The 17th Conference of Baltic Society of Sport Science

# ABSTRACT BOOK

April 24–26, 2024

Tartu, Estonia

## Scientific Committee

| | |
|---|---|
| Prof. Jaak Jürimäe | University of Tartu |
| Prof. Mati Pääsuke | University of Tartu |
| Prof. Priit Kaasik | University of Tartu |
| Prof. Jarek Mäestu | University of Tartu |
| Assoc. Prof. Andre Koka | University of Tartu |
| Prof. Diana Reklaitiene | Lithuanian Sport University |
| Prof. Aivaras Ratkevičius | Lithuanian Sport University |
| Prof. Arvydas Stasiulis | Lithuanian Sport University |
| Prof. Andra Fernate | Latvian Academy of Sport Education |
| Prof. Juris Grants | Latvian Academy of Sport Education |
| Prof. Janis Zidens | Latvian Academy of Sport Education |
| Prof. Rutenis Paulauskas | Vytautas Magnus University |
| Assoc. Prof. Aušra Lisinskiene | Vytautas Magnus University |
| Prof. Jerzy Sadowski | Jozef Pilsudski Academy of Physical Education |
| Prof. Pawel Tomaszewski | Jozef Pilsudski Academy of Physical Education |
| Assoc. Prof. Krzysztof Piech | Jozef Pilsudski Academy of Physical Education |

## Organizing Committee

Evelin Mäestu

Kadi Rutens

Jaak Jürimäe

Getter Marie Lemberg

Jarek Mäestu

Andre Koka

Kristi Vaher

Piret Pärsim

Margit Mägimets

Mare Vene

# Content

# KEYNOTE SPEAKERS

## Plenary session I

**April 25, 2024**
**Room: A.M. Viru auditorium**

### Exercise intensity and duration relationship - impact on strain, fatigue, and adaptation

**PETER HOFMANN**

**INSTITUTE OF HUMAN MOVEMENT SCIENCE, SPORT & HEALTH, UNIVERSITY OF GRAZ**

Performance diagnostics is a major prerequisite for any exercise training in health and disease. However, to prescribe exercise in all dimensions, we need to apply the so-called F.I.T.T.T. principle which considers not only intensity (I.), but also duration (time, T.), type (T.), and timing (T.) of exercise producing a specific amount of fatigue and recovery needs, defining the frequency (F.) of exercise sessions per week. Unfortunately, most studies as well as the practice focus on intensity only which defines metabolic and cardio-respiratory “intensity zones”, however fails to prescribe overall load. Recently, it was recognized that also duration of exercise plays a major role regarding acute physiological responses and training effects. Duration is dependent on intensity in a non-linear fashion which can be described by the power-duration-relationship. Although a well-known concept, it is rarely applied to define duration. To overcome such a deficit intensity prescription will be combined with power-duration analyses in order to prescribe overall workload with respect to different training targets regarding effects. It is suggested that different percentages of maximal duration elicit different effects on fatigue, recovery time and adaptation. We could show recently that different durations at the same intensity affect fatigue and recovery differently. Besides that, we also could show individual duration thresholds comparable to intensity thresholds. Such a concept allows to prescribe optimal workloads for any specific intensity with respect to at least three different targets such as “recovery”, “stabilization” and “adaptation”.

# What makes fit and what makes fat: portrait of Lithuanian schoolchild and its changes through decades?

**ARUNAS EMELJANOVAS**

**LITHUANIAN SPORTS UNIVERSITY**

**Background:** Physical fitness is crucial for the overall well-being and development of schoolchildren. Developing physical fitness is crucial for various activities in daily life and contributes to overall physical competence. Physical fitness is a multi-faceted state encompassing cardio-respiratory (aerobic) capacity, muscular strength, power/agility, and flexibility components. The aim of the study is to analyse the differences in fitness among 11-18 years-old Lithuanian boys and girls between 1992, 2002, 2012 and 2022 years. Also, to analyse the relationships between physical fitness and physical and mental health, health-related behaviours.

**Methods:** Total of more than 18 000 secondary school children of 11-18 years-old participated in 1992, 2002, 2012 and 2022. To analyse the changes in children's fitness across 3 decades, the following EUROFIT tests were used: 10 x 5-meter Shuttle Run, 20 m Endurance, Standing Broad Jump, Abdominal Curls, Sit-and-Reach, Flamingo Balance, Bent-Arm-Hanging, height and weight. IPAQ-short form was used to measure physical activity. A Kidmed screener was used to evaluate adherence to a healthy diet. Psychological well-being was indicated using WHO-5, psychological distress - Kessler 6-item scale, social support - the Sallis Support for Exercise Scales, and self-rated health - a single item on a Likert scale.

**Results and conclusions:** In general, there is a tendency for physical fitness among Lithuanian schoolchildren of 11-18 years old stopped deteriorate. Moreover, there is also the noticeable fact that flexibility improved in both genders in comparison with the previous decade (year 2012). There are around 8 percent of overweight and 3 percent of obese schoolchildren as well as 30 percent of underweight. There is a higher prevalence of overweight and obesity in boys than girls. Overweight and obesity can be predicted by older age, male gender, lower father‘s education, higher family financial status, high psychological distress, and not participating in after-school sports.

# Motor creativity promotion: teaching strategies and evaluation

**AISTE BARBORA UŠPURIENĖ**

**VYTAUTAS MAGNUS UNIVERSITY EDUCATION ACADEMY**

**Aim of the study:** to reveal strategies for teaching and evaluation children's motor creativity.

**Methods:** Research on strategies for teaching and assessing motor creativity is still quite limited. The material was selected using specific keywords in scientific databases. The review covers 20 selected research articles published in peer-reviewed journals between 2013 and 2023. Data were analysed using qualitative content analysis. A total of 18 journals were selected and 20 articles were analysed in detail. The objects of analysis were teaching strategies and evaluation methods. In addition, the characteristics of good methods were examined and their relevance to teaching was highlighted.

**Results:** In total, 20 different teaching methods were found to improve children's motor creativity in different ways. The teaching methods that were most emphasised were those where children worked in groups and actively participated in the learning process.

**Conclusions:** The research shows that teaching methods that provide a good introduction and supporting guidelines and involve active participation are valuable.

# Plenary session II

**April 26,2024**
**Room: A. M. Viru auditorium**

## Genetic bases of athletic performance

**ALON ELIAKIM**

**TEL AVIV UNIVERSITY, ISREAL**

Recent studies have suggested that several potential genes may contribute to athletic success and sport excellence. This includes genetic variants associated with metabolic pathways (e.g. aerobic, anaerobic), blood lactate transport and clearance, muscle functioning and trainability, muscle damage and others. However, while genetic assessment will probably become part of future talent identification, at present, the predictive value of genetic testing is not well studied. This is mainly because athletic success depends on a combination of genetic, physiological, behavioural, and environmental factors (including the quality of coaching; availability of medical, nutritional, and psychological assistance; equipment and facilities advantages as well as administrative aspects). It is important to note that the athlete's coaching team should consider genetic evaluation and testing not only for talent identification or sport event selection, but also for the identification of athletes who are in danger of sports associated catastrophes, and also for possible assistance in optimizing the athlete's training process itself.

The present talk would present examples for potential practical uses of genetic profile assessment for talent identification and successful selection in a variety of sport types (e.g. power, speed, and/or endurance sports), for the prevention of sport-related disasters and for improving the athletic training process. The presentation will also clarify that genetic aid should not be limited to top world-class athletes but can be beneficial to national-level athletes as well.

# Personality traits' associations with body composition and physical activity

**KADRI ARUMÄE**

**INSTITUTE OF PSYCHOLOGY, UNIVERSITY OF TARTU, ESTONIA**

Personality traits—people's characteristic patterns of thinking, feeling and behaving—are widely thought to influence health behaviours, including physical activity and diet, and shape body composition through such behaviours' accumulating effects. Indeed, body weight, commonly quantified with body mass index (BMI), modestly but robustly correlates with numerous personality traits, including lower conscientiousness and higher anger, worry, impulsiveness, conventionality, assertiveness, and talkativeness. However, detailed investigations are needed to fully understand these associations' nature and implications. For one, recent longitudinal analyses cast doubt on common beliefs about traits' effects on body weight, instead showing that rising BMI predicts declines in conscientiousness and agreeableness (Arumäe et al., 2023). Further, associations with BMI are not straightforward to interpret as the index conflates fat mass with fat-free mass. To disentangle these components of body composition, we applied validated formulas to estimate relative fat mass (RFM) and basal metabolic rate (BMR)—the latter of which also proxies fat-free mass—and found that RFM correlated most strongly with lower openness to experience and conscientiousness while BMR uniquely correlated with higher assertiveness (Arumäe et al., 2022), suggesting that either larger lean mass or higher basal metabolism may enable dominant behaviour. Finally, aspects of physical activity may also relate to distinct personality traits: analyses with physical activity polygenic scores indicate that light-intensity physical activity is associated with higher extraversion whereas moderate-to-vigorous physical activity is associated with higher conscientiousness and lower openness. Future studies are needed to identify causal pathways and possibilities for intervention.

# Physical activity in children and youth - challenges and opportunities

**MERIKE KULL**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

Physical activity is an important lifestyle factor associated with a wide range of benefits in children's health and development. Despite international collaborations and national surveys indicating the importance of physical activity, numerous children fail to meet current recommended levels. A consensus underscores that urgent action is needed to address physical inactivity pandemic. Schools emerge as potentially powerful agents for changes to support children physical activity as majority of young children participated in school. However, a flexible approach coupled with empowerment is requisite, as physical activity promotion does not inherently feature within their existing agenda. Therefore, it is a challenge to involve and empower schools to become efficient agents of physical activity enhancement and to ensure that the physical activity related practices are embedded into the system. The adoption of a whole-school approach supports schools integrating physical activities into the daily school routine, encompassing active commuting to and from school, as well as incorporating movement within and between lessons, indoors and outdoors alike. Nonetheless, the development and implementation of a comprehensive school-based physical activity intervention present significant challenges, as the school is a complex social network comprising different interests, stakeholders and aims.

# Exploring cyclist behavior, habits, and safety outcomes in Latvia

**KATRINA VOLGEMUTE**

**DEPRATMENT OF SKIING, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the Study:** The aim of this study is to explore the correlation between cyclists' behavior, habits, and safety outcomes in Latvia.

**Methods:** A total of 299 cyclists from various regions of Latvia participated in this research. The study encompassed inquiries into respondents' demographics, cycling habits, and safety outcomes. The Cycling Behavior Questionnaire (CBQ) and the Cyclist Risk Perception and Regulation Scale (RPRS) were utilized to evaluate cyclists' behavior.

**Results:** The findings reveal that cyclists in Latvia frequently engage in riding errors and traffic violations. Such behavior correlates with a higher likelihood of involvement in road crashes. Conversely, cyclists demonstrating positive behavior exhibit better knowledge of traffic rules and demonstrate an enhanced risk perception, indicating greater awareness of road traffic safety.

**Conclusion:** The study concludes that older individuals exhibit significantly lower involvement in traffic accidents over the past five years, characterized by fewer driving errors and a heightened level of risk perception. This underscores the pivotal role of risk perception in road safety.

# SCIENTIFIC SESSION I

## Session 1: Sports Physiology and Coaching I

**April 25, 2024**
**Room: A.M. Viru auditorium**

### Adaptive changes after 3-week cycling sprint interval training in young and older adults

**PÄÄSUKE M, PURGE P, REMMEL L, ERELINE J, KUMS T, JÜRIMÄE J.**

**INSTITUTE OF SPORTS SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** To compare the effect of 3-week cycling sprint interval training (SIT) on body composition, aerobic capacity, and blood biochemical markers in healthy young and older adults.

**Methods:** Ten young (aged 20-30 years) men and 10 older (aged 60-73 years) men participated in this study. The participants underwent SIT (six bouts of 30 s all-out cycling interspaced with 4 min of rest) three days a week for three consecutive weeks. Pre and post intervention body composition measurements, assessment of aerobic capacity and blood biochemical markers (serum levels of glycose, insulin, HOMA-IR, IL-6, TNF-α and irisin) were determined.

**Results:** Measured body composition values did not change ($p>0.05$), whereas peak power output per kg body mass and VO2peak per kg body mass were increased ($p<0.05$) after 3-week SIT program in young and older men. Serum irisin concentration increased ($p<0.05$) and IL-6 concentration decreased ($p<0.05$) after a 3-week SIT program only in older men. In addition, TNF-α, glucose and insulin levels did not change significantly after an SIT period in young and older men.

**Conclusions:** A 3-week cycling SIT intervention with only nine training sessions increased aerobic capacity without changes in body composition in healthy young and older men. In older men, a short-term SIT increased circulating irisin concentrations and improved their inflammatory profile. SIT is a time efficient alternative for traditional aerobic training to improve metabolic health and aerobic capacity in older adults.

# Physical and physiological response to different modes of repeated sprint exercises in basketball players

**KAMARAUSKAS P, PAULAUSKAS R.**

**EDUCATION ACADEMY, VYTAUTAS MAGNUS UNIVERSITY, KAUNAS, LITHUANIA**

**Aim of the study:** This study aimed to investigate changes in physical and physiological responses to different modes of repeated sprint exercise (RSE) by measuring speed, total time (of sprints), fatigue index, heart rate, local oxygen saturation, total haemoglobin content, and blood lactate.

**Methods:** Twelve highly trained male basketball players (age 21.0±1.9y.o.; body mass 86.2±5.8kg; height 189.6±6.8cm; BMI 23.9±1.3kg·m-2; years of experience 12.0±1.9y.) participated in two RSE tests. The volume of the physical load (distance, work-to-rest ratio) was the same in both exercises, but load specifics were different. The first mode (RSE1) consisted of 10x30-m sprints (with one change of direction, COD) interspersed with 30s of passive recovery, while the second mode (RSE2) of 20x15-m shuttle sprints interspersed with 15s of passive recovery. Both exercise modalities were repeated three times with a five-minute rest interval between bouts, and a 7-day recovery between testing conditions.

**Results:** Results showed that different modes of RSE elicited a different physical response and metabolic demand. Longer sprints with COD placed a higher demand on the anaerobic-glycolytic system compared to more frequent straight sprints. However, players' fatigue was more noticeable in shorter and more frequent sprints. Heart-rate responses and local use of O2 showed a similar activity of aerobic reactions through the different exercises. During the sprints, players' SmO2 fell to 40% and recovered to the level of about 80% during passive rest intervals, without showing differences in both modalities.

**Conclusions:** This study showed that different modes of RSE cause a different physical response and metabolic demands in highly trained basketball players.

# Muscle oxygenation in different types of intermittent training protocols

**PAULAUSKAS R.**

**EDUCATION RESEARCH INSTITUTE, EDUCATION ACADEMY, VYTAUTAS MAGNUS UNIVERSITY**

**Aim of the study:** This study aimed to investigate muscle oxygenation responses during repetition training (RT), interval training (IT), and sprint interval training (SIT).

**Methods:** Near-infrared spectroscopy (NIRS) monitors were placed on the latissimus dorsi (LD), pectoralis major (PM), and vastus lateralis (VL) of a world-class kayaker during their preparatory period. The intensity of work, relief, and recovery intervals were the independent variables that were manipulated using three different training protocols.

**Results:** The inferential analysis between intermittent training protocols showed significant differences for all variables except total the hemoglobin (tHb) index in LD during bout 2 ($F = 2.83$, $p = 0.1$, $\eta p2 = 0.205$); bout 3 ($F = 2.7$, $p = 0.125$, $\eta p2 = 0.193$); bout 4 ($F = 1.8$, $p = 0.202$, $\eta p2 = 0.141$); and bout 6 ($F = 1.1$, $p = 0.327$, $\eta p2 = 0.092$). The comparison between IT protocols RT and SIT presented similar results. All variables presented higher values during SIT, except HR results. Finally, the comparison between IT and SIT showed significant differences in several variables, and a clear trend was identified.

**Conclusions:** The results of this study suggest that the application of different intermittent exercise protocols promotes distinct and significant changes in the peripheral effect of muscle oxygenation in response to training stimuli and may be internal predictors of hemodynamic and metabolic changes.

# Local vibration influence on cyclist anaerobic power and anaerobic power capacity

**CIEKURS K[1], BRĒMANIS A[1], CIEKURE M[2], BRĒMANE M[3].**

**[1]LATVIAN ACADEMY OF SPORT EDUCATION**
**[2]NATIONAL HEALTH SERVICE REPUBLIC OF LATVIA**
**[3]RIGA TECHNICAL UNIVERSITY**

**Aim of the study:** Nowadays, a lot of research and training methods are developed to increase the overall speed of cyclists. The following is the goal of this research - discovering new opportunities for improvement of anaerobic power and its capacity for cyclists during the training period. The following tasks were set to achieve the goal of this research: to determine the anaerobic performance level for cyclists before and after local vibration exercises were introduced; to develop methodology of local vibrations application for cyclists during the training period.

**Methods:** As a major part of the research, anaerobic power, and anaerobic power capacity of students of the cycling department of the Murjāņi Sports Gymnasium (MSG) were thoroughly studied. Anaerobic power and capacity testing was performed on a Cyclus2 bicycle ergometer. The following research methods were used during the creation of this research paper: scientific analysis of literature sources, comparative method, confirmatory experiment, manipulation of local vibrations, mathematical data processing method.

**Results:** The main participants of the research were seven MSG students (14-16-year-olds) with various levels of experience in the sport of cycling. The average weight of the group is 58.9 kg, the average height is 173 cm. Calculating the Student's t-test for anaerobic power capacity, it was found that the result is $p = 0.01$ or 1%, which indicates the truthfulness of the obtained data. Finally, calculating the Student's t-test for anaerobic power, it was found that $p = 0.021$ or 2.1%, which, again, indicates the reliability of the obtained data.

# Is 70 min of heat exposure through two weeks enough to induce heat acclimation?

**BRAZAITIS M, DAUKSAITE G, SOLIANIK R, EIMANTAS N.**

**INSTITUTE OF SPORTS SCIENCES AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY**

**Aim of the study:** We propose that daily activation of nociceptor TRP channels through 5-minute immersion in 45°C water could be the primary mechanism driving HA induction.

**Methods:** Ten healthy young adult males and ten females participated in a study where they underwent daily 5-minute whole-body immersions in 45°C water for 14 days. A provoking test for assessment of heating tolerance was conducted two weeks before and one day after 14-day HA program, and one month after the end of the HA program. Changes in well-established HA parameters such as body temperatures, heart rate, sweating, subjectively perceived stress, and plasma prolactin concentrations in response to provoking heating were measured.

