\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$) was observed in December of the 1st year (Dec1) and the highest level in May of the 3rd year (May 3) in both subjects (75.8 and 92.3 in TA1; 73.1 and 84.9 in TA2, respectively). The concentrations of ACTH, cortisol and thyroxine increased during ITE in Dec 1 and in May 3 in TA1 by 121.0 and 54.8 $\text{pg}\cdot\text{ml}^{-1}$; 119.3 and 85.9 $\text{nmol}\cdot\text{l}^{-1}$; 19.4 and 3.4 $\text{nmol}\cdot\text{l}^{-1}$, respectively. Corresponding values in TA2 were 133.5 and 82.3 $\text{pg}\cdot\text{ml}^{-1}$; 124.4 and 88.0 $\text{nmol}\cdot\text{l}^{-1}$; 11.1 and 0.5 $\text{nmol}\cdot\text{l}^{-1}$. The level of insulin tended to decrease during ITE in Dec 1 (by 0.2 and 4.8 $\text{mU}\cdot\text{l}^{-1}$, in TA1 and TA2, respectively) whereas a small increase was observed in May 3 (by 4.3 and 1.9 $\text{mU}\cdot\text{l}^{-1}$, in TA1 and TA2, respectively). The changes of the levels of growth hormone, testosterone, prolactin, thyroid gland stimulating hormone and luteinizing hormone during ITE did not reveal any regular pattern throughout the study period. These data indicate that the peak functional capacity in top level triathletes coincides with a decreased response of anterior pituitary, adrenal cortex and thyroid gland to ITE.

GLUTATHIONE REDOX STATUS IN ENDURANCE-TRAINED MEN FOLLOWING INTENSIVE PHYSICAL LOAD

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Intensive exercise is related to increased generation of reactive oxygen species, which results in oxidative stress (OxS). The principal cellular non-enzymic antioxidant system is the glutathione system. The purpose of this study was to evaluate the changes in glutathione redox ratio (GSSG/GSH) in blood following intensive physical load, and examine whether vitamin C and protein consumption is associated with the concentration of glutathione in blood and erythrocytes following physical load and during the recovery period. The study subjects included 16 male subjects who participated in ski marathon (42 km) (Study I) and 18 male subjects who participated in 21-km run (Study II). Study I showed that physical load slightly increased the GSSG/GSH in total blood, while GSSG/GSH significantly decreased in erythrocytes. Study II revealed that the GSSG/GSH ratio in whole blood did not change remarkably during post-COMP and during RECOV as compared to pre-COMP level, while GSSG/GSH in erythrocytes significantly increased during post-COMP. Consumption of vitamin C up to 1000mg/daily was related to higher levels of serum vitamin C during physical load. Protein consumption (more than 1.5g/kg/daily) was associated with the higher level of reduced glutathione in erythrocytes in pre-COMP and in the recovery period. In conclusion, exercise-induced changes in the glutathione system did not exceed the respective threshold value and may vary according to different physical load.

MUSCLE VISCOELASTICITY IN PARTIAL WATER IMMERSION MODEL

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Aims: Borelli has stated that muscular tensions are inevitably involved in holding posture. Diminishing of the antigravity support function in water heightens human longitudinal measure up to 3–4 cm, summated from multilevel inter-vertebral discs upraising. Besides the cross-bridge kinetics also a calcium-dependent increase in titin based third filament stiffness acts in muscle contraction. Related to water sports and rehabilitation exercises in pool it is useful to investigate intact muscle tone and visco-elastic (stiffness and elasticity) properties in water immersion (WI). In this study, the aim was to use the tibialis anterior muscle (TA) as a representative of the musculoskeletal support system to determine the effect of partial water immersion (PWI) microgravity simulation on muscular tone and visco-elastic properties. We also aimed at clarifying whether this PWI effect could be subjectively perceivable by participants. Methods: 15 healthy females participated in this two-stage study. 1) Myometric measurements of the tibialis anterior muscle on both sides of the body were recorded. At first this was done while the participants were in relaxed supine position in a special water immersion ergo-tub device without water. Next, measurements were recorded in the same standardized position but the tube was filled with thermo-neutral water up to occiput and tube bottom contact level. 2) Questionnaire was used to clarify whether and how subjects can perceive difference in gravitational loading in the same supine position with and without surrounding partial water immersion. Results: The data were combined over the whole group; means of myometric parameters were compared using Student's t-test with equal/unequal variances. The equality of variances was assessed by the Levene test. The box-plot method was used because it can combine a display of all the data together with a statistical summary and the concise graphs are easily interpreted. Statistics were performed using SAS (<http://v8doc.sas.com/sashtml/>) and R (<http://www.r-project.org>).