**Results:** The HA program significantly lowered both resting and post-heating body temperatures ($p < 0.05$), heart rate ($p < 0.05$), subjective warmth perception ($p < 0.05$), and prolactin activity response ($p < 0.05$) in both male and female subjects. These effects remained significant one month after completing the HA program. However, the HA program did not have a significant effect on sweating capacity in either group of subjects ($p > 0.05$).

**Conclusions:** This study, for the first time, demonstrated that undergoing a repeated 14-session brief head-out hot-water immersion over 14 days induced HA in both sexes. Furthermore, it was observed that the HA effect persisted significantly one month after the HA program. Our study provides strong mechanistic evidence supporting the notion that short-term daily activation of nociceptor TRP channels is crucial for successful HA induction.

# The effect of exercise duration on RPE during low-intensity cycling exercise in highly trained endurance athletes

**MÄESTU J, KUUSEMETS R, PURGE P, RÄPPO H.**

**INSTITUTE OF EXERCISE AND SPORT SCIENCES, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** The aim of the study was to investigate the extent of change in RPE compared to lactate concentration and heart rate while exercising at 105% of the first ventilatory (VT1) threshold.

**Methods:** 13 high level triathletes performed the incremental exercise test (IET) using the face mask and 90 min constant intensity test (CON) at 105% of VT1 on cycling ergometer. RPE, heart rate (HR), blood lactate (La) were measured after every 10 minutes during CON. Before and after CON fatigue was measured on VAS scale.

**Results:** RPE did not change significantly during the first 50 min of CON, similarly with HR. LA increased and was the highest (2.69□0.8 mmol/L) during the first 10 min and decreased afterwards. The extent of change in HR during CON and the mean of anaerobic threshold HR ($r = 0.622$; $p<0.05$) during IET were related. Fatigue increased during the test ($p<0.05$), but the change was not related to the physiological parameters measured during IET, nor was the change in fatigue related to change in RPE value at the end of the CON ($p>0.05$). Significant changes were found in RPE, HR and LA during 90 min CON, while these changes were not related with the performance parameters on IET. However, the change in HR during CON and HR at anaerobic threshold were significantly related.

**April 25,2024**
**Room: F. Kudu auditorium**

# Examining the efficacy of a web-based need-supportive intervention program for physical education teachers: the changes in cognitive and behavioral outcomes among students in relation to physical activity

**PAAP H, KOKA A, MEERITS P-R, TILGA H.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the Study:** This study aimed to assess the effectiveness of a web-based intervention program for physical education (PE) teachers on various study characteristics among middle-school students in Estonia. The focus was on perceived autonomy support, competence support, relatedness support, and controlling behavior from teachers. Additionally, the study examined students' satisfaction and frustration of basic psychological needs, autonomous motivation towards physical activity (PA) in PE and leisure time, and self-reported PA.

**Methods:** A total of 1283 students from Estonian middle-schools (553 boys, 725 girls, and 5 with no defined gender), participated in the survey. PE teachers and their students were randomly assigned to either the experimental (teachers n=36; students n=463) or control (teachers n=49; students n=820) group. The survey included an initial online questionnaire for students from both groups for baseline measures. Subsequently, PE teachers in the experimental group underwent a 4-week online training program followed by a 4-week implementation period. Nine weeks after the intervention, students from both groups responded to the online questionnaire for the second time.

**Results:** Analysis of covariance revealed that students in the experimental group perceived autonomy support (p=0.044), competence support (p=0.007), and relatedness support (p=0.044) significantly higher than those in the control group at follow-up.

**Conclusions:** This study concludes that the developed web-based intervention program positively influenced students' perceptions of autonomy, competence, and relatedness support from PE teachers. The results emphasize the 4- week web-based program's effectiveness in fostering a supportive teaching environment in PE.

# Mentoring in dual career sports: A systematic review

**MARTINSONE S.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** To research mentoring in dual careers in sports in a European context

**Methods:** Literature review: To study and analyze the scientific literature on mentoring in dual careers in sports. Tasks: To research and analyze the scientific and methodological literature on mentoring, dual careers in sports, and the interaction between sports and educational organizations.

**Results:** All articles emphasize the importance of dual careers in athletes' lives, reflecting various support mechanisms and approaches. Differences mainly manifest in focus groups (athletes, parents, mentors) and specific areas of dual careers where emphasis is placed (psychological support, educational programs, international projects). A common feature is an understanding of the challenges of dual careers and the need for multidimensional support that covers both academic and sports needs.

**Conclusions:** These articles make an important contribution to the research on dual careers in sports, offering insights into various strategies and practices that can promote successful dual careers for athletes. They imply that effective support requires an integrated approach that includes both the educational and sports sectors, as well as the involvement of parents and mentors. Continuous international dialogue and the exchange of best practices are also important to provide athletes with the necessary resources and support for a dual career in sports.

# Sports brand management based on customers wishes, Latvian football league

**IĻJINS A.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** The current research show part of brand architecture and brand association, how are integrated to examine the role of the league brand on the relationship between league clubs and fans. As this paper will show, professional sports teams unite to produce a league product, brand consumer's support is important for the successful management and marketing of league and teams. One of the main sources of income for football teams and leagues around the world is the integration and communication around brand. Team identification, the degree to which an individual feels psychologically linked to a team, has been a focal point in studies of sport fans and sport spectatorship. How to do it and what we want to see for it shows this research. The purpose of this study is to assess the relationship between team identification, fan wishes, fan intentions and behaviors and clubs work with events for Latvian football league.

**Methods:** Research methods, questionnaire to approve the hypothesis: If the activities of the Latvian League football clubs are linked to the Latvian Football League brand, then interest in the Latvian Football League brand will increase, as well as the value of the brand will increase.

**Results and Conclusions:** The findings of this research contribute knowledges by empirically demonstrating that characteristics of the league brand have an influence on team-related behavioral intentions with fans. The results have practical marketing implications for professional sport teams and league.

# A constraint-based approach to skills training in game sports

**BURKAITĖ G.**

**ACADEMY OF EDUCATION, VYTAUTAS MAGNUS UNIVERSITY, LITHUANIA**

**Aim of the study:** To investigate the relationship between non-linear pedagogy based on eco-dynamic systems theory in the context of sport instruction. The study explores the theoretical foundations and practical applications of non-linear pedagogy within the framework of eco-dynamic systems theory.

**Methods:** In the study used theoretical analysis, and literature review. Theoretical analysis involves examining key concepts and principles of non-linear pedagogy and eco-dynamic systems theory. A literature review explores practical applications of non-linear pedagogy and its connection to eco-dynamic systems theory.

**Results:** The theoretical analysis reveals significant overlap between non-linear pedagogy and eco-dynamic systems theory, emphasizing ecological constraints, self-organization, and adaptive behaviors. The literature review demonstrates the widespread adoption of non-linear pedagogy in sport contexts but limited explicit references to eco-dynamic systems theory.

**Conclusions:** This study clarifies and investigates the alignment between non-linear pedagogy and eco-dynamic systems theory. The results indicate that non-linear pedagogy is based on the principles of eco-dynamic systems theory, providing a theoretical foundation for adaptive sport instruction.

# Athletic career development and its stages transition strategies

**KOVAĻOVS A[1], FERNĀTE A[2].**

**[1]DEPARTMENT OF SPORT GAMES, LATVIAN ACADEMY OF SPORT EDUCATION**
**[2]DEPARTMENT OF SPORT AND TRAINING THEORY, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** to theoretically explore the areas, approaches, and strategies of athlete's career transition.

**Methods:** Methods that were used was theoretical analysis and synthesis of scientific articles within the research problem in the scientific data in the ScienceDirect database from 1950 to 2024.

**Results:** Main results showed that in the scientific literature, an applied strategy is associated with the promotion of the transition from youth elite to adult elite sport, which consists of setting goals, educating the participants and humane consultations and during the transition stage, the athlete faces both sporting and non-sporting areas.

**Conclusions:** The conclusions of the study was that studies on transitional approaches have used different terminology with similar content. Newer terminology is usually based on old experience and previous findings, but the principles are the same (holistic approach). The theory of transition (stages of a sports career, development of motivation, development of talent) through a sports career has been mentioned by many authors: the largest model consists of 4 stages, in which attention is paid not only to the development of physical fitness or skills, but also to motivation, to the importance of the social environment (parents, coaches, peers, sports club policy).

# Supporting the development of socio-emotional skills in physical education by the Estonian physical education teachers

**PIHU M, SALME K.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** Social and emotional learning (SEL) is an integral part of education and human development. Through the SEL process pupils acquire the skills to manage emotions, achieve goals, show empathy, maintain supportive relationships, and make responsible decisions. The purpose of this research was to map how Estonian physical education (PE) teachers support the development of SEL of young people in PE classes.

**Methods:** The sample of the research was formed by Estonian PE teachers. The combined data analysis method was used. With questionnaire, it was explained how PE teachers (N=137) support students' SEL development in PE classes in two categories: integration of SEL into the learning process and supportive class atmosphere. With the interviews were explored specific activities how teachers (n=6) support the development of SEL in PE classes.

**Results:** 72,2% of the teachers said that they use evidence-based approach to teach SEL consistently. 89% do it so that it is developmentally appropriate for pupils. 83,9% of the teachers said that their pupils can share their opinions and experiences. Statistically significant differences between men and women occurred in integrating SEL into teaching in both categories. A little bit over 50% of the PE teacher are familiar of the new PE curriculum (accepted in 23.02.2023). With the interviews it came out that PE teachers support and teach SEL unconsciously.

**Conclusions:** The results provided important information about supporting and teaching the development of SEL in PE.

## Session 3: Physiotherapy and Health I

**April 25, 2024**
**Room: seminar room 3014**

### Effects of resistance exercise on postural balance in older adults at low and high risk of mild cognitive impairment

**MICKEVIČIENĖ L, DROZDOVA–STATKEVIČIENĖ M, MASIULIS N, KUŠLEIKIENĖ ORON LEVIN S, ČESNAITIENĖ VJ.**

**DEPARTMENT OF HEALTH AND REHABILITATION, LITHUANIAN SPORT UNIVERSITY**

**Aim of the study:** About 30% of people over 65 years old experience one or more falls each year. For older people with mild cognitive impairment (MCI), this rate is approximately twice as high. Emerging evidence suggests a complex interplay between physical and cognitive functions in maintaining balance and preventing falls. In addition, it has been shown that strengthening of lower limbs with resistance training can reduce the prevalence of falls. However, the differential effects of resistance training on balance among older adults with MCI remain inadequately explored.

**Methods:** Seventy-one apparently healthy male/female older adults (aged 60-85 years old) were randomly allocated to a 12-week lower limb progressive resistance or no intervention, stratified in two groups for low or high MCI risk. Postural sway velocity (Vcop) was assessed using a posturography method with a single piezoelectric force plate.

**Results:** After 3 months of resistance training, there was a significant decrease of sway velocity (Vcop) in the ML direction (p=0,03 d=0,718) and AP direction (p=0,023 d=0,765) in subjects with higher risk of MCI. Details will be provided in the presentation.

**Conclusion:** Our study demonstrated that after resistance training the subjects with higher risk of MCI significantly improved the balance control comparing with those with low risk of MCI. The findings affirm that regular resistance exercises can be a crucial factor in improving or maintaining posture balance and reducing the risk of falls for individuals with higher risk of MCI.

# The Effect of High Intensity Interval Training Program, Quality of Life and Severity of Chemotherapy Side Effects in Women with Breast Cancer (Cancerbeat project, Nr. EEZ/BPP/VIAA/2021/2)

**KLAVINA A[1], CESEIKO R[1], CAMPA M[1], JERMOLENKO GF[1], LLORENTE A[2].**

**[1]LATVIAN ACADEMY OF SPORT EDUCATION**
**[2]OSLO UNIVERSITY HOSPITAL INSTITUTE FOR CANCER RESEARCH**

**Aim of the study:** Women with breast cancer (BC) experience multiple symptoms related to the neoadjuvant chemotherapy (NAC) treatment that impair their functioning and quality of life (QoL). This study aimed to explore the effect of high intensity aerobic interval training on quality of life and NAC side effects in women with BC.

**Methods:** 56 patients diagnosed locally advanced (stage II-III) ER+ BC receiving NCT were randomly assigned to HIIT group and a control group for 6 months. HIIT group performed 2-3 HIIT sessions per week according to the study protocol. The CG followed standard of care instructions by the oncologists. To assess the QoL participants completed the EORTC QLQ-C30 with the additional BC module of QLQ BR-23.

**Results:** Side effects data were analysed for 37 participants (nHIIT = 17, nCON = 20) who reported at least 14 (60%) weeks. The most common side effect participants experienced at least one to four days/ week was pain (average 50.9% and 56.8% for HIIT and CG, respectively), followed by sleep disturbances (average 50.9% and 49.9%, respectively). About 31 % in both groups experienced sleep disturbances 5-7 days/week. The physical functioning (PF), social scale scores and body image significantly decreased in both groups. However, analyses of covariance demonstrated significantly higher scores after intervention for HIIT group in PF ($p = .028$), significantly less scores on symptom scale ($p = .011$).

**Conclusions:** HIIT is effective physical exercise program to maintain higher quality of life and help to reduce some of NAC side effects for women with BC.

# The effect of repeated short-duration hot water immersion on glucose tolerance and insulin response

**SOLIANIK R, DAUKŠAITĖ G, JARUTIENĖ L, BRAZAITIS M.**

**INSTITUTE OF SPORT SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** The main aim of this study was to determine if repeated 5-min whole body immersion (HWI) in hot water could affect glucose tolerance and insulin response.

**Methods:** Male (n = 13) and female (n = 11) subjects completed fourteen 5-min sessions involving whole body immersion in 45 °C water. Changes in adrenaline, noradrenaline, interleukin-6, tumor necrosis factor alpha, and glucose and insulin release in response to a 2-h 75 g oral glucose tolerance test, were assessed.

**Results:** Repeated HWI in 45 °C water had no effect on concentrations of catecholamines and cytokines in both sexes. Glucose area under the secretary curve was not affected in both sexes, but females had a lower insulin area under the secretary curve and decreased insulin resistance one month after the end of repeated HWI in 45 °C water.

**Conclusions:** Repeated short-duration hot water immersion improved insulin sensitivity only in females. These findings from this study provide strong rationale to further investigate the potential of short-duration heat strategies as a therapeutic approach to improve metabolic health, taking into account sex-related differences.

Funding: This work was supported by the Research Council of Lithuania (grant number S-PAD-22-9).

# Correlation of quality of life scores with kinesiophobia and physical activity level in people with the hypermobility spectrum

**FEOFILOVA A, KURMEĻEVA A, DUBIŅINA E.**

**DEPARTMENT OF HEALTH CARE, LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**

**Aim of the study:** Joint hypermobility is characterized by an unusually large range of movement in one or more joints, with adult prevalence estimates ranging from 5% to 43%. This condition is often associated with chronic pain, diminished functional capabilities, and a consequent reduction in quality of life. Furthermore, individuals with hypermobility may experience enhanced emotional distress and reduced physical activity levels, compounded by a heightened risk of developing kinesiophobia - a fear of movement due to the potential for pain or injury. This study aims to explore the correlation between health-related quality of life, kinesiophobia, and physical activity levels in individuals within the hypermobility spectrum.

**Methods:** Participants completed online questionnaires using Google Forms. The study employed validated tools including the Tampa Scale for Kinesiophobia to assess fear of movement, the International Physical Activity Questionnaire (IPAQ) short version to measure physical activity levels, and the SF-36 to evaluate quality of life. Data analysis was performed using IBM SPSS Statistics. Approval was secured from the LASE Ethics Commission.

**Results:** Thirty-seven participants (5 men, 32 women; average age 38.9 ± 11.8 years) were recruited. Most resided in Riga (60%), held higher education degrees (70%), and were employed (78%). Common symptoms included joint pain during physical activity and instability; only five participants reported no symptoms. Diagnoses related to hypermobility were confirmed in 65% of participants, while the remainder reported typical symptoms. The majority (67.6%) exhibited low kinesiophobia scores (17-37 points), suggesting minimal fear of movement. However, smaller proportions displayed moderate to high fear levels, indicating potential targets for therapeutic intervention. Physical activity levels varied, with 40% of participants reporting moderate activity. SF-36 results indicated mild to moderate impairment across various health domains, notably in vitality, bodily pain, and general health.

**Conclusions:** The findings highlight a complex interplay between joint hypermobility, kinesiophobia, and physical activity. While most participants demonstrated low kinesiophobia and mild quality of life impairments in some domains, significant concerns remain regarding moderate to high kinesiophobia and notable impairments in vitality, bodily pain, and general health. These insights emphasize the need for tailored interventions to mitigate the psychoemotional and physical challenges faced by this population.

# Effects of head-neck cooling on central and peripheral fatigue and blood markers of stress in multiple sclerosis (MS) and healthy men

**DAUKŠAITĖ G, EIMANTAS N, BRAZAITIS M.**

**INSTITUTE OF SPORTS SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY**

**Aim of the study:** Fatigue is one of the most reported disabling and multifaceted symptoms of multiple sclerosis (MS) people. Local head and neck cooling strategies may help alleviate MS fatigue and associated heat sensitivity. However, no research has comprehensively described the peripheral and CNS responses to head-neck cooling during isometric exercise in non-challenging ambient temperature conditions in MS and healthy men. Furthermore, no data describing the impact of head-neck cooling and fatiguing exercise on blood markers of stress, muscle temperature and subjective effort sensations.

**Methods:** We assessed local head-neck cooling (at 18°C on skin contact place) intervention in MS men with a relapsing-remitting form of the disease (n = 18; age 34.9 ± 8.1) and healthy men (n = 22; age 31.7 ± 5.9). Both groups performed 100 intermittent isometric knee extensions with 5s contractions and 20s rest. The main variables were measured before exercise, after 100 repetitions, and 1 h after exercise. We evaluated central activation ratio (CAR), maximal voluntary contraction (MVC), electrically induced force, muscle temperature and subjective effort sensation.

**Results:** We observed that MS men group was more affected by central and peripheral fatigue and subjective sensation than healthy men. The head-neck cooling for MS subjects decreased central fatigue, but increased peripheral fatigue compared to non-cooled condition. Whereas cooling had similar effect on blood markers of stress and muscle temperature in both MS and healthy men group.

**Conclusion:** For individuals with MS engaged in strenuous physical activity, head-neck cooling may help improve exercise tolerance and reduce central fatigue.

# Psychoemotional state during 8-hour work day: glucose and ketone levels in healthy women, fed vs. fasted - pilot study

**GRIGAITĖ V, ČEKANAUSKAITĖ A, ŠATAS A, MAŽUOLYTĖ-BINDERIENĖ A, BRAZAITIS M.**

**INSTITUTE OF SPORTS SCIENCE AND INNOVATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** To analyze how fasting and fed state glucose and ketone changes relate to psychoemotional state during simulated 8 - hour work day.

**Methods:** Healthy 18 - 35-year-old women. During fasting participants restrain from consuming any food for 36 hours before beginning simulated workday consisting of 8 sessions of cognitive tests from Automated Neuropsychological Assessment Metrics 4 (ANAM4). Total session duration lasts 45 - 50 minutes. To evaluate psychoemotional changes Stanford sleepiness scale, Dundee questionnaire and visual analogue scale (VAS) on a 10 cm. long horizontal line are filled. Finger prick test with portable analyzers are used to measure ketone and glucose concentration.

**Results:** Fasted participants showed increase motivation and alertness at the end of simulated 8 - hour work day relating to increased ketone levels. After eating participants reported higher mind wondering, mental fatigue and sleepiness along with increased glucose concentration.

**Conclusions:** Mind wondering, mental fatigue and sleepiness along with increased glucose levels after eating has been observed. Motivation is reported higher during fasting, increasing along with ketones, suggesting that ketone bodies may be related with positive psychoemotional state. More data is needed to confirm results.

# Session 4: Physical Activity and Fitness I

**April 25, 2024**
**Room: Seminar room 3015**

## Physical activity of grandchildren in the opinion of grandparents

**PIECH K.**

**FACULTY OF PHYSICAL EDUCATION AND HEALTH, JOZEF PILSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW, BIALA PODLASKA, POLAND**

**Aim of the study:** The aim of the study was to knowledge of grandchildren's participation in physical activity.

**Methods:** The research used a diagnostic survey method with an interview technique. Interviews were conducted with the oldest inhabitants of the Lublin region. A total of 120 interviews were conducted.

**Results:** Based on the interviews, several types of fun and games that took place during the respondents' childhood were identified. Research has shown that young generations spend their free time passively. There is a problem of not participating in physical education lessons.

**Conclusions:** It was observed that the surveyed grandparents were very concerned about their grandchildren's low involvement in physical activity. In the childhood of the surveyed grandparents, there was a wide variety of forms of physical activity and creativity. The respondents spoke positively about physical education classes and all students participated in them at that time.

# Outdoor recess already on some days of the school week is associated with higher physical activity levels and lower sedentary time of students

**LEMBERG GM, RISO E-M, KULL M, MÄESTU J, MÄESTU E.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** This study aimed to measure and compare the levels of PA during recess and school time between schools with different recess opportunities in students from 15 primary schools in Estonia.

**Methods:** Students from grades three to six (9-13-yeard-olds) were included in the study. Sedentary behaviour and PA levels were measured with accelerometers. Schools were divided into three groups based on the school day structure: 1) "outdoor recess"; 2) "outdoor recess on some days"; 3) "indoor recess".

**Results:** "Indoor recess" group spent significantly more time sedentary during recess compared to "outdoor recess" and "outdoor recess on some days" groups, accordingly 43.6%, 30.8%, and 34%. Recess time spent in moderate-to-vigorous PA (MVPA) remained similar for all grades in the "outdoor recess" group, whereas in other groups the trend of increased sedentary time and decreased MVPA was found with increasing age. "Outdoor recess" group reached the highest total school time MVPA (27.7%) during recess compared to other groups. Even though no significant difference was found, girls acquired more total school time MVPA during outdoor recess compared to boys (28.3% vs 26.9%).

**Conclusions:** These findings emphasize that outdoor recess can be an important addition to daily school schedules to increase student's PA levels, and outdoor recess even on some days, is already associated with higher PA levels and lower sedentary time of students. In addition, outdoor recess can be a useful tool for slowing down the decrease of PA levels as children grow.

# The effect of breathing exercises on adults' sleep quality: an intervention that works

**STEINMANE V, FERNATE A.**

**LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**

**Aim of the study:** This study investigates the application of various breathing exercises to enhance sleep quality. Respiration is an indispensable aspect of life that significantly influences both the physical and mental well-being of individuals, as well as sleep quality. Embracing appropriate breathing exercises has proven to be advantageous for short-term relief and long-term holistic health. The aim of the study is to theoretically investigate the application of breathing exercises to improve sleep quality.

**Methods:** a scientific article review was conducted, drawing upon completed trials within scientific articles found in ScienceDirect and PubMed databases (period 2017-2023). The focus on articles that utilize deep breathing, diaphragmatic breathing, mindful breathing, respiratory muscle training, and pursed lip breathing allowed us to explore the potential benefits of these techniques on sleep quality.

**Results:** By synthesizing findings from diverse trials, this study contributes to a deeper understanding of how specific breathing techniques may modulate physiological and psychological factors involved in sleep regulation. The durations of adult engagement in daily breathing exercise sessions lasted for a month or longer. Study results show that consistent success was observed across seven studies employing various breathing exercises for distinct patient groups, with improved sleep quality noted among participants who completed the prescribed breathing techniques.

**Conclusion:** the insights gained from this theoretical investigation promote knowledge for an intervention (content, duration, timing) that works and improves sleep quality through the approach of breathing exercise application.

# Academic achievement and physical fitness of 5th grade students according to sports club attendance in Tartu and Tartu County

**JÄRVAMÄGI M, REISBERG K, RISO E-M, JÜRIMÄE J.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**

**Aim of study:** The aim of this study was to analyse and find associations between the sports club attendance, physical fitness, and academic achievement of the 5th grade students of Tartu and Tartu County.

**Methods:** 162 children, 80 girls and 82 boys, aged 11.5 years participated in this study. Participants were divided into three groups according to training sessions per week: Group 1- 4 x or more; group 2- 2-3 x; Group 3- 1x or less. Physical activity (PA)was measured over seven days by accelerometers, at the same time records of organized trainings were kept. Physical fitness was tested using Alpha fitness programme. Cardiorespiratory fitness (CRF)was assessed by 20-m-shuttle run test. Schools reported about students' academic achievements in Estonian language and Math. The results were summarized for statistics.

**Results:** Children from Group 1 had significantly better summarized grades than children from Group 3 (8.96±1.06 vs 8.23±1.25; $p<0.05$). The result of 20-m-shuttle run test was better in Group 1 as compared to Group 2 and Group 1 (37±17, 25±11 and 22±12 laps respectively; $p<0.05$). Significant positive associations were found between the academic achievements and CRF, number of training sessions per week and durations of trainings. No differences in PA were found in studied groups.

**Conclusions:** The results of this study show that attending a sports club did not have an impact on the level of PA. Academic results were better in 5th Grade children who trained 4 or more times per week.

# Web-based need-supportive interventions for physical education teachers and parents to support children's physical activity related cognitive outcomes

**MEERITS P-R, TILGA H, KOKA A.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** Web-based need-supportive interventions for physical education teachers and parents to support children's physical activity related cognitive outcomes. This study tested the effectiveness of web-based need-supportive intervention programs for physical education (PE) teachers and parents on changes in components of trans-contextual model of motivation (TCM), including children's perceptions of need support from PE teachers and parents, autonomous and controlled motivation towards physical activity in PE and leisure time context, components of theory of planned behavior (i.e., attitude, subjective norms, and perceived behavioral control, intention), and effort towards leisure-time physical activity (LTPA).

**Methods:** 115 children (Mage = 12.47 ± 0.68, boys = 55, girls = 60) and one parent for each child were recruited. Children were cluster-randomized by school into four study groups: PE teacher intervention; parent intervention; both PE teacher and parent interventions; control. Children completed questionnaires on psychological measures from the TCM pre-intervention, post-intervention, and one month after the intervention.

**Results:** Results of the path analysis using residualized change scores demonstrated that the parents' intervention had direct negative effect on perceived subjective norm (β=-0.221, p=0.033), and direct negative effect on controlled motivation towards LTPA (β=-0.207, p=0.05). The parents' intervention also demonstrated indirect negative effect on controlled motivation in LT (β=-0.037, p=0.033), mediated by perceived need-supportive behaviors of PE teacher and controlled motivation in PE.

**Conclusions:** The web-based need-supportive intervention programs for PE teachers and parents did not predict effort towards LTPA, but parental need-supportive intervention may reduce children's perceived controlled motivation in PE and leisure-time contexts. Future research is recommended to replicate the interventions with a larger number of participants.

# Well-being and work specifics for fitness trainers in Latvia

**KEIZANE A, CUPRIKS L.**

**DEPARTMENT OF ACYCLIC SPORTS, LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA, RIGA**

**Aim of the study:** Work-related load can cause serious health issues and discomfort. Ligament and muscle sprains and inflammations, psycho-emotional issues, burnout, and other problems among trainers are not treated in due course and contribute to the inability to work in the future. The profession of a fitness trainer is quite challenging - heavy workload, highly changing environment, noise, the risk factor, high responsibility, high flow of people, high competition, and a relatively low salary. Every day, fitness trainers help others to improve their health and appearance. However, trainers often forget about how much the specifics of their work can harm themselves. Therefore, the purpose of this study is to investigate the work specifics of fitness trainers and how it affects the well-being of trainers in Latvia.

**Methods:** An anonymous online survey was conducted to achieve this goal. The survey consisted of 26 closed-ended questions with multiple-choice answers and the possibility to add one's own response option. The survey was divided into blocks, namely qualification and work experience, work specifics and conditions, rest and recovery, characteristics of well-being. In total, 141 fitness trainers from Latvia participated in the study, of which 92 were women and 49 were men. For data analysis, the SPSS 18.0 software was used for performing mathematical and descriptive statistics.

**Results:** Analysing the obtained results, it can be concluded that fitness trainers in Latvia have a very heavy workload on a daily basis, there is practically no opportunity to rest and recover between the training sessions, there are very few or no days off at all, there is often no time and energy to fully and qualitatively focus on one's own body and physical form, and often there are no regular visits to qualified specialists who could help coaches to improve their own well-being. All of this contributes to discomfort, pain, and ill health among fitness coaches on a daily basis. Therefore, this issue needs to be addressed at the industry level.

# POSTER PRESENTATIONS

**April 25, 2024**

## Session 1: Sports Physiology and Coaching

### Development of dynamic balance of kayakers on sup board during competition period (10-14 years)

**GULBE A, ALDINA M.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** Kayaking and paddling on the SUP board requires highly developed balance abilities, both static and dynamic. The literature highlights the need for well-developed hip mobility to ensure proper force transfer to the upper limbs and reduce the risk of injury. Both sports require well-developed motion coordination capabilities, which also include expressions of balance to achieve a high-value result. The aim: Assessment of the set of special balance exercises performed on the SUP board on the balance abilities of 10 - 14-year-old kayakers.

**Methods:** Analysis of literary sources; Testing. Special balance tests (Y-balance test: UQ (upper quarter) and LQ (lower quarter); Bourban ventral test; Modified Bass test for dynamic balance; Pedagogical experiment; Mathematical statistical methods.

**Results:** Exercise on the SUP board can help to improve balance for kayakers, as not only is the body's static position control improved, but also the ability to transfer weight and change the position of the support points on an unstable surface. The exercise set consisted of 6 science-based exercises to be applied to both enhancing the strength of the deep muscle and promoting active joint stability. Athletes exercised on the SUP board, in safe conditions for 8 weeks, 3 times a week.

**Conclusions:** The special set of balance exercises on the SUP board during the competition period improve the dynamic balance abilities of the 10-14-year-old kayakers, because Y balance test results show statistically reliable improvements mean while Bourban ventral muscle chain test and Modified Bass tests shows statistically irrelevant improvements.

# Accuracy of free throws shots in basketball and its dependence on the intensity of physical load in basketball games and trainings

**TOMAŠS A.**

**DEPARTMENT OF SPORT GAMES, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** Adequacy of training load to competition activity requirements and its effect on free throw shot accuracy.

**Methods:** 1. Analysis of literature sources; 2. Pedagogical observation; 3. Testing; 4. Mathematical statistics.

**Results:** 1. The training load intensity is lower than the game load intensity. The biggest difference of the heart rate frequency between trainings and games is observed in the maximal load intensity zone, where players' heart rate frequency is 90 - 100%/max. In trainings it is 4.12% from training time, but in games it is 12.12% from game time. 2. The load amount affects the realisation percentage of the free throw shots in game. In trainings free throws are executed at the average heart rate frequency 66.57%/max. and the realisation percentage is 75.17%, but in games the average heart rate frequency is 73.37%/max. and the shot realisation percentage is 62.77%. So, in trainings shots are executed at the heart rate frequency which is per 6.80%/max lower than in games, but the shot realisation percentage is per 12.40% higher than in games.

**Conclusions:** It is concluded that one of the factors that could affect shot accuracy in games is the heart rate frequency, as in trainings, executing shots at lower heart rate frequency, the shot realisation percentage is higher. To improve players' free throw shot realisation percentage we recommend to adapt training loads to game loads.

# Resistin is associated with body image perception in adolescent rhythmic gymnasts

**REMMEL L[1], JÜRIMÄE J[1], TAMM A-L[2], PURGE P[1], TILLMANN V[3].**

**[1]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]DEPARTMENT OF PHYSIOTHERAPY AND HEALTH PROTECTION, TARTU HEALTH CARE COLLEGE, ESTONIA**
**[3]INSTITUTE OF CLINICAL MEDICINE, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** Rhythmic gymnasts (RG) have negative self-perception of their body image and their body size. In addition, they are more likely to be dissatisfied with their body mass and shape compared to normal-weight untrained controls (UC). Accordingly, the aim of this study was to investigate the associations of body image perception (BIP) with body composition, daily energy consumption and different blood biochemical markers in adolescent RG compared to UC.

**Methods:** Thirty-three highly trained RG girls and 20 UC girls aged 14-18 years participated in this study. Height, body mass, body composition, energy intake, resting energy expenditure (REE), training volume and different blood biochemical markers were measured. Body attitude test (BAT) was used to evaluate BIP of the participants.

**Results:** The studied groups had similar body height, body mass and BMI values, but the TB FM% and TB FM values were lower ($p < 0.05$) and the TB LBM was higher ($p < 0.05$) in RG compared to the UC. There were no differences in the total BAT scores between the studied groups. In RGs, the total BAT score correlated positively with the serum resistin level ($r = 0.35$; $p = 0.047$), and serum resistin level correlated negatively with TB FM% ($r = −0.36$; $p = 0.040$). Resistin and BMI were the independent variables that explained 40.8% of the variability in the BAT score only in RGs.

**Conclusions:** In conclusion, these findings demonstrate that resistin may be a link between BIP and body composition, most likely through fat mass, in highly trained adolescent female rhythmic gymnasts.

# Relations of perceived parental support with youth basketball performance

**POLITIS G[1], MILAVIC B[2].**

**[1]LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**
**[2]UNIVERSITY OF SPLIT, CROATIA**

**Aim of the study:** Aim of this study was to determine relations of perceived parental support and basketball performance of youth male basketball players. Seventy-eight young (age 16.46±0.98) male Greek basketball players from 6 different youth teams were voluntarily involved in this study.

**Methods:** Perceived parental support variables were measured by the Parental Involvement in Sport Questionnaire (PISQ) by Lee and MacLean (1997) and by Lazopoulou (2006) using 33 questions adapted for basketball. Four scales with satisfying metric characteristics were used: directive behaviours scale (8 questions), praise and understanding behaviours scale (6), active involvement scale (7), and pressure behaviours scale (7). The player's basketball performance measure was taken as an assessment from the team coach (highest, moderate, and lowest player value in team).

**Results:** Perceived parental behaviours to basketball were: moderate for praise and understanding scale and active involvement scale (3.74±0.82; 3.42±0.63), and low for directive behaviours and pressure behaviours (2.47±0.85; 2.47±0.70). Significant differences were found between U16 and U18 groups of basketball players according to the directive behaviours scale (2.63 vs. 2.17; p=0.02) and pressure behaviours scale (2.59 vs. 2.25; p=0.03). Parents of the younger players use more often directive and pressure behaviours in communication with their sons than the parents of the older players. According to the players overall team's basketball value groups, there were no found differences in the perceived parental support between these groups. Perceived parental involvement is not related to the player's basketball performance.

**Conclusions:** The results of this research indicate the need for coaches to communicate more often with the parents of basketball players and to educate them additionally, thereby increasing the frequency of praise/understanding and active involvement behaviours and reducing the frequency of directive and pressure behaviours in their communication.

# Impact of 48-hour fasting on exercise metabolism: Contrasting responses in endurance vs. high-intensity athletes to maintain similar exercise tolerance

**YLAITĖ B, EIMANTAS N, SOLIANIK R, BRAZAITIS M.**

**INSTITUTE OF SPORT SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY**

**Aim of the study:** To assess the effects of a 48-hour fasting period on exercise metabolism among endurance athletes compared to high-intensity athletes. The study will focus on investigating alterations in fat and carbohydrate oxidation and their subsequent impact on exercise tolerance to exhaustion.

**Methods:** Sixteen well-trained male athletes, comprising eight endurance (EN) and eight high-intensity (HI) athletes, underwent a stage incremental test until exhaustion both before and after a 48-hour fasting period. Gas exchange was continuously monitored, and substrate oxidation was analysed during the tests under both conditions.

**Results:** A significant interaction of fasting and discipline emerged between EN and HI for fat oxidation ($p<0.001$) and carbohydrate oxidation ($p=0.012$). More in detail EN athletes showing a greater drop (delta) in carbohydrate oxidation ($p=0.004$) than HI, while HI athletes a lower increase (delta) in fat oxidation ($p=0.002$), after 48-hour fasting. Despite a significant effect of fasting on time to reach exhaustion for both groups, no significant interactions of fasting and discipline emerged for the time to reach exhaustion, with no difference in the pre to post fasting delta between the two groups.

**Conclusions:** To maintain comparable exercise tolerance until exhaustion, EN athletes demonstrated an enhanced capacity to shift towards fat oxidation, whereas HI athletes to maintain robust levels of carbohydrate oxidation, after a 48-hour fasting period. This suggests that prolonged exposure to either endurance or high-intensity exercise likely influences the adaptive response of exercise metabolism during extended periods of caloric deprivation.

# Climbing sports for the visually impaired people

**LIEPINA I, PORTNOVA I.**

**DEPARTMENT OF RECREATION, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** This study aimed to develop recommendations for the organization of climbing sports training for trainers working with individuals with visual impairments, with the hypothesis that practical recommendations could enhance Paralympic sports development in Latvia.