TA muscle stiffness and tone decreased significantly ($p < 0.05$), no difference was in elasticity. Conclusions: Decrease of tibialis anterior

muscle tone and stiffness in PWI show that this so called non-postural muscle is also involved in antigravity support function. It seems that immediate variation sensing of gravitational force, specific for our PWI model, might be related to prompt changes in muscular tone and visco-elasticity. Better understanding of muscle visco-elastic response to WI gives the possibility to develop different water-sport and leisure activities and preventive and recovering interventions and will enhance patients' motivation for water exercising.

THE RELATIONSHIP AMONG PHYSICAL DEVELOPMENT, PHYSICAL READINESS AND PUBERTY LEVELS OF DIFFERENT AGE GIRLS

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Aim: to distinguish the relationships between different age girls' physical development and readiness levels and their puberty levels. **Methods:** Research involved 145 girls aged 12 to 17 and belonging to the main health group. Physical preparedness and physical development were investigated. Tests of 60 m and 300 m running were performed. **Results:** 60 m and 300 m running results of girls belonging to puberty stage 2 decreased considerably in comparison with the results of 1st and 3rd stage girls. Acceleration has impacted not only bodily dimensions and puberty, but also physical features. An analysis of physical readiness level data indicates increasing power-endurance results from stage 1 to stage 2 and decreased results among puberty stage 3 girls. Girl body mass results increase simultaneously with their puberty stages. The distribution of puberty stages among the girls having participated in our research was as follows: 3% of them belonged to the zero stage, 10% – to stage 1, 15% – to stage 2, and 73% – to stage 3. **Conclusion:** The analysis of the obtained physical readiness results based on puberty stages indicates that power-endurance results increase from stage 1 to stage 2; meanwhile, they decrease among girls belonging to the third puberty stage. It has been determined that more biologically mature girls are able to perform longer jobs requiring strength and velocity. But their

organisms become exhausted and they get tired sooner when they perform works requiring endurance.

PHYSICAL ABILITY AND AUTONOMIC CONTROL OF HEART RHYTHM DEPENDENCE ON THE TEENAGERS GIRLS' PHYSICAL DEVELOPMENT LEVEL

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Aim: to analyse and to estimate puberty level of the same – age (13–14 years old) girls' as well as its impact on physical development level and autonomic control of heart rhythm. Methods: The experiment involved 40 adolescent girls aged 13–14 and selected according to puberty phases. We recorded two parameters of physical development – the height (in cm) and body mass (in kg). To estimate heart rhythm characteristics, we used the rhythmography methods related to determination of rhythm frequency (RF), rhythm dispersion (RD) and absolute values of very low frequency (VLFC), low frequency (LFC) and high frequency components (HFC) in the heart rhythm spectre as well as percentile values (NVLFC, NLFC, NHFC) of the same components in the lying position at rest. Results and conclusions: Girls belonging to the slow puberty phases, when compared to those of fast and normal puberty phases, have more prominent autonomic control of the rhythm of the heart, which predetermines the lowest heart rhythm frequencies and the greatest dispersion of it while at rest and the most prominent heart rhythm reaction during functional orthostatic tests as well as the highest parameters of the functional Ruffier test. Such a situation reflects a higher level of functional heart capacities in the group of slow puberty.