**Methods:** The study employed research tasks including theoretical exploration of Paralympic climbing sports and physical activities for the visually impaired, examination of foreign experiences in organizing climbing sports classes for this population, organizing practical climbing lessons, and developing theoretical-practical recommendations for trainers. Research methods included literature analysis, ascertaining experiments, observation, surveys, and descriptive statistics. A total of 43 literature sources were analyzed, predominantly in English. Twelve practical climbing classes were conducted, along with two surveys-one with a Slovenian climbing coach and another with practice participants, yielding seven responses.

**Results:** Findings indicated limited adaptation of climbing sports for the visually impaired globally, with communication strategies and group sizes emerging as key factors in successful training.

**Conclusions:** The study concludes that climbing sports can be adapted for individuals with visual impairments, though such initiatives are scarce in Latvia. Practical recommendations emphasize the importance of smaller group sizes, effective communication methods such as Bluetooth headsets, and extended lesson durations. Trainers need to familiarize themselves with the specific needs of visually impaired athletes and ensure environmental safety and assistance when necessary. Overall, the study highlights the potential for inclusive climbing sports programs and the need to encourage trainers to engage with athletes with special needs to promote broader participation and development in Paralympic sports.

# Selected indicators of sports success of young tennis players

**WALDZINSKI T[1], WALDZINSKA E[1], DURZYNSKA A[1], LITWINIUK A[1], OZDOBA M[2].**

**[1]FACULTY OF HEALTH SCIENCES, UNIVERSITY OF LOMZA, POLAND**
**[2]GDAŃSK TENNIS ACADEMY, POLAND**

**Aim of the study:** The aim of the study was to knowledge of the relationship between reaction time and special physical fitness of tennis players aged 10-12 years old.

**Methods:** The study involved 45 tennis players training in clubs in the Podlaskie Voivodeship, Poland. The participants were divided into age categories, and the tennis players varied in their level of sport advancement. Two tests were used to assess reaction time: Blink. Pro Infinity (reaction time test); International Tennis Number (special fitness of tennis players test).

**Results:** Positive average and high correlation coefficients between reaction time test (Blink) and special physical fitness of tennis players test (ITN) scores increased with the age of the tennis players tested: 10-year-olds r=0.358 (aver-age correlation) and positive correlations 11-year-olds r=0.521, $p<0.05$ and 12-year-olds r=0.599, $p<0.02$.

**Conclusions:** The results of the study provide evidence that the training of juvenile tennis players influences not only the increase of their special fitness, but also the speed (effectiveness) of their motor response to stimuli simulated in laboratory conditions. The increasing interdependence of the indices of both variables (special physical fitness and reaction time to external stimuli) with age indicates that stimulating the natural process of biological growth of the organism at this stage of ontogenesis with specific tennis exercises has a positive effect on this component of coordination ability (motor reaction time), which is related to human motor safety in the general sense.

# Energy balance, body composition and performance in adolescent cyclists and paddlers

**KÄNGSEPP, A[1], PURGE, P[1], REMMEL, L[1], JÄÄGER L[1], TILLMANN, V[2], JÜRIMÄE, J[1].**

**[1]INSTITUTE OF SPORTS SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]INSTITUTE OF CLINICAL MEDICINE, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** Children start training at an early age, where, in pursuit of high goals, they often reach high training loads as young athletes. The increased energy expenditure, because of high training load and possible negative energy balance, can negatively affect the health and physical development of young athletes. A high training load of young athletes can provoke fatigue, the accumulation of which leads to a state of possible overload of athletes. The AIM of the investigation was to find possible differences between energy intake, body composition and physical performance between cyclists and paddlers.

**Methods:** The study involved 11 cyclists (16.3±1.3 yrs, 182.1±6.1 cm, 69.2±7.1 kg, body fat: 15.5±1.8 %%,) and 8 paddlers (15.3±1.0 yrs, 178.4±4.7 cm, 72.3±8.4 kg, body fat: 18.1±3.9 %,). Incremental cycling test was done with Lode Corrival exercise cycling ergometer, body composition was measured using the DEXA method (Hologic Discovery), dietary assessment was done by 3-day dietary recall and training activity was assessed by questionnaire.

**Results:** No differences ($p>0.05$) between cycling and paddling groups in training times (5.7±2.1 vs 7.5±3.1) and weekly training volume (552.2±152.7 vs 491.9±225.9 min) was observed. There were significant differences ($p<0.05$) between paddlers and cyclists in VO2max (4.5±0.5 v. 3.6±0.5 L/min), VEmax (191.3±26.7 vs 161.3±26.4 L/min), Pamax (390.6±59.4 vs 275.5±27.6 W) and energy intake (2849.6±256.8 vs 3372.6±570.7 kcal/day).

**Conclusions:** It was concluded that although paddlers and cyclists train with a similar load and had similar body composition, the performance indicators of cyclists were better.

# The effectiveness of a web-based intervention program in enhancing physical education teachers' need-supportive behaviors: a study of teachers' experiences

**TILGA H, ALJASMÄE L-M, PAAP H, MEERITS P-R, KOKA A.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** The aim of the study was to examine the effects of a web-based intervention program designed to enhance physical education (PE) teachers' need-supportive behaviors on teachers' self-reports of need-supportive and controlling behaviors, satisfaction of basic psychological needs, intrinsic motivation, and teaching efficacy.

**Methods:** A total of 74 teachers (20 male and 54 female) participated in the study. The average age of the teachers was 46.01 years (SD=12.64, range=22-68). The average teaching experience was 17.33 years (SD=13.83, range=1-45). Teachers were divided into two groups: experimental (n=30) and control group (n=44). One week before and one month after the intervention program period, teachers completed a questionnaire containing the study variables. Teachers in the experimental group underwent a four-week online training, during which they were introduced 5-6 videos per week on motivational behaviors for providing autonomy, competence, and relatedness support toward their students. Following video review, they were asked to complete a short test and incorporate the learned motivational behavior into their classes on a weekly basis. At the end of each week, they were tasked to report on the implementation of these motivational behaviors.

**Results:** It was found that teachers in the experimental group reported significantly higher self-reported experiences of providing autonomy support (p=0.002), competence support (p=0.009), and teaching efficacy (p=0.006) at one month follow-up.

**Conclusions:** The web-based intervention program, which focused on enhancing PE teachers' need-supportive behaviors toward their students, successfully boosted teachers' own perceptions of providing need support, as well as teaching efficacy.

# Movement games to promote thinking skills of 5–6-year-old children

**DRAVNIECE I, BULA-BITENIECE I, LINDE A.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** to create a set of movement games integrating mathematics, Latvian language, and natural sciences for children aged 5-6.

**Methods:** 1. Analysis of the literature; 2. Interviews with pre-school teachers; 3. The ascertaining experiment; 4. Creation of the control tasks in the given study areas to assess children's performance before and after the research; 5. Creating and approving a set of movement games; 6. Statistical analysis of the results.

**Results:** A collection of 30 games integrating mathematics, Latvian language, and natural sciences to enhance thinking skills was created and tested in the pre-school educational institution "Xxx". 10 games were dedicated to each learning area. To assess the usefulness of the developed set of movement games, control tasks were created to measure the level of performance of children's thinking skills before and after the approbation of movement games. The control tasks are designed differently, but similarly, according to the created and approved set of movement games. Both control and combined tasks demonstrated an overall performance improvement of 9 points, representing a 20% increase from the initial results. The calculated p-value in all fields of study is less than 0.05, which indicates that the results are reliable and the randomness in the data acquisition process is less than 5%.

**Conclusions:** Upon evaluating the obtained results, comparing children performance the levels in mathematics, Latvian language, and natural sciences before and after the approbation of movement games, it can be concluded that created set of movement games has improved children's thinking skills.

# Unveiling the shadows of cheating: a qualitative investigation of athletes' views on cheating in sports

**HOPPEN B[1], SUKYS S[2].**

**[1]DEPARTMENT OF HEALTH, PHYSICAL AND SOCIAL EDUCATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**[2]DEPARTMENT OF HEALTH, PHYSICAL AND SOCIAL EDUCATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** Cheating in sports remains an intriguing ethical problem that captivates not only researchers but also those interested in sports. The aim of this research was to extend our knowledge of cheating in sports through the athletes' and coaches' perspective, and specifically, to qualitatively describe their perceptions of cheating and the underlying reasons for this behavior.

**Methods:** Eight athletes and four coaches (M = 11, F = 1) representing eight different sports (fitness, football, basketball, sailing, karate, bodybuilding, swimming, boxing) were recruited through purposive sampling to undertake a semi-structured interview to enable a qualitative analysis of athletes' and coaches' views on cheating in sports.

**Results:** When examining cheating in sports, six main themes were identified: the concept of cheating (dishonest behavior; deception; lie; lack of transparency; rule breaking; non-compliance with the law), the concept of cheating in sports (doping; match-fixing; sports' rule breaking; unfair play), reasons to cheat in sports (better results; money; recognition; fame; physical abilities; personality traits; heredity; morality; perfectionism) moral behavior and cheating (the concept of moral behavior, the concept of moral behavior in sports, personal values and sports values), and influence of coaches and parents on cheating in sports (coaching influence on cheating; parental influence on cheating).

**Conclusions:** These findings offer insights into factors that are related to cheating behavior in sports and further our understanding of this complex problem. We believe the current findings can be useful for future antidoping research.

# The peculiarities of teaching professional terminology in English, German, Russian and Latvian to sport science students in virtual and in-person environments

**MALAHOVA L, BOGE I.**

**DEPARTMENT OF MANAGEMENT AND COMMUNICATION SCIENCE, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** The evolution of technologies resulted in the transfer of teaching from the traditional classroom to the online environment in tertiary education, including language teaching. The present study investigates the advantages and limitations of learning sports terminology by sport science students online and face-to-face.

**Methods:** A questionnaire to ascertain students' experiences was distributed to 36 students from different study years, who studied English, German, Russian or Latvian.

**Results:** It was found that both online and face-to-face studies of sport terminology in foreign languages had their advantages and disadvantages from students' perspectives. Students cited flexibility, access to online materials and choice of learning environment as the main advantages, which is consistent with the findings of other studies of online foreign language studies. The disadvantages relate to technical problems, the studies feeling less personal, difficulty in understanding new material and limited availability of the teacher.

**Conclusions:** The conclusion is that synchronous online live classes would work best if supplemented by continuous support from the teaching personnel, regular offline meetings or classes and access to online resources used for studies outside the online lessons.

# Foreign language learning strategy peculiarities in Latvian sport science and health care students

**RUDZINSKA I, JAKOVĻEVA M.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** Test SILL (Strategy Inventory for Language Learning) questionnaire use in learning and teaching foreign language by Latvian HEI (higher education institution) sport and health care students.

**Methods:** We used SILL questionnaire with 49 items - 8 memory, 15 cognitive, 8 metacognitive, 6 compensation, 6 affective and 6 social ones, 3 point Likert Scale: never (1), sometimes (2), often (3); correlational anlaysis to find correlations between the means of strategy groups with student genders and grades in Sport English and English in Physiotherapy courses in sport and health care students in a Latvian HEI, and t-test to find statistically significant differences in the reported use of the strategies.

**Results:** The students tended to use cognitive and compensation strategies more often and affective ones less often (mean =1.78; st.dev.=0.39; min.=1.00; max.=2.67) strategies. The strongest correlation with the grade has the strategy I think about the relationships between what I already know and new things I learn - 0.27, Sig=0.05 (medium strong correlation). t-test proved that statistically significant differences exist in the use of affective strategies only-women use them more (t=-2.09, Sig. (2-tailed=0.04).

**Conclusions:** SILL is a reliable tool to be used to develop Latvian HEI Sport and Health Care student foreign language skills and competencies by using strategies. Women tend to use affective strategies more than men, The students who use memory strategy I think about the relationships between what I already know and new things I learn tend to have higher marks in the mentioned courses.

# Evaluation parameters of communication skills in volleyball

**SPROGE E, ABELE A.**

**DEPARTMENT OF SPORT AND TRAINING THEORY, EDUCATION PSYCHOLOGY, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** Goal-Provide an evaluation of the parameters of communication for evaluating communication skills during contact in volleyball for athletes.

**Methods:** Theoretical - analysis of scientific articles.

**Results:** 1. In order to fully evaluate the communication skills, cooperation, and efficiency of athletes on the field, four main parameters are distinguished. 2.The selection of parameters for evaluating communication skills in volleyball is based on accepted communication models and theoretical principles that aim to enhance teamwork. The chosen parameters will effectively measure the level of mutual communication between volleyball players during game performance.

**Conclusions:** This theoretical basis ensures that players' actions and communications are suitable for teamwork.

# Application ways of artificial intelligence in the sports industry: The systematic literature review

**JASINSKAS E, SIMANAVIČIUS A, ŪSAS A.**

**DEPARTMENT OF SPORT AND TOURISM MANAGEMENT, LITHUANIAN SPORTS UNIVERSITY**

**Aim of the study:** is to reveal the application ways of artificial intelligence in the sports industry.

**Method:** Analysis of scientific literature.

**Results:** Artificial intelligence can be used in the sports business in a number of ways. Several methods are associated with improving the work of a sports coach with athletes, this application ways of AI are performance analytics and injury prevention (Zhang, 2022; Araújo et. al., 2021; Li & Xu, 2021). AI can analyze player performance, help coaches optimize training programs and analyze biometric data to predict and prevent injuries by monitoring players' physical condition and workload. Another major use of artificial intelligence in the sports industry is associated with marketing tools (Naraine & Wanless, 2020; Kuo et al., 2021): fan engagement, marketing and sponsorships, ticketing, and pricing. AI can personalize the fan experience with targeted content, recommendations and interactive features and optimize sponsorship deals. Besides AI algorithms can help optimize ticket prices based on demand, weather, team performance and other factors to maximize revenue. The last group of ways to use artificial intelligence in the sports industry is related to human resource management (Najjar, 2023): Recruiting athletes. AI can help scout and recruit new talent by analyzing player data and performance.

**Conclusions:** The following ways of application of artificial intelligence in the sports industry are most often mentioned in the scientific literature: performance analytics, injury prevention, fan engagement, marketing, and sponsorships, recruiting athletes.

# Development of social skills by children with behavioral difficulties through physical activities

**STANIONIS D, POŽĖRIENĖ J.**

**DEPARTMENT OF PHYSICAL AND SOCIAL EDUCATION, LITHUANIAN SPORTS UNIVERSITY, KAUNAS**

**Aim of the study:** The aim of research is to assess the influence of physical activities on the development of social skills of children with behavioral difficulties.

**Methods:** In order to reveal how the application of physical activities helps to develop the social skills of children with behavioral difficulties, two types of anonymous, closed and open-type question questionnaires both for educators educating younger school-age children and for their parents were prepared.

**Results:** The study revealed that the inclusion of children with behavioral difficulties in physical activities is an excellent tool for the development of their social skills, self-awareness, and mutual cooperation to achieve a common goal. Involving children with behavioral difficulties in regular physical activities lays a secure foundation for their social and personal outlook. Encouraging disciplined, responsible behavior by involving children in team cooperation promotes taking responsibility for behavior and cooperation with the coach and team members. Involving children with behavioral difficulties into physical activities, during which they learn to be responsible, dutiful, and disciplined people, is undoubtedly important for the development of social skills of these children.

**Conclusions:** 1. The research revealed that although teachers who work with children of younger school age take a responsible approach to the development of social skills of children with behavioral difficulties, they lack opportunities for the application of systematic physical activities and the creation of a suitable physical and psycho-emotional environment.

# Ethical issues in sports

**MAJAUSKIENE D[1], VALANCIENE D[2], SKURVYDAS A[1].**

**[1]EDUCATION ACADEMY, VYTAUTAS MAGNUS UNIVERSITY, KAUNAS, LITHUANIA**
**[2]FACULTY OF LAW, VILNIUS UNIVERSITY, LITHUANIA**

**Aim of the study:** Sport has a great importance for society's values and norms of behavior. Sports competition is often a role model for parents, coaches, and teachers to teach their children values and behavior patterns. However, sports arenas are full of unethical behavior. The positive impact of sport on societies can take place when it is guided by ethics. According to Milius' utilitarian theory, if utilitarian moral theory is diligently practiced by the sporting community, at best it can help improve world relations, and at worst, help prevent slippage of world relations (Schneider, 2015). Scientists, paying attention to the above-mentioned problems, conduct research in which they are analyzed in order to highlight the impact of sports on society and promote ethical values in sports.

**Methods:** Analysis of scientific information as well as content analysis of documentary materials were used methods at this research. Web of science database were consulted.

**Results:** After analyzing the scientific articles available in the Web of Science database since 1990, we found that research on ethical issues in sports is increasing. Researchers have focused on respectability, integrity, doping, and matters related to the Olympic movement. Less attention has been given to corruption and bullying in sports.

**Conclusions:** In order to promote ethical sport, it is important to ensure compliance with the principles set forth in the Sports Code of Ethics, the Olympic Charter, and the Anti-Doping Code. It is especially important that sports institutions and organizations promote ethical values through sports, educate athletes, and maximize the potential of sports for building a better society.

# Session 3: Physiotherapy and Health

## Health behaviour influencing factors in physiotherapy students: descriptive study

**SPUNDIŅA L[1], ĀBELE A[1], VESETA U[2].**

**[1]LATVIAN ACADEMY OF SPORTS EDUCATION**
**[2]RIGA STRADIŅŠ UNIVERSITY**

**Aim of the study:** The aim of this study is to describe health behavior factors in physiotherapy students.

**Methods:** A cross-sectional descriptive study was conducted. There was used survey consisting of General Self-Efficacy Scale, IPAQ SF for physical activity (PA) measurement, and Health Behavior Inventory measured in 4 subscales: proper eating habits, preservative behavior, positive mental attitude, and health practices.

**Results:** In total, 52 physiotherapy students participated in the study. 37 (27 female, 10 male) with a mean age 20.6. were included in further analysis. 55.2% reported sufficient PA, 37.9% moderate, and 6.8% insufficient PA. Self-efficacy (SE) scores range from 22.00 to 38.00, with an average of 31.00 (SD 3.84) indicating high SE. 45.9% reported low level of health behavior (HB), 51.4% average and only 2.7 % high HB. Spearman's rho was used to determine the correlation between variables showing positive statistically significant correlation between age and self-efficacy (r=0.545), self-efficacy and positive mental attitude (r=3.98), self-efficacy and physical activity (r=0.336), positive mental attitude and preservative behavior (r=0.422), preservative behavior and health practices (r=0.374), and positive mental attitude and health practices (r=0.376).

**Conclusions:** The positive correlations suggest that factors such as age, self-efficacy, positive mental attitude, and engagement in physical activity may influence health behavior among physiotherapy students. Further investigation in larger sample size should be conducted. Based on the identified correlations, tailored interventions can be developed to target specific factors influencing health behavior among physiotherapy students.

# Effect of a 3-month home exercise program on 6-minute walk test and handgrip strength in children with cystic fibrosis

**METS M[1], AMJAGA A[1,2], PUKS K[2].**

**[1]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]TALLINN CHILDREN'S HOSPITAL, TALLINN, ESTONIA**

**Aim of the study:** To assess the effect of a 3-month home exercise program (HEP) on 6-minute walk test (6MWT) result and handgrip strength in children with cystic fibrosis.

**Methods:** Eight children (ages 8-17 years) diagnosed with cystic fibrosis participated in this intervention study. All participants performed a 3-month HEP which included endurance, strength and stretching exercises. Participants were instructed to perform the HEP minimum of 3 hours each week. The participants' aerobic capacity was measured with 6MWT and handgrip strength with a hand-held dynamometer. Assessments were done pre-HEP and post-HEP.

**Results:** All participants completed the 3-month HEP. Participants performed the HEP 5.25±0.34 days (mean ± SE) per week, during which they spent an average of 3.75±0.37 (mean ± SE) min per week performing the exercise program. Post-HEP, the 6MWT distance increased significantly ($p<0.05$) from 553.4 m to 621 m. Heart rate, oxygen saturation, and fatigue and dyspnea results after 6MWT did not change significantly post-HEP ($p>0.05$). The 3-month HEP did not have a significant effect on handgrip strength ($p>0.05$), which was 24 kg pre-HEP and 24.9 kg post-HEP. However, dominant handgrip strength was found to be positively correlated with the 6MWT distance.

**Conclusions:** The 3-month HEP improved aerobic endurance in 6-17-year-old children with cystic fibrosis by increasing 6MWT distance to an age-norm level after HEP. This study provides insight into the effect of a HEP in Estonian children diagnosed with cystic fibrosis. Further studies with larger samples and longer interventions are needed to fully determine its effect and impact.

# Interleukin 6 coding gene variant in Lithuanian professional team sports

**ANIKEVIČIŪTĖ G[1], ŽAŽECKYTĖ G[1], GINEVIČIENĖ V[1,2].**

**[1]DEPARTMENT OF HUMAN AND MEDICAL GENETICS, INSTITUTE OF BIOMEDICAL SCIENCE, FACULTY OF MEDICINE, VILNIUS UNIVERSITY, VILNIUS, LITHUANIA**
**[2]EDUCATION ACADEMY, VYTAUTAS MAGNUS UNIVERSITY, KAUNAS, LITHUANIA**

**Aim of the study:** Phenotypes of athletic performance are complex traits influenced by genetic and environmental factors. The IL-6 rs1800795 (-174G/C) single nucleotide polymorphism (SNP) was found to be functionally affected IL-6 activity during muscle contraction. Research shows that IL-6 G-allele associated with increased IL-6 levels and physical performance characteristics of professional athletes. The aim of the present case-control association study was to examine the association between the IL-6 rs1800795 polymorphism and athletic performance among Lithuanian elite athletes.

**Methods:** The study sample included 191 Lithuanian elite athletes (endurance, sprint/power, and team sports) and 205 non-athletes from the general Lithuanian population (control group). Genotyping of IL-6 rs1800795 was performed by real-time polymerase chain reaction method using TaqMan® technology. Statistical data analysis was performed using R Studio 4.1.1.

**Results:** Case-control association analysis revealed that the IL-6 rs1800795 genotypes significantly differed in the team sports group (due to a prevalence of GC genotype) compared to the control group (GG/GC/CC: 16.7%, 66,7%, 16.7% vs. 35.1%, 43.4%, 21.5%, $p<0.01$). Binary logistic regression analysis showed that the IL-6 heterozygous GC genotype more than doubled the odds of becoming a professional team sports athlete (OR = 2.6; 95% CI: 1.46-4.67; $p<0.005$).

**Conclusions:** Genetic variant of IL-6 is important factor in adaptation to intense physical training, especially in team sports. The IL-6 rs1800795 polymorphism (GC-genotype) is related to aerobic and anaerobic capacity and can be interpreted as a predisposing factor for high results of Lithuanian team sports representatives.

# Impact of muscle-strengthening workouts on human kinetic chains based on literature review

**OZOLS E, GALEJA Z.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** is to find out the effects of therapeutic exercises on the entire KC, and the secondary goal was to highlight which exercises activated the entire KC in better ways to enhance physical performance compared to the single muscle activation of a KC.

**Methods:** A search of the literature was performed from 1 January 1990 to 1 March 2024 and the first evidence of the effect of exercises on the functioning and performance of the kinetic chain was found in 1990. We searched the four databases of Web of Science, ScienceDirect, PubMed, Scopus.

**Results:** Kinetic chain exercises can engage either individual muscle groups or multiple muscle groups simultaneously. The research results indicate that closed-chain exercises stimulate a greater number of muscle groups within a kinetic chain compared to open-chain exercises. Combining closed and open-chain exercises in a mixed approach allows for targeting a broader range of muscle groups throughout an entire kinetic chain.

**Conclusions:** However, no closed or open-chain exercise can activate the optimal muscles of different regions simultaneously.

# Basic principles of rehabilitation of oncological patients

**CIEKURE M[1], CIEKURS K[2].**

**[1]NATIONAL HEALTH SERVICE REPUBLIC OF LATVIA**
**[2]LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** In recent years, the prevalence of malignant tumors has been increasing. Additionally, cancer is one of the leading reasons of disability worldwide. Thanks to early diagnosis and timely initiation of cancer treatment, which includes rehabilitation during treatment, the survival and quality of life of the oncology patients can be significantly improved. The goal of this research is as follows - To determine if rehabilitation is an integral part of an integrative health care model for oncological patients.

**Methods:** In order to successfully achieve the goal of the research, the following research methods were applied: research and analysis of scientific literature sources and documents. In the framework of the research, the medical documentation of oncology patients in 4 stages of cancer treatment was studied.

**Results:** Immediately after establishing the oncological diagnosis, it is important to determine the stage of the cancer and make a histological verification of the tumor, as further treatment tactics depend on it. Initially, when working with oncological patients, potential rehabilitation specialists should be involved as soon as possible. Subsequently, after the primary therapy of oncological patients is determined, the side effects of the chosen treatment method can be observed. Moreover, if malignant tumors have been cured, it is important to evaluate the state of oncological patients in the long term by conducting a dynamic monitoring by a specialist.

**Conclusions:** In conclusion, appropriate physical activity should be adapted for all types of cancer and stages of treatment. Physical activity can prevent the development of cancer, improve quality of life.

# The effectiveness of adapted physical activity on the physical and emotional state of people with Alzheimer's disease

**JOCIENE E, POZERIENE J.**

**DEPARTMENT OF HEALTH PROMOTION AND REHABILITATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** Alzheimer's disease (AD) is a chronic, degenerative, irreversible brain disease in which memory, speech and orientation disorders, mental and behavioral disorders, and difficulties in performing daily life activities occur due to the death of neurons. (Knopman et al., 2019). Physical activity has beneficial effects on cognitive function in individuals at risk of AD and in individuals with dementia (Muller et al., 2018). The aim of the study is to assess the effect of adapted physical activity (APA) on emotional/physical state, cognitive functions, and signs of dementia of people with Alzheimer's disease.

**Methods:** The study involved 5 subjects who lived in a nursing home and were diagnosed with AL. The selection criteria were as follows: age (65-70 years old), diagnosed with Alzheimer's disease; does not have other neurological diseases, the ability to move independently, understand tasks and perform them. Research methods: Blessed Dementia Scale, Short Physical Performance Battery - SPPB); The Cognitive Failures Questionnaire, Clock Drawing Task (CDT).

**Results:** The Short Physical Performance Battery results after 3-month participation in APA program improved: 1) in balance by 0.1 points (before APA sessions, 1.4 ± 0.53 points, and 1.5 ± 0.6 points after APA); 2) in Walking by 0.1 points (before APA sessions, 1.7 ± 0.21 points, and 1.8 ± 0.48 points after APA). There was significant improvement Cognitive function was the same as at the beginning of the study.

**Conclusions:** The APA program, used for three months, did not have statistical improvement in the subjects physical and emotional state.

# FMS (Functional Movement Screen) evaluation after correction of diastasis of M. Rectus Abdominis in women 1-3 years after childbirth

**GALEJA Z, OZOLS E.**

**INSTITUTE OF PHYSIOTHERAPY, LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** During pregnancy, a woman's body is affected by various changes - physiological, psychological, biochemical, anatomical. One of the changes can be mentioned the expansion of the diastasis recti abdominis. Also, diastasis can cause abdominal hernias, stress urinary incontinence, fecal incontinence, pelvic pain, and diastasis creates a cosmetic defect. (Michalska, 2018; Reinpold, 2019; Thabet, 2019). This results in a decrease in abdominal wall integrity, mechanical control, and functional strength. The aim of the research: to study the impact of rectus abdominis diastasis on the functional abilities of the musculoskeletal system.

**Methods:** 1) Literature analysis; 2) Measurement of diastasis with a caliper (3 measurements); 3) Assessment of functional movements - FMS test; 4) Experiment; 5) Mathematical statistics.

**Results:** In FMS, the result of each test has improved separately, but statistically reliable changes are not observed in the "hurdle step" test. The total number of FMS points increased by 2.9 points, from 12.5 ± 1.84 points to 15.4 ± 1.37 points, which indicates that the limit value of 14 points was violated because if less than 14 points are obtained in the FMS test, there is a higher probability that a person will get injured.

**Conclusions:** The application of the therapeutic exercise program (developing the deep muscles of the corset) for 8 weeks gives statistically reliable positive changes - in 3 measurement levels, the diastasis of the rectus abdominis decreases, which shows that it is also possible to correct the diastasis 1-3 years after childbirth.

## Session 4: Physical Activity and Fitness

# Acute intraocular changes during isometric exercise and recovery: the influence of participant's sex and breathing type

**VIEVERSYTĖ-DVYLIENĖ M[1], STRECKIS M[2], BRAZAUSKAS L[2], STRECKIS V[3].**

**[1]INSTITUTE OF SPORTS SCIENCE AND INNOVATION, LITHUANIAN SPORTS UNIVERSITY**
**[2]FACULTY OF MEDICINE, LITHUANIAN UNIVERSITY OF HEALTH SCIENCES**
**[3]DEPARTMENT OF TRAINING SCIENCE, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**

**Aim of the study:** To compare ocular changes during isometric exercise in both sexes with different kind of breathing techniques.

**Methods:** 24 healthy volunteers performed isometric exercise (knee extension) in a BIODEX MEDICAL SYSTEM chair for 1 minute: randomly selected 12 subjects (6 men and 6 women) with normal breathing (NB) and the rest - while holding their breath for the last 10 seconds (Valsalva's maneuver (VM)). Rebound tonometry was used to measure intraocular pressure (IOP) and Aurora fundus camera - photos of retinal vessels before exercise, directly after and 5,10,15 min of recovery. "ImageJ" was used for manual vessel's diameter calculation.

**Results:** During VM there was significant decrease of IOP in female group 5min after exercise ($p<0,05$), while during NB there was no significant changes between sexes. Female superior artery-to-vein ratio (AVR) decreased significantly immediately after, 5 and 10 min after exercise during NB, and VM caused a decrease in AVR immediately and after 5 min post exercise in both sexes. During NB, the inferior AVR was statistically significantly reduced only in the male group 10 min after exercise, while VM caused a change in AVR in both sexes immediately after exercise, and in men 5 min after.

**Conclusions:** To avoid sudden changes in AVR and IOP after isometric training, NB during exercises and longer rest intervals between exercises should be recommended. Post-exercise changes in retina showed slower recovery in AVR in women than in men during both breathing techniques.

# Effects of two-week reduction in physical activity on skeletal muscle strength and endurance of young men and women

**KATINĖ A[1], ŠERMUKŠNIS M[1], GRAY S. R[2], RATKEVIČIUS A[1,3].**

**[1]DEPARTMENT OF HEALTH PROMOTION AND REHABILITATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**[2]INSTITUTE OF CARDIOVASCULAR AND MEDICAL SCIENCE, UNIVERSITY OF GLASGOW, UK**

**[3]SPORTS AND EXERCISE MEDICINE, WHRI, SCHOOL OF MEDICINE AND DENTISTRY, UK**

**Aim of the study:** to investigate effects of two-week reduction in step counts to below 2500 steps per day on muscle strength, endurance and aerobic capacity in young men and women.

**Methods:** 39 volunteers (16 men, 23 women) were randomly assigned to the control (CON) or intervention (INT) groups, respectively. CON group (8 men, 11 women) maintained their usual levels of physical activity while INT group (8 males, 12 females) reduced physical activity to less than 2500 steps per day. Measurements of aerobic capacity were taken with ergometer cycling exercise and Polar heart rate monitor, muscle strength and endurance time was measured with Biodex system 3, body composition was measured with TBF-3000, tanita.

**Results:** Women had higher ($p < 0.01$) HR than men. HR increased ($p < 0.001$) with increase in exercise intensity for both sexes. CON and INT groups differed ($p < 0.01$) in changes of MVC for knee extension as MVC tended to increase in CON group and decrease in INT group from the pre to the post measurements. There were no differences between men and women in the endurance time.

**Conclusions:** The results show that two-weeks of very low step counts reduced voluntary strength of knee extensors but did not affect knee flexors of men and women. There were also no changes in isometric contraction endurance or aerobic fitness. It appears that the negative impact of physical inactivity was greater for the antigravity muscles compared to their antagonist.

# Estonian 10th graders' physical fitness levels compared to FitBack health-related norms

**VAHER K, MÄESTU E, PIHU M.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** Physical fitness (PF) is one of the powerful markers of health in children and adolescents,1,2, but there has been a growing concern about the decline of the PF (Fühner et al. 2021, Masanovic et al. 2020). Cardiorespiratory fitness (CRF) and muscular strength have shown strongest and consistent associations with health-related outcomes 3,4. This supports the relevance of fitness assessment at the individual and population levels. The aim of this study is to measure health-related PF in Estonian 10th grade students and to compare the results with Fitback health-related norms.

**Methods:** In total 521 10th grade students (236 male), aged 15-17 years, health-related fitness was measured. For CRF 20-m shuttle run was performed and for muscular strength standing long jump (in cm) and handgrip strength (in kg) was measured. All individual results were compared to FitBack health-related norms.

**Results:** Average results for the handgrip strength was 46.9±8.2kg for males and 30.2±4.8kg for females and for standing long jump 222.4±28.1 cm for males and 167.9±23.9 cm for females. For the 20m shuttle run test, male students were on the average stage 7.0±2.2 and female students on the stage 4.1±1.4. According to the handgrip strength about 54% of students, to the standing long jump about 61% of students and to 20m shuttle run about 45% of students were in good healthy range. Whereas, about 22%, 21% and 28% of students were in poor health range, based on handgrip strength, standing long jump and 20m shuttle run, respectively.

**Conclusions:** Although little more than 50% of 10th grade students have good fitness levels, about 25% of 10th grade students had poor health-related fitness, meaning that in order to prevent current or future health risks it is necessary to significantly improve their fitness.

# Age-related changes in the Tartu marathon and half-marathon performance

**PEHME A, PUHKE R, ALEV K.**

**INSTITUTE OF SPORT SCIENCE AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** Every sports discipline has its specific age of peak performance. Several researchers have shown that performance in sports peak is attained in the late twenties or early thirties for both men and women. The aim of the present study was to compare the age of peak performance of men and women in the 1997 and 2024 Tartu marathons and half-marathons.

**Methods:** All participants who finished the Tartu Marathon`s 63 km and 31 km race in 1997 and 2024 were considered. Data were obtained from the publicly available race website. Age, gender, and finishing time of each official finisher were considered for data analysis. Female and male finishers were distributed into 5-year age intervals. The men-to-women ratio was calculated for the whole sample and each age group.

**Results:** In 1997, 10 times more men than women finished the marathon, in 2024 the finishing number of women had increased, making up 15% of all finishers. The men-to-women average ratio did not change significantly in the half marathon distance. Men were mainly participating between 20-60 years and women 20-55 years in the 1997 marathon. In the 2024 marathon no differences between men and women emerged, with most participants aged 35-60 years. When 5-year intervals were considered, the age group of peak performance was 30-34 years in the 1997 marathon and 25-29 years in the 2024 marathon, for both women and men. The best race time was obtained at 30.

# Research protocols: The effect of participation in sports on problematic internet use and physical and cognitive health in adolescents

**NURULFA R, KLAVINA A.**

**LATVIA ACADEMY OF SPORT EDUCATION**

**Aim of the study:** Adolescence is a crucial life phase. The physical, mental, cognitive, and social development of humans accelerates during this time. At this age, individuals develop independent lifestyles that can affect their health and academic success. This study examined how extracurricular sports affect cognitive and physical capacities in 11–16-year-olds.

**Methods:** This cross-sectional study will include 100 teenagers, 50 from Latvia and 50 from Indonesia. Three research tools will be used in the study: the Problematic Risk Internet Use Screening Scale (PRIUSS), the Bruininks-Oseretsky Motor Skills Test II (BOT 2), and Raven's Progressive Matrices. The study hypothesizes that teenagers who exercise after school have stronger motor proficiency, cognitive capacities, and decreased internet use risks. This initial study begins with a literature review of problematic internet use, physical movement proficiency, and cognitive function. The researchers identified adolescent physical, emotional, social, and cognitive health issues. Prior studies from 2019 to 2024 yielded noteworthy findings.

**Results & Conclusions:** Based on the consistent findings of a positive relationship between problematic internet use and cognitive ability which in turn leads to decreased physical activity. Therefore, further research is needed and strategies to enhance physical and cognitive activity, ultimately reducing levels of problematic internet use in adolescents. To protect and involve adolescents to maximize their growth and development, improve their physical and mental health as adults, and strengthen future generations.

# Physical activity and fitness of applicants of the Estonian Academy of Security Sciences

**JALAKAS E.**

**ESTONIAN ACADEMY OF SECURITY SCIENCES**

**Aim of the study:** Physical abilities are necessary components in the field of internal security. Regular weekly physical activity is correlated to body composition parameters as well as with the physical ability to perform fitness tests well.

**Methods:** In survey 2021 year applicants of the Estonian Academy of Security Sciences entrance test data and voluntarily collected answers and measurements were analyzed to discover cutting points of differences among physical activity and body parameters to physical tests results.

**Results:** The result of the women 3 km run was statistically significantly connected to the distribution of training repetitions (>=4 times training per week 18:23, St.D 2:28; <=3 times 19:22, St.D 2:02; $p<0.05$) For women whose BMI was 22 kg/m2 or more, the average time of a 3 km run (19:39, St.d =1.54) was statistically significantly different from women with BMI<22 kg/m2 (18:22, St. D=2:23) ($p<0.01$). The divergence point of the result of a statistically different 3 km run in men according to BMI was BMI 25 kg/m2 or more - such men had an average result of 16:27 (St.D 1:42), men with a BMI of less than 25 had an average result of the run of 15:28, St. D 1:59, $p<0.01$. Men who exercised 4 or more times a week before physical tests had statistically significantly higher mean results in the 2-minute sit-ups test (50 repetitions, St.D=13,4 vs 57,6 repetitions, St.D=12,0).

**Conclusions:** Further studies are recommended to encourage physical activity before and during internal security officer's training.

# SCIENTIFIC SESSION II

## Session 1: Sports Physiology and Coaching II

**April 25, 2024**
**Room: A.M. Viru auditorium**

### Aerobic capacity under specific and non-specific testing conditions in swimmers aged 11-13 years

**MACONYTĖ V[1], STASIULĖ L[1], JUODSNUKIS A[1], ZUOZIENE IJ[2], STASIULIS A[1].**

**[1]DEPARTMENT OF HEALTH PROMOTION AND REHABILITATION, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**
**[2]DEPARTMENT OF COACHING SCIENCES, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**

**Aim of the study:** to compare aerobic capacity indicators under specific and non-specific testing conditions in young swimmers aged 11-13 years.

**Methods:** Eleven healthy swimmers (mean age, 12.1 ± 1.0 years) performed three incremental exercise tests. One of the tests was performed under specific conditions (swimming test), and the other two were under non-specific conditions (cycling and arm cranking). Data on the pulmonary gas exchange were recorded using the portable analyser MetaMax 3B (Cortex, Leipzig, Germany).

**Results:** The relative peak oxygen uptake (V̇O2peak) value during swimming was 49.3 ± 6.2 mL/kg/min, which was higher than that during arm cranking (39.6 ± 7.3 mL/kg/min; $P < 0.01$) but lower than that during cycling (54.3 ± 7.8 mL/kg/min; $P < 0.01$). Strong positive correlations were observed in the absolute and relative V̇O2peak values between swimming and cycling ($r = 0.857$, $P < 0.01$; $r = 0.657$, $P < 0.05$) and between swimming and arm cranking ($r = 0.899$, $P < 0.01$; $r = 0.863$, $P < 0.05$). A strong positive correlation was also observed in V̇Epeak values between swimming and arm cranking ($r = 0.626$, $P < 0.05$).

**Conclusions:** Swimmers aged 11-13 years showed V̇O2peak and V̇Epeak values during the specific swimming test that were significantly greater than those during arm cranking but lower than those during cycling. However, aerobic capacity parameters measured during specific conditions significantly correlated with those measured during non-specific conditions.

# Associations between internal load and changes in performance in youth basketball players

**KUUSEMETS R, MÄESTU J, PURGE P, VAHTRA E.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** The aim of the study was to compare and analyse internal load parameters, wellness and physical performance changes in youth basketball players during 6-week in-season phase.

**Methods:** Twelve young male basketball players (age: 15 ± 1 years; height: 186 ± 10.5 cm; body mass: 73,9 ± 15.2 kg) competing in the Under16 Estonian Championships were recruited for this study. Changes in workload and wellness were monitored across 6 weeks during the in-season phase. Physical performance was assessed with 20-m sprint, countermovement jump and incremental exercise test until volitional exhaustion. Internal load was determined as session-rating of perceived exertion (sRPE) and also using heart rate and accelerometry (Polar Team Pro) to calculate cardio and training load. Wellness was evaluated using questionnaires assessing fatigue, sleep quality, general muscle soreness, stress levels and mood.

**Results:** Workload was significantly lower ($p<0.05$) during the sixth week. Workload according to sRPE was significantly higher ($p<0.05$) during the third and fifth week compared to the first week. Cardio load and training load were associated ($p<0.05$) with each other. sRPE did not have any association with cardio and training load. Countermovement jump did not change during study, while 20-m sprint was significantly decreased ($p<0.05$) at the end of the study. There were no changes in wellness during the study.

**Conclusions:** sRPE as subjective internal load did not have any association with objective cardio and training load. This finding suggests that players subjective feeling can be different from their heart rate values.

# Influence of high training loads and neuromuscular fatigue on performance change in high-level basketball players during a preparatory period

**KALMUS O-E[1], MÄESTU J[1], KAART T[2], ALVAR B[3], NACLERIO F[4].**

**[1]INSTITUTE OF SPORTS SCIENCES AND PHYSIOTHERAPY, FACULTY OF MEDICINE, UNIVERSITY OF TARTU, TARTU, ESTONIA**

**[2]INSTITUTE OF VETERINARY MEDICINE AND ANIMAL SCIENCES, ESTONIAN UNIVERSITY OF LIFE SCIENCES, TARTU, ESTONIA**

**[3]DEPARTMENT OF KINESIOLOGY, POINT LOMA NAZARENE UNIVERSITY, SAN DIEGO, CA, USA**

**[4]INSTITUTE FOR LIFECOURSE DEVELOPMENT, SCHOOL OF HUMAN SCIENCES, CENTRE FOR EXERCISE ACTIVITY AND REHABILITATION, UNIVERSITY OF GREENWICH, UNITED KINGDOM**

**Aim of the study:** This study examined the effect of a 21-day (3-week) low-volume taper period, after a 5-week loading phase in ten elite basketball players (age 23±3.9 years, height 196.3±7.6 cm, body mass 92.8±7.8 kg).

**Methods:** Weekly changes in internal training load (iTL), estimated by the workout time and the post-workout perceptual response and countermovement jump (CMJ) performance as a marker of neuromuscular fatigue, were monitored across the study. Additionally, CMJ, 20-m sprint time (S-20) and the mean concentric velocity using a predetermined 1-m·s−1 load in barbell back squat (Squat V1Load) were measured before the loading phase and at 7, 14, and 21 days during the taper phase.

**Results:** Compared to the last loading week, the iTL was significantly lower ($p<0.05$) during the 3-week taper. CMJ height and Squat V1Load decreased during the 5-week loading phase and were significantly ($p < 0.001$) lower compared to the baseline values. Conversely, CMJ and Squat V1Load progressively increased during the taper, reaching similar values to the baseline after one week (week 6). Even though CMJ, V1Load and S-20 recovered during the taper, only the CMJ height demonstrated further significant ($p<0.05$) positive enhancement effects in the last week of the taper (week 8) compared to the baseline. Additionally, no significant changes from baseline were observed for the S-20 and Squat V1Load during the taper period.

**Conclusions:** In conclusion, after a 5-week loading period, a three-week low-volume taper is sufficient to restore neuromuscular performance (as estimated by the CMJ height test in elite basketball players).

# Concurrent validity and reliability of laboratory and portable vertical jump assessment technologies

**COLETTA F[1], FREIDGEIMAS G[1], PERNIGONI M[1], KAMANDULIS S[2].**

**[1]DEPARTMENT OF COACHING SCIENCE, UNIVERSITY OF KAUNAS, LITHUANIA**
**[2]INSTITUTE OF SPORT SCIENCE AND INNOVATION, UNIVERSITY OF KAUNAS, LITHUANIA**

**Aim of the Study:** This research aimed to evaluate the concurrent validity and reliability of three portable vertical jump measurement technologies-Optojump, G-Flight, and My Jump 2- in comparison to the laboratory standard "AMTI" force plate system.

**Methods:** The study involved fifteen female football players aged 14-16, who performed vertical jumps measured by the aforementioned technologies across two different days. Pearson's correlation coefficient (r) was calculated to assess the validity of the tools compared to "AMTI" plate and to evaluate test-retest reliability.

**Results:** All three technologies demonstrated very strong positive correlations with the "Force plate" (Optojump: $r = 0.996$, G-Flight: $r = 0.978$, My Jump 2: $r = 0.948$; all $p < 0.001$), indicating high concurrent validity. Additionally, test-retest reliability was high for all technologies (Optojump: $r = 0.931$, G-Flight: $r = 0.894$, My Jump 2: $r = 0.875$; all $p < 0.001$), showcasing consistent performance across sessions.

**Conclusions:** The study concludes that recent advancements in technology provide reliable and informative tools for vertical jump measurement, capable of supporting athletes across various sports disciplines. These technologies offer practical, cost-effective options for sports practitioners and researchers in various training and competitive environments.

# Coaching and sports training quality monitoring

**VITOLIŅŠ K, FERNĀTE A.**

**LATVIAN ACADEMY OF SPORTS EDUCATION**

**Aim of the study:** Performance analytics and monitoring of athletes performance have been widely studied and discussed in the scientific literature. However, less attention has been paid to the systematic monitoring of coaches activities and the determining criteria of a good sports training process. The aim of the study was to gain an understanding of the content of the existing scientific literature on the monitoring of coaches and the most important aspects of the quality assessment of the training process.

**Methods:** The method used were a systematic review of the published sources of scientific literature, which are available in the electronic databases of ScienceDirect and Google Scholar (published from 2014-2024). The following keywords were used: "coaching monitoring"; "sport training quality"; "sport training quality monitoring".

**Results:** As a result of the study, the term coaching monitoring was explained and the most important aspects of monitoring the quality of sports training were examined. The meaning and function of coaching monitoring involves continuous systematic data collection based on selected criteria, with its most essential function being the ability to instantly inform involved parties about the characteristics of the performance process. Sport training quality monitoring also considers systematic and continuous data collection on selected criteria to provide involved parties with training process characteristics.

# Knee muscle strength and hamstrings to quadriceps ratio in young and adult football players

**ZUSA A, ZIDENS J, JAKUBOVSKIS G, LAKSBERGS M.**

**HEALTH CARE IN SPORT RESEARCH CENTER, LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**

**Aim of the study:** Knee joint injuries are popular in football players, the hamstrings and quadriceps muscle strength and H:Q ratio is most examined parameter and is associated with knee injury risk and it prevention. Previous studies have reported results of hamstrings to quadriceps strength ratio from 50 to 83%. Many studies have examined isokinetic muscle strength in different angular velocities and age groups, however, the number of studies with young athletes are limited. The aim of the study was to evaluate the muscle strength and hamstrings to quadriceps peak torque ratio in young and adult football players.

**Methods:** Three and ten maximal voluntary isokinetic knee flexions and extensions at angular velocity 60°/s and 180°/s, and H:Q strength ratio was evaluated.

**Results:** It was found that larger H:Q strength ratio is during angular velocity 60°/s test. There is a positive relationship between age, athlete's sport level and H:Q strength ratio - in adult athletes hamstring to quadriceps muscle strength ratio is larger in comparison with young players.

**Conclusions:** The results suggest, that regular high intensity specific training in football is increasing H:Q strength ration and increases knee joint injury risk.

# Agreement between ventilatory thresholds and muscle oxygen saturation breakpoints of *Vastus Lateralis* and *Erector Spinae* muscles of young trained road cyclists

**RANNAMA I, REINPÕLD K.**

**SCHOOL OF NATURAL SCIENCES AND HEALTH, TALLINN UNIVERSITY, ESTONIA**

**Aim of the study:** to analyse the agreement between Ventilatory Thresholds and local muscle oxygen saturation (SmO2) Breakpoints of the Vastus Lateralis and Erector Spinae muscles.

**Methods:** 13 male and three female competitive cyclists (19.5±6.3 y.; 1.81±0.08 m; 73.1±7.7 kg; 61.4±6.5 mL/min/kg) performed incremental cycling exercise (3 min steps and 30W of 20W (female) increment) on Cyclus2 ergometer. First (VT1) and second (VT2) Ventilatory Thresholds were evaluated through pulmonary gas exchange, and changes in the linearity of the left (L) and right (R) Vastus Lateralis (VL) and Erector Spinae (ES) muscle SmO2 signals were determined as first (BP1) and second (BP2) Breakpoints. The agreement between relative power (Pkg) values at VT1 and BP1 and VT2 and BP2 for all muscles was evaluated by Bland-Altman (Limits of Agreement - LOA) and correlation analyses.

**Results:** The average Pkg values were 2.85±0.39, 2.70±0.36, 2.85±0.48, 2.87±0.36 W/kg for VT1 and BP1 for LVL, RVL and ES, and 4.03±0.452, 3.81±0.4, 4.03±0.56, 4.23±0.53 for VT2 and BP2 for LVL, RVL and ES. LOA and between VT1 and BP1 were -0.42 to 0.76, -0.66 to 0.67 and -0.44 to 0.39 and between VT2 and BP2 -0.56 to 1.00, -0.63 to 0.64 and -0.61 to 0.21 for LVL, RVL and ES respectively. The correlations between VT1 and BP1 were r=0.69, r=0.71 and r=0.85, and between VT2 and BP2, r=0.64, r=0.82 and r=0.92 for LVL, RVL and ES, respectively.

**Conclusion:** The SmO2 BP-s of ES are in higher agreement with systemic thresholds than BP-s in VL as primary power-producing muscles during cycling.

# Session 2: Pedagogy, Social Aspects and Management in Sport II

**April 25, 2024**
**Room: F. Kudu auditorium**

## Relationships of Estonian adolescents' participation in sport with values and attitudes towards moral decisions

**NOORMETS J, KUU, S.**

**SCHOOL OF NATURAL SCIENCES AND HEALTH, TALLINN UNIVERSITY, ESTONIA**

**The aim of the study:** to investigate the relationship between Estonian adolescent's values and moral decision-making attitudes with the activity of participating in sports. The data in the present study were part of the project initiated by the Tallinn University and was conducted in the 2021/2022 academic year. Research project has been approved by the Ethics Committee of Tallinn University.

**Methods:** The sample (n=1892) for the study consisted of 12- to 17-year-old boys (n=925) and girls (n=967) from 25 schools. A sum index of sport activity (SAI) was calculated, consisting of three variables of extracurricular sports participation. Three groups were distinguished: low, moderate, and high active. Study adopted Youth Sport Values Questionnaire (Lee et al., 2008) and Attitudes to Moral Decision-making in Youth Sport Questionnaire (Lee et al., 2007).

**Results:** MANOVA was conducted to determine whether there is a difference between SAI groups on YSVQ-2 subscale and AMDYSQ subscale scores. There were statistically significant differences in YSVQ-2 and AMDYSQ subscale scores between different SAI levels. With one exception (acceptance of cheating) the SAI has a statistically significant effect on all values (moral, competence, status) and two attitude factors (acceptance of gamesmanship, keep winning in proportion). The results indicated that, compared to low active students, high active students reported higher levels of moral, competence and status values, and acceptance of gamesmanship and keeping winning in proportion.

**Conclusions:** We can reject the null hypothesis and conclude that sports activity has at least a weak effect on values and attitudes in sport.

# Outdoor activities interventions evaluation on students' self-regulation skills

**ANTAPSONE E.**

**LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**

**Aim of the study:** To assess the impact of an outdoor activity intervention on enhancing students' self-regulation skills: ability to follow instructions, self-regulation of behavior and emotional self-regulation.

**Methods:** research and analysis of literature sources, The Emotion Regulation Checklist, Day-Night Stroop task; Head-Toes-Knees-Shoulders task; mathematical and statistical methods.

**Results:** After the outdoor activity intervention, students' self-regulation skills were retested. Based on the obtained results, it was concluded that the statistics do not confirm the reliability of the average increase. Statistics confirmed the reliability of the average increase in self-regulation of student behavior ($p<0,05$).

**Conclusion:** The applied outdoor activity intervention has contributed to the self-regulation of students' behavior and according to the average indicators, a positive trend towards the increase of results in the self-regulation of students' behavior and the ability to follow instructions is visible.

# How young athletes in Lithuania assess their self-regulated learning skills?

**GRAŽULIS D[1], SABALIAUSKAS S[2], ŽILINSKIENĖ N[1], KAUKĖNAS T[3].**

**[1]ACADEMY OF EDUCATION, VYTAUTAS MAGNUS UNIVERSITY, LITHUANIA**
**[2]FACULTY OF MEDICINE, VILNIUS UNIVERSITY, LITHUANIA**
**[3]YOUNG RESEARCHER, LITHUANIA**

**Aim of the study:** This study was conducted to determine how the Lithuanian youth population involved in sport evaluates self-regulatory learning skills by responding to the Self-Regulatory Learning in Sport Practice 26-item scale (SRL-SP).

**Methods:** Our study included 731 respondents (mean age 16.03 (±1.38) years; on average, athletes practiced their chosen sport for 6.46 (±2.95) years, 8.33 (±2.09) times per week and on average 13.83 (±5.17) hours per week). A refined model of the Self-Regulatory Learning in Sport Practice scale (SRL-SP) was used to assess athletes' self-regulatory skills (McCardle, Young & Baker, 2018). Our SRL-SP consists of 26 statements organized into five subscales with metacognitive items (planning, checking, evaluating/reflecting) and motivational items (self-efficacy for challenge (SEC), effort).

**Results:** The research data showed that younger athletes (13-15 years old) rated their self-regulation skills higher ($p<0.05$) than older athletes (16-19 years old). Individual sport athletes had a statistically significant higher rate (3.98±0.71)($p<0.05$) than team sport athletes (3.86±0.77) in the 'checking' subscale.

**Conclusions:** There are statistically significant differences according to age, sport specificity and performance in the chosen sport. The use of the self-regulation scale in sport serves as a valuable tool for young people to understand the organization and dynamics of their learning environment. By using self-regulation as both a theoretical framework and a practical construct, science is able to improve its understanding of the sport environment as a unique structure.

# Predicting adolescents' physical activity during school recess in a schoolyard: Testing a model based on self-determination theory and theory of planned behaviour in Estonian, Latvian, and Lithuanian samples

**KOKA A[1], RUTKAUSKAITĖ R[2], FERNĀTE A[3], ROOSIVÄLI I[1], GRUDZINSKAITĖ G[2], VAZNE Ž[3], GRUODYTĖ-RAČIENĖ R[2], VISAGURSKIENĖ K[2], TILGA H[1].**

**[1]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]DEPARTMENT OF PHYSICAL AND SOCIAL EDUCATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**
**[3]DEPARTMENT OF SPORT AND TRAINING THEORY, EDUCATION, PSYCHOLOGY AND EDUCATION INTERNSHIP, LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**

**Aim of the study:** This study aimed to examine how motives from the Self-determination Theory (SDT) influence adolescents' intention and physical activity (PA) behaviour during recess in a schoolyard within the Theory of Planned Behaviour (TPB). It was hypothesized that motives will influence intention and subsequent PA behaviour through the cognitions of attitude, subjective norms, and perceived behavioural control (PBC) from the TPB.

**Methods:** Students from Estonia (n=193), Latvia (n=233), and Lithuania (n=284) with mean age of 15.7 years old (SD=1.72; 57% females) completed measures of autonomous and controlled motivation, attitude, subjective norms, PBC, and intention for PA during recess in a schoolyard. Four weeks later, students completed self-reported measure of PA behaviour during school recess in a schoolyard.

**Results:** Results of the well-fitting multi-group structural equation model revealed few significant differences in the structural relations among the constructs in the proposed model across the three countries. The strength of the effect of the autonomous motivation on attitude was significantly lower in the Lithuanian sample relative to Estonian and Latvian samples. The strength of the effect of the attitude on intention was significantly lower in the Estonian sample relative to Lithuanian and Latvian samples, whereas the strength of the effect of PBC on intention was significantly lower in the Latvian sample relative to the Estonian sample.

**Conclusions:** Findings support the generalizability of the pattern of relations between motivational and social cognition correlates of PA intention and PA behaviour during recess in the schoolyard among adolescents in Estonia, Latvia, and Lithuania.

# Inclusive physical education Technological Pedagogical and Content Knowledge (TPACK) among primary schools teachers

**NG K[1,2,3], VENCKUNIENE K[4], KLAVINA A[5], LABECKA M[6], OSTASEVICIENE V[4], POZERIENE J[4], KOISTINEN R[1], PUROMIES M[1], REKLAITIENE D[4], MORGULEC-ADAMOWICZ N[6].**

**[1]UNIVERSITY OF EASTERN FINLAND, JOENSUU, FINLAND**
**[2]UNIVERSITY OF TURKU, RAUMA, FINLAND**
**[3]UNIVERSITY OF LIMERICK, IRELAND**
**[4]LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**
**[5]LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**
**[6]JOZEF PILSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW, WARSAW, POLAND**

**Aim of the study:** Since restrictions were put in place due to COVID-19, technology has become widely available in primary schools. Contemporary teachers need to apply technological, pedagogical, and content knowledge (TPACK) together for effective teaching practices. Yet, less is known how technology use and TPACK are related to effective inclusive physical education. The aim of this study was to investigate the associations between technology use, TPACK, and inclusive physical education teacher efficacy of primary school teachers.

**Methods:** Primary school teachers from Latvia, Lithuania, Finland, and Poland were asked to complete an online survey about technology use in teaching, TPACK, and self-efficacy for inclusive physical education. Data were controlled by type of teaching environment (general school vs special education) and mediation analyses were performed to study the associations.

**Results:** General teachers (n=119) used technology more often than special education teachers (n = 90). Technological integration in physical education and digital assessment tools were used the most. Pedagogical and content knowledge (PCK) and TPACK mediated the association between technology use and teacher self-efficacy to teach children with intellectual, physical, or visual educational needs. Yet, technological, and pedagogical knowledge (TPK) negatively mediated the association between technology use and teacher efficacy with students with physical educational needs.

**Conclusions:** Primary school teachers who use more technology have increased self-efficacy to teach children with special needs, particularly when greater TPACK values are reported. The combination of using technology and training on TPACK could be essential to improve teachers' self-efficacy in inclusive physical education.

# Sports industry sustainable development dimensions and criteria (indicators)

**LUIKA S[1], FERNĀTE A[1], ŽĪDENS J[1], BIRZINA I[1], KAMEŅECKA-USOVA M[2], KUDINSKA M[3], SOLOVJOVA I[3], MIKELSONS M[3], GRIKIS R[3].**

**[1]LATVIAN ACADEMY OF SPORT EDUCATION**
**[2]RĪGA STRADIŅŠ UNIVERSITY**
**[3]LATVIAN UNIVERSITY**

**Aim of the study:** The aim of this study was to analyse sports industry sustainable development dimensions and criteria, by means of a systematic review.

**Methods:** The systematic review was conducted taking the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines. The literature review of the review articles was based on a consideration of 5 databases (Science Direct, Scopus, PubMed Central, ERIH+, Web of Science) sport management journals, covering the period from 2014 to 2024, with the string: "sport", "industry", "sustainable", "development", "dimensions", "criteria" and "indicators". Results: Initially 117 606 records were collected ("sport" AND "industry" AND "development"), of which a total of were 86 analysed in depth after the screening process was completed.

**Results:** Preliminary results revealed that governance, human resources, finance resources, sports facilities, enterprise sponsorship of sports, sports competitions, and events (large scale) are main dimensions and its criteria.

**Conclusions:** The results obtained were reviewed in relation to the evolution of every dimension, criteria, indicators, symbol, criteria and indicators description, research methods.

# Session 3: Sport Physiology and Coaching III

**April 25, 2024**
**Room: Seminar room 3014**

## Impact of resistance training on anaerobic performance and dynamic balance in young football players

**SINULIGGA AR[1], PONTAGA I[1], SLAIDINS K[2].**

**[1]DEPARTMENT OF ANATOMY, PHYSIOLOGY, BIOCHEMISTRY, BIOMECHANICS, HYGIENE AND INFORMATICS, LATVIAN ACADEMY OF SPORTS EDUCATION, RIGA, LATVIA**
**[2]DEPARTMENT OF SPORTS GAMES, LATVIAN ACADEMY OF SPORTS EDUCATION, RIGA, LATVIA**

**Aim of the study:** The present study aimed to investigate the implementation effect of resistance exercises with the athletes' body weight and plyometrics on anaerobic performance characteristics and dynamic balance in young football players.

**Methods:** Participants were 15 years old with similar anthropometric characteristics, training hours per week, and training experience and were divided into an intervention group (n=16), and a control group (n=21). The intervention group participated in the leg and core muscles resistance training and plyometric jumps program for eight weeks twice per week with a duration of each training session of 30 minutes. The tests used were: six-second peak power cycling (6sCS), Wingate test on the bicycle ergometer, countermovement-jump (CMJ) height jump, and dynamic balance assessment using a total stability index (TSI) and trunk total deviation (TTD).

**Results:** The peak power of 6sCS and the mean power of the Wingate test significantly improved in both groups of participants ($p<0.001$). The intervention group significantly outperformed the control group only in the CMJ height which became significantly higher in the intervention group ($p<0.05$) but did not change in the control group ($p>0.05$). In contrast, there was no significant improvement in dynamic balance in TSI and TTD for both groups ($p > 0.05$).

**Conclusions:** In conclusion, implementing resistance exercises for eight weeks (twice a week for 30 minutes) enhanced young football players' anaerobic performance characteristics but did not improve their dynamic balance. Specific balance training should be implemented by adding various complexities and challenges to improve dynamic balance performance.

# Respiratory and lower limb musculotendinous structures follow similar adaptive paths in response to different chronic exercise training

**CESANELLI L[1,2], CONTE D[3,4], SATKUNSKIENE D[2].**

**[1]INSTITUTE OF SPORT SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**

**[2]DEPARTMENT OF HEALTH PROMOTION AND REHABILITATION, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**

**[3]DEPARTMENT OF MOVEMENT, HUMAN AND HEALTH SCIENCES, UNIVERSITY OF ROME "FORO ITALICO", ROME, ITALY**

**[4]DEPARTMENT OF COACHING SCIENCE, LITHUANIAN SPORTS UNIVERSITY, KAUNAS, LITHUANIA**

**Aim of the study:** This study aimed to evaluate the impact of chronic exposure to specific exercise training (high-intensity intervals vs. endurance) on the structural and functional characteristics of lower limb and respiratory musculotendinous structures.

**Methods:** Experienced basketball players (BP, n=16), cyclists (CY, n=16), and non-specifically trained individuals (CN, n=16) were compared. Assessment included B-mode ultrasonography of Vastus lateralis, gastrocnemius lateralis, medialis, diaphragm muscles, patellar tendon, and Achilles tendon. Maximal voluntary isometric and passive torque measurements were performed on knee-extensors and plantar-flexors.

**Results:** Athletes exhibited larger and stronger musculotendinous structures than CN ($p<0.05$). BP had larger plantar-flexors and diaphragm, greater fascicle length, more explosive plantar-flexors and respiratory muscles, and larger tendons than CY ($p<0.05$). Conversely, CY showed a greater muscle pennation angle ($p<0.05$).

**Conclusions:** This study highlights that chronic, specific exercise training induces distinct adaptations not only in primary musculotendinous structures but also in accessory components like respiratory muscles.

# Comparison of variability of passes, their effectiveness, and their usage in football matches of the Latvian youth championship for age groups U13 and U14

**BLEIDELIS I.**

**LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**

**Aim of the study:** This research critically assesses the progression of football, highlighting the effects of evolving regulations, tactical advancements, and improved training techniques. It underscores the integration of digital technologies into football, with the goal of making the sport more scientifically understandable and manageable for coaches amid a wealth of information. The study underscores the significance of comprehending various performance factors-such as physical, psychological, technical, and tactical aspects-for football players.

**Methods:** In addressing the challenges within youth football, the research critiques the common practice of organizing 11 vs. 11 matches for players below the U14 level, noting limited opportunities for skill refinement and tactical development. Employing a comparative descriptive approach, the study delves into the efficiency and variability of passing among the U13 and U14 age groups in the Latvian Youth Championship. By utilizing the Game Performance Evaluation Tool (GPET) and video analysis, the research seeks to make comparisons and elucidate the effects of transitioning to larger fields and more intricate game formats on young players' performance.

**Results and Conclusions:** In summary, the study stresses the importance of adopting developmentally appropriate methods in youth football, aligning training and gameplay with the growth and capabilities of the players, thus providing valuable insights for optimizing youth football training process.

# Reaction speed training in fencing: literature review and future agenda

**TETERIS LE, SAULITE S, LICIS, R.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** The sport of fencing is fast, athletic, and psychologically very challenging. In combat sports, it is necessary to react in the shortest possible time since the fighting tactics involve the execution of attacks and defensive techniques throughout the fight. Reaction speed, which is one of the determinants of speed, has become one of the main factors of athletic performance to achieve success in fencing. The ability to influence reaction speed is complex, and researchers have reported mixed findings on developing reaction speed. The purpose of this study was to analyze the scientific literature to find an effective training method to develop reaction speed in fencing.

**Methods:** The Google Scholar database was used to find original studies focusing on the development of reaction speed in fencing written in English. 7 scientific articles were included in the study.

**Results:** Scientific studies on the development of reaction speed show that systematic and long-term training from 6 weeks to 3 years improves the reaction speed of fencers. Exercises are applied according to the specifics of fencing by hitting the fencing target after visual signals, as well as by applying direction change exercises.

**Conclusions:** Reaction speed training should be a part of the fencing training program for both children and adult high-level fencers. In the future, research should be continued on the development of reaction speed in fencing using new training methods and devices.

# Comparison of static and dynamic balance at the beginning and end of the competition season in adolescent male football players

**PONTAGA I[1], SINULINGGA A.R[1], SLAIDINS K[2].**

**[1]DEPARTMENT OF ANATOMY, PHYSIOLOGY, BIOCHEMISTRY, BIOMECHANICS, HYGIENE AND INFORMATICS, LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**
**[2]DEPARTMENT OF SPORTS GAMES, LATVIAN ACADEMY OF SPORT EDUCATION, LATVIA**

**Aim of the study:** to compare static and dynamic balance characteristics at the beginning and end of the competition season in young male football players who regularly implemented strength endurance exercises for leg and core muscles and static balance training and in the control group.

**Methods:** Two groups of amateur adolescent male footballers were included: the experimental group (performed balance and strength endurance exercises twice per week for 30 minutes) and the control group. The training experience and weekly hours, anthropometrical characteristics did not differ between the groups. Balance performance was measured using a ProKin 252 stabilimeter platform (TecnoBody, Dalmine, Italy) in a one-leg stance for the 30s with open eyes.

**Results:** Initial static balance (area and perimeter of the centre of pressure (COP) motions, COP sway speed in the anterior-posterior, medial-lateral directions) and dynamic balance characteristics (total stability index and trunk total St.Deviation) did not differ significantly between both legs and the groups ($p>0.05$). Static balance characteristics did not change after the season in participants of the experimental group ($p>0.05$) but significantly worsened and became lower in the control group ($p<0.003$). Dynamic balance characteristics did not change significantly in the competition season and did not differ in participants of both groups ($p>0.05$). Only the trunk total St. Deviation was better in the experimental group standing on the dominant leg ($p=0.008$).

**Conclusions:** Static balance performance worsening could be explained by changes in movement strategy due to surface changes: from a solid floor out of the season to a turf surface during the competition period.

# Swimmers' shoulder injury prevention by testing at a young age

**SOLOVJOVA J[1], BOOBANI B[1], JAKUBOVSKIS G[1], GLASKOVA- KUZMINA T[2].**

**[1]DEPARTMENT OF ATHLETIC AND SWIMMING, LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**
**[2]UNIVERSITY OF LATVIA, RIGA, LATVIA**

**Aim of the study:** The research aimed to determine the incidence and causes of shoulder injury and muscle imbalance by testing Latvian young freestyle swimmers to prevent and reduce shoulder injuries by focusing on factors that increase the risk of shoulder injury.

**Methods:** A total of 107 young male competitive freestyle swimmers from 3 age groups (13-18 years old) from different clubs in Riga, Latvia, were selected. They participated in Latvian Youth, Junior, and Open Championships and trained for 4 to 9 years. To determine the incidence and causes of shoulder injury and muscle imbalance, a questionnaire, a body posture assessment according to a diagnostic testing method for visual diagnostics, muscular functional testing, and a video analysis were used to collect the data.

**Results:** The questionnaire result shows increasing pain in all age groups (group 2, 15-16 years old (32%), group 1, 13-14 years old (11%) and group 3, 17-18 years old (7%)). The body deviation forward, so-called "body falling" forward, was observed in all groups (1, 2, and 3); the distance from the vertical line between the outer ankle and the auricle of the ear in all three groups is 10.5±0.4 to 11.4±0.9 cm. The upper cross syndrome was found in all swimmers. The video analysis showed that the streamlined position is not achieved because the body is not in line. The muscles holding the shoulder joint stretch, and the blade comes up. A straight arm pulls crosses the body's middle line.

# Session 4: Physical Activity and Fitness II

**April 25, 2024**
**Room: Seminar Room 3015**

## Psychometric Properties of a Physical Activity Scale (PAS)

**FERNATE A, VAZNE Z.**

**DEPARTMENT OF SPORT AND TRAINING THEORY, LATVIAN ACADEMY OF SPORT EDUCATION, PSYCHOLOGY AND EDUCATION INTERNSHIP, LATVIA**

**Aim of the study:** to validate the construct validity of a Physical Activity Scale (PAS) in Latvian for measuring average weekly physical activity of sleep, work, and leisure time.

**Methods:** participants were 288 adults (age 22-53; 48,6% women and 51,4% men). The adaptation of the questionnaire the Latvian version of the Physical Activity Scale (PAS) took place in several stages. The forward-backward translation of the questionnaire was provided by professional English and Latvian philology specialists specializing in sport science. The questionnaire process and collection of respondents' data took place anonymously, in accordance with the Vienna Convention on Human Rights. Indicators in the Global Physical Activity Questionnaire (GPAQ), International Physical Activity Questionnaire (IPAQ) were used to evaluate Physical Activity Scale (PAS) construct validity. Mathematical statistics (descriptive statistics and the inferential statistics) were used.

**Results:** Statistically significant correlations were determined between indicators obtained in all physical activity questionnaires applied in the research ($p<0.05$).

**Conclusions:** The preliminary results have shown that indicators of internal coherence of the questionnaires on physical activity indicators Physical Activity Scale (PAS) show a corresponding reliability of the translated Latvian version of the questionnaire.

# The effect of short-term high-intensity interval training on the CVS in individuals exercising for health enhancement

**KAIRIŪKŠTIENĖ Ž[1], PODERIENĖ K[1], VELIČKA D[2]. PODERYS J[1].**

**[1]INSTITUTE OF SPORT SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**
**[2]DEPARTMENT OF SPORT MEDICINE, LITHUANIAN UNIVERSITY OF HEALTH SCIENCES, KAUNAS, LITHUANIA**

**Aim of the study:** to determine the effect of high intensity interval training (HIIT) on the CVS in individuals who were actively exercising for health enhancement.

**Methods:** Actively exercising individuals(n=20) were invited to perform the HIIT session, i.e. the four 20-s sets. ECG was recorded continually throughout the exercise and recovery. We evaluated concatenations between two ECG indices and created two synchronized timelines - and, where and were real numbers of selected ECG parameters.

**Results:** The majority of the subjects (seven cases) did not show any significant changes in the ST-segment depression; part of the subjects (three cases) reacted to the speed task - their ST-segment depression was gradually increasing; and in two subjects, the greatest ST-segment depression was observed after the completion of the last task. The high impact of HIIT was also confirmed by the fact that variations in Disc values were continuously increasing throughout exercise sets and rest intervals as well Disc values remain lower after 30 minutes of simulated training session. The inadequacy of such exercises was demonstrated by the fact that 3 out of 20 subjects withdrew from the study, and three more had manifest functional ischemic phenomena in the myocardium either during or immediately after the exercise.

**Conclusion:** HIIT exercises cannot be recommended for all individuals, as they pose a risk, and this training technique is suitable only for individuals who train regularly or who have a physician's permission to perform such type of exercising.

# Investigating strategies to alleviate mental fatigue during prolonged cognitive work: insights from EEG data

**SATAS A, GRIGAITE V, MAŽUOLYTE-BINDERIENE A, CEKANAUSKAITE A, BRAZAITIS M.**

**INSTITUTE OF SPORTS SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY**

**Aim of the study:** Prolonged cognitive work often leads to mental fatigue, impacting motivation and cognitive function. This exploratory study aims to evaluate the effectiveness of specific interventions in mitigating mental fatigue during extended cognitive tasks.

**Methods:** Eleven subjects participated in simulated 8-hour office-like cognitive work, with EEG data collected before and after cognitive work to assess central nervous system activity. The interventions tested included medium-intensity physical activity pre- and post-work, interrupting sitting during cognitive tasks (combined work model) and fasting during the work period.

**Results:** Results indicate that both pre- and post-work physical activity correlate with reduced mental fatigue, as evidenced by EEG patterns indicative of sustained cognitive function. Similarly, adopting a combined work model, incorporating increased physical activity during cognitive tasks, appears to mitigate mental fatigue. Conversely, fasting during cognitive work tends to exacerbate mental fatigue, reflected in EEG data showing decreased cognitive efficiency.

**Conclusions:** These preliminary findings suggest that incorporating moderate physical activity before and after cognitive work, as well as increasing physical activity during tasks, may be effective strategies in combating mental fatigue. These insights contribute to discussions on optimizing strategies to mitigate mental exhaustion in workplace settings.

# Effects of high-intensity and low-intensity resistance training with blood flow restriction on physical capacity in elderly male

**KERNAGYTĖ Ž, MICKEVIČIENĖ L, KLIMAVIČIŪTĖ E.**

**DEPARTMENT OF COACHING SCIENCE, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** Older adults has tendency to experience sarcopenia - one of the main consequences of aging, related to the decline of physical capacity. As such, blood flow restriction (BFR) training has received much attention as a potentially safer method, maintaining high level of muscle stimulation. It is important to investigate whether low-intensity resistance training with BFR has the same effect on physical capacity in elderly people.

**Methods:** Forty-one healthy older male adults (aged 60-74 years) were randomized to 12 weeks of lower body low-intensity resistance exercise training with BFR and high-intensity resistance training (HIRT). In both groups, subjects performed the following exercises: leg curl, leg press and leg extension. Muscle strength was assessed by performing one-repetition maximum (1RM). Subjective exercise intensity was measured using rating of perceived exertion (RPE) with modified Borg scale.

**Results:** We found that muscle strength statistically increased in both groups. Muscle strength in leg curl and leg press was not significantly different between groups. Muscle strength in leg extension was significantly different between groups ($p<0.001$), the HIRT group achieved better results compared to the BFR group. RPE in leg curl and leg press was not significantly different between groups. In leg extension, RPE was significantly different between groups ($p=0.024$) with lower RPE scores in HIRT training.

**Conclusions:** Significantly better 1RM results in the HIRT group indicates greater gains in physical capacity compared to the BFR group. Lower RPE scores in the HIRT group suggest that elderly adults perceived this training as easier compared to the BFR training.

# The recovery-stress questionnaire to measure stress-recovery of martial arts athletes

**BOOBANI B[1], GRANTS J[1], LITWINIUK A[2].**

**[1]LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**
**[2]FACULTY OF PHYSICAL EDUCATION AND HEALTH IN BIALA PODLASKA, JOZEF PILSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW, POLAND**

**Aim of the study:** The study aims to validate and adapt the Recovery-Stress Questionnaire (RESTQ-Sport) to assess martial arts athletes' psychological recovery and stress levels.

**Methods:** A comprehensive validation process will be undertaken, involving translation of the RESTQ-Sport into Latvian by qualified linguists, followed by back-translation to confirm accuracy. The translated questionnaire will then be administered to a large sample of martial arts athletes across Latvia. Recruitment efforts will include martial arts clubs, online forums, and social media platforms. Participants will be instructed to complete the questionnaire, which assesses stress and recovery levels across multiple dimensions over the preceding three days. Data collection will be conducted precisely to ensure a variety of representative samples.

**Results:** At this stage, results are pending as data collection is ongoing. However, this phase's focus is accumulating a significant number of responses to ensure the reliability and validity of the translated and validated questionnaire. Once data is collected, rigorous statistical analysis will be performed to evaluate the psychometric properties of the Latvian version of the RESTQ-Sport.

**Conclusions:** Upon data collection and analysis, the study aims to provide valuable insights into the applicability of the RESTQ-Sport in the context of Latvian martial arts athletes. The findings will inform future research and practical applications, potentially benefiting coaches, trainers, and sports psychologists in optimizing athletes' performance and well-being within the challenging martial arts domain.

# Investigating the impact of a combined work model strategy on cognitive efficiency and mental fatigue resistance: preliminary findings

**ČEKANAUSKAITĖ A, ŠATAS A, GRIGAITĖ V, MAŽUOLYTĖ-BINDERIENĖ A, BRAZAITIS M.**

**INSTITUTE OF SPORTS SCIENCE AND INNOVATION, LITHUANIAN SPORTS UNIVERSITY, LITHUANIA**

**Aim of the study:** This study aims to assess the effectiveness of a combined work model strategy in enhancing cognitive efficiency and resilience to mental fatigue among employees, addressing the prevalent issue of mental fatigue in modern workplaces.

**Methods:** Twelve healthy young adults (aged 23.3 ± 6.4 years) participated in a simulated office-like work scenario. Cognitive functions were evaluated using the Automated Neuropsychological Assessment Metrics version 4 (ANAM4), while cortisol levels in saliva were measured to assess stress response. Additionally, questionnaires were administered to gauge mental fatigue, sleepiness, and motivation levels. Preliminary

**Results:** Cortisol levels exhibited a natural decrease in the evening compared to the morning, indicating typical diurnal variation, and suggesting that the combined work condition did not negatively impact stress mechanisms. Cognitive function demonstrated improvements in accuracy in spatial orientation, memory, and task effectiveness, with a trend toward decreased reaction time and enhanced throughput. Motivation levels remained stable, while participants reported increased arousal and maintained fatigue levels similar to the control group.

**Preliminary Conclusions:** The preliminary findings indicate that the combined work model strategy may not adversely affect stress mechanisms within the body, as evidenced by natural cortisol fluctuations. Moreover, cognitive enhancements, particularly in spatial orientation, memory, and task effectiveness, imply potential benefits of the combined work model in enhancing cognitive efficiency. However, increased arousal and sustained fatigue levels highlight the need for further investigation into optimizing breaks to alleviate mental fatigue. These initial insights underscore the importance of continued research to refine strategies for promoting cognitive well-being and productivity in the workplace.

# Impact of physical activity on cognitive efficiency and mental fatigue resistance during simulated working day

**MAŽUOLYTĖ-BINDERIENĖ A, ČEKANAUSKAITĖ A, ŠATAS A, GRIGAITĖ V, BRAZAITIS M.**

**INSTITUTE OF SPORT SCIENCE AND INNOVATIONS, LITHUANIAN SPORTS UNIVERSITY**

**Aim of Study:** This study aimed to investigate the impact of moderate-intensity physical activity before and after an 8-hour simulated workday on mental fatigue, cognitive efficiency, hormonal changes, and autonomic nervous system balance.

**Methods:** Twelve healthy individuals (23.7 ± 6.4) participated in both control and exercise protocols involving 30 minutes of moderate-intensity aerobic exercise before and after a simulated 8-hour workday. Cognitive functions were measured using Automated Neuropsychological Assessment Metrics 4 (ANAM4). Psycho-emotional changes were assessed using visual analogue scales, while heart rate variability (HRV) and salivary testosterone level were measured.

**Results:** Preliminary results showed decreases in memory and cognitive efficiency. Subjective mental fatigue increased, while motivation decreased during simulated working day in both conditions. The exercise group exhibited an increased testosterone level and higher HRV LF/HF ratio, indicative of sympathetic nervous system dominance. Elevated HRV LF/HF ratio could be related to the greater effort exerted at work. These preliminary findings underscore the potential role of physical activity in better mental fatigue resistance and enhancing motivation. However, further research is necessary.

**Conclusions:** Moderate-intensity aerobic activity before and after a mental workday preliminary seems to increase HRV LF/HF ratio and enhance better mental fatigue resistance, possibly mediated by hormonal changes and autonomic nervous system regulation. Future research should elucidate underlying mechanisms to validate these findings and inform practical interventions aimed at optimizing cognitive performance and well-being in the workplace.

# SCIENTIFIC SESSION III

## Session 1: Sports Physiology and Coaching IV

**April 26, 2024**
**Room: A. M. Viru auditorium**

### Selected factors determining success in combat sports

**LITWINIUK A[1], BLACH W[2], GRANTS J[3], BOOBANI B[3].**

**[1]FACULTY OF PHYSICAL EDUCATION AND HEALTH, JOZEF PILSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW, BIALA PODLASKA, POLAND**
**[2]UNIVERSITY OF WROCLAW, POLAND**
**[3]LATVIAN ACADEMY OF SPORT EDUCATION, RIGA, LATVIA**

**Aim of the study:** to monitor changes of selected mental and physiological stress indicators judo sportsman.

**Methods:** The study included 20 elite judo athletes. Capillary blood was sampled from earlobe prior to the 1st, and then after 1st, 2nd, and 3rd struggles, each of them played on three consecutive days. LA and CK were assayed by kits of Dr. Lange -GERMANY. Athletes did not perform any extra efforts during the tournament.

**Results:** Judo match is an intensive, anaerobic exertion that produces high level of LA and CK progressively increased following successive fights reaching maximal values after final exertion. At competitions, it is often said that this is the magic of numbers, and it beats both ways, namely that the sportsman who are titled are world champions, in a sense they are a bit stressed, and on the other hand, the sportsman who fight with the sportsman titled, in a way they are a bit stressed that they are definitely better.

**Conclusions:** The mental support of the trainer relieves stress, and experienced athletes have different strategies of coping with stress, which differ depending on, for example, personality profile. Average, individual differences in CK values indicate that each boxer would be classified to the high-, medium- or low responder to the effort. The results also have a clinical application value of implementing movements for rehabilitation of people with body balance problems.

# The benefits of providing verbal feedback on the key elements of sports technique for motor tasks with a complex movement structure

**BIEGAJŁO M, NOGAL M, NIŹNIKOWSKI T.**

**FACULTY OF PHYSICAL EDUCATION AND HEALTH IN BIAŁA PODLASKA, JÓZEF PIŁSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW**

**The aim of the study:** to determine the impact of verbal feedback on the effectiveness of Yurchenko vault.

**Methods: In** the research took part female gymnasts (n=16). The pedagogical experiments were carried out in two stages using the technique of two parallel groups. The aim of the first stage of the research was kinematical analysis of exercises and gymnastic routines in order to identify key elements of the sports technique. In turn, the aim of the second stage was to assess the effectiveness of teaching and improvement of Yurchenko vault with the use of feedback about errors made in key elements and information about all errors made in the whole routine.

**Results:** The technique evaluation by experts has been carried out in pre-test, before the process of motor learning, post-test, straight after experiment, and in retention-test, one week later. Using the analysis of t Welch test, it was shown that the difference in results obtained by the two groups in the pre-test were not statistically significant. Based on the ANOVA analysis of variance in a mixed design, a significant measurement effect was noted, which indicates significant differences between successive measurements. On the basis of t Welch analysis for independent data, it was shown that the experimental group - having feedback on key elements, obtained significantly higher average judges' scores at post-test and at retention test.

**Conclusions:** Verbal feedback on errors made in the key elements of the task is more effective than information on all errors recorded during the Yurchenko vault.

# Arsenal of technique, resultativity and effectiveness of judokas at European Championships cadets – Ovidelas 2023 (weight categories -66 and -73kg)

**PIMENOVS E, SAULĪTE S.**

**LATVIAN ACADEMY OF SPORT EDUCATION**

**Aim of the study:** The evaluation of technical mastery among judokas, particularly differences in high-class athletes during competitions, remains relatively underexplored. Thus, our research aims to delve into this domain, focusing on the arsenal of techniques, resultativity, and effectiveness exhibited by high-class judokas competing in the European Championships Cadets - Odivelas 2023, within the weight categories of -66 and -73 kilograms. Studying the technical arsenal utilized in competitions serves multiple purposes: it helps gauge the level of technical preparedness, facilitates comparisons between athletes, and identifies emerging trends in technical mastery. This valuable information will not only benefit judo professionals but also aid in fine-tuning high-level judo training programs and strategies for international competitions.

**Methods:** Our investigation entails a comprehensive approach, incorporating literature reviews, analysis of competition documents and protocols, and examination of competition footage from the European Championships Cadets - Odivelas 2023. Specifically, we analyze performances of high-class athletes who achieved recognition in the -66 and -73 kilograms categories. Statistical methods will be employed to extract meaningful insights from the data. By scrutinizing the nuances of technique, resultativity, and effectiveness demonstrated by judokas at this championship, we aim to contribute to a deeper understanding of the intricacies involved in high-level judo competition.

**Results & Conclusions:** This research holds promise for informing coaching methodologies, refining training regimens, and advancing the overall standard of judo performance at the European level.

# Differences of physical capabilities, anthropometric parameters and training loads of 15-19 years old athletes practicing different sports

**PURGE P, KÄNGSEPP A, REMMEL L, KIVIL A, JÜRIMÄE J.**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** Children start training at an early age, where they often reach large training loads as young athletes. The high training load of young athletes can provoke fatigue, the accumulation of which leads to a state of overload of athletes and a decrease in performance. The aim of our study was to map the physical capabilities, anthropometric parameters and training loads of young athletes practicing different sports.

**Methods:** The study involved young boys (16.1±1.2 yrs, 182.2±6.9 cm, 75.4±13.2 kg) who practiced judo (n=9), flat water kayaking (n=8), cycling (n=11), skiing (n=10) and handball (n=15). At the Tartu University Training science Lab, the subjects performed an incremental test with a cycling ergometer. The isometric force was determined at a knee angle of 60 degrees, and the isokinetic force at 60,180 and 300 degrees per second by angular velocity.

**Results:** All athletes trained an average of 6.1±2.4 times and 537.7±208.5 minutes per week. Of the anthropometric parameters, judo athletes and handball players were heavier (86.2±8.4 and 80.7±10.8 kg) than others ($p<0.05$), had higher LBM (64.5±10.9 and 62.7±8.3 kg) and bone mass (3.2±0.6 and 3.3±0.5 kg) as the other sports athletes ($p<0.05$). VO2max/kg of cyclists (64.8±3.3 ml/min/kg) and skiers (58.3±3.2 ml/min/kg) was higher ($p<0.05$) than other sports. In isokinetic strength tests were judo athletes and handball players superior ($p<0.05$) to other athletes, but the work fatigue extension of the 20x isokinetic strength test for handball players was the lowest (-1.3±0.7, $p<0.05$).

**Conclusions:** Athletes in different sports are trained with similar training volumes, but the various training characteristics affect their physical capabilities differently.

# The effects of acute sodium citrate supplementation on metabolism and 5000 m running performance in trained young men

**VAHER I[1], TIMPMANN S[2], MEDIJAINEN L[2], ÖÖPIK V[2].**

**[1]DEPARTMENT OF PHYSIOTHERAPY AND ENVIRONMENTAL HEALTH, TARTU HEALTH CARE COLLEGE**
**[2]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU**

**Aim of the study:** The aim of the studies was to determine the effect of sodium citrate (CIT) ingestion on 5000 m running performance in a temperate laboratory environment (L-T), in competitive conditions in the outdoor stadium (F-T), and in a warm laboratory environment (L-W).

**Methods:** In L-T 17, in F-T 10, and in the L-W study 16 endurance-trained males (aerobic capacity 61.3 ± 4.9, 60.8 ± 5.5 and 56.9 ± 4.7 ml·kg-1·min-1 respectively) completed two 5000 m runs with preceding CIT or placebo (PLC) supplementation, in a double-blind, counterbalanced, crossover manner.

**Results:** CIT ingestion (500 mg·kg-1 body mass) compared to PLC induced increases in water retention, body mass, and plasma volume in F-T and L-W study ($P < 0,05$). Pre- and post-exercise blood HCO3- concentration, base excess, and pH were higher ($P < 0,05$) in the CIT compared to the PLC trial in the L-W study. Post-exercise lactate concentration was higher in CIT compared to the PLC trial in L-T and L-W studies. 5000 m running time was significantly faster after CIT supplementation in L-T ($P = 0.001$) but not in F-T ($P = 0.09$) and L-W ($P = 0.183$) studies.

**Conclusions:** Acute CIT supplementation before exercise may improve performance in a temperate laboratory environment but not in an outdoor stadium or a warm laboratory environment. CIT supplementation induces alkalosis, water retention, plasma volume expansion, and an increase in post-exercise blood lactate concentration.

# Session 2: Pedagogy, Social Aspects and Management in Sport III

**April 26, 2024**

**Room: F. Kudu auditorium**

## A new measure: Coach-Athlete-Parent (C-A-P) relationship in youth sport: the positive and negative processes in the C-A-P questionnaire (PNPCAP)

**LISINSKIENE A[1], LOCHBAUM M[2].**

**[1]EDUCATION ACADEMY, EDUCATIONAL RESEARCH INSTITUTE, VYTAUTAS MAGNUS UNIVERSITY**
**[2]DEPARTMENT OF KINESIOLOGY & SPORT MANAGEMENT, EDUCATION ACADEMY, EDUCATIONAL RESEARCH INSTITUTE, VYTAUTAS MAGNUS UNIVERSITY**

**Aim of the study:** Coach-Athlete-Parent relationship in youth sports participation is fundamental. Coaches, parents, and athletes routinely interact and these interactions impact youth sports participation.

**Methods:** In Study 1, 308 participants completed the existing 48-item measure, resulting in 15 items that were fit into two dimensions, positive and negative group processes. In Study 2, 678 participants completed the 15-item measure.

**Results:** After examining the analyses, 11 items remained to form the Positive and Negative Processes in the Coach-Athlete-Parent Questionnaire (PNPCAP).

**Conclusions:** In summary, the PNPCAP is a valid brief measure for assessing interpersonal relationships among coach-athlete-parents in both team and individual sports contexts. Future research is needed to continue to develop the scale for construct validity as well as translate the scale into multiple languages to determine validity across countries.

# The motor learning effects of combining an external attentional focus and task-relevant autonomy

**CHALIBURDA A, WOŁOSZ P, SADOWSKI J.**

**JÓZEF PIŁSUDSKI UNIVERSITY OF PHYSICAL EDUCATION IN WARSAW, BIALA PODLASKA, POLAND**

**Aim of the study:** Decades of research have been spent investigating methods to facilitate motor learning effectively. Theoretical explanations would suggest, and recent empirical evidence has shown, that the combination of autonomy-supported (i.e., self-controlled) practice conditions and an external focus of attention may benefit motor learning outcomes. However, not all investigations have consistently provided evidence for a motor learning benefit. Providing autonomy over task-irrelevant information has been proposed as one explanation for the mixed results. Studies have demonstrated that autonomy-supported conditions utilizing task-relevant information, relative to task-irrelevant, can produce greater benefits relative. Therefore, the purpose of the present experiment was the investigate the combined effects of an external attentional focus and task-relevant autonomy on the motor learning of a standing korfball shooting task.

**Methods:** One hundred and ten physical education graduate students (41 females and 69 males, age = 22.53) participated in the study. Participants were randomly assigned to one of four practice groups: external focus (EXT), internal focus (INT), autonomous (AS) and autonomous-external (AS-EXT). Participants performed 50 trials (5 sets x 10 repetitions) on