NUTRITION PECULIARITY OF LITHUANIAN AND PORTUGUESE STUDENTS

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Aim of research: evaluate and compare nutrition peculiarity of lithuanian and portuguese, health education, students. Methods. There were two groups of investigatives: students of health education, physical activity and health from Lithuanian Academy of Physical Education (n=71) and students of health specialities from Universidade de Tras-os Montes e Alto Douro (Portugal) (n=59). In research were used these methods: questionnaire, food registration and analysis of food composition, anthropometric measurements and mathematical statistics. Results. Analysis showed, that nutrition of lithuanian and portuguese students doesn't match to recommendations of WHO. Students don't eat regularly. Factors that influence food selection of different nationality students were meaningly different ($p<0.05$). Energetic proportions of daily food components weren't meaningly different. Students amount of proteins in ration did conform to WHO recommendations but portuguese students get to less carbohydrates and both nationalities students use too much fat. BMI of portuguese students was lower than lithuanian, amount of daily obtained calories was higher. The prevalence of smoking is bigger among portuguese students. Conclusions. Energy proportions of lithuanian students: from proteins – 14%, from fats – 36%, from carbohydrates – 50%. Energy proportions of portuguese students: from proteins – 15%, from fats – 36%, from carbohydrates – 49%. The nutrition of lithuanian and portuguese students doesn't satisfy the recommendations of WHO.

WOMEN PHYSICAL FITNESS IN THE CONTEXT OF PHYSICAL ACTIVITY AND AGE

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The aim of the study was to determine the physical fitness of the middle-aged physically active and young sedentary females. Methods. Physical activity of the subjects was assessed using International Physical Activity Questionnaire (2003). Test battery of health-related fitness (UKK health-related fitness test battery, 1994; Eurofit physical fitness tests for adults, 2003) were used to evaluate physical fitness of the subjects. The sample of the study consisted of 30 young (20–29 years age) and 30 middle-aged (30–59 years age) women. The research was carried out in Kaunas, March – April 2005. Statistical significance was tested using χ^2 criterion, the Fisher test and the dispersion analysis. Results and conclusions. The results of the study revealed that the level of physical activity of the middle-aged females is higher than that of the young sedentary. Health-related fitness in the middle-aged physically active females is of higher level than in young sedentary females.

INTENSITY, FREQUENCY AND DURATION OF DAILY PHYSICAL ACTIVITY OF 9–11TH GRADES' STUDENTS

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Aim. To establish intensity, frequency and duration of physical activity (PA) of the 9–11th grades' Lithuanian schoolchildren. Methods. The research was carried out in April 2005 in five Lithuanian cities. The sample size in the gender and age groups of 16–18 year old students was calculated according to the data of Lithuanian population census of 2001. The sample for the analysis of PA consisted of 678 students. Their PA was established using the international physical activity questionnaire (IPAQ short form, Ainsworth et al., 2000).

Statistical description: frequencies and percent of nominal and rank categories of variables, means of quantitative variables, standard deviations and medians. Statistical criteria were used: t-criterion, the criterion of chi-squares and disperse analysis. The level of statistical significance for verification of statistical hypotheses was set at 0.01. Data analyses were conducted using SPSS and Excel programs. Results. The frequency and duration of boys' PA is higher than the girls. The frequency and duration of vigorous PA of girls and boys of upper grades is higher than that of the lower grades and there are no differences between the grades as far as moderate level of PA is concerned. There is no difference between boys and girls as to the duration of time spent in sedentary occupation. Usually it takes 8–9 hours per day. Conclusions. Total volume of daily PA of the majority of Lithuanian schoolchildren does not correspond to the WHO (2003) recommendations related to the health enhancing PA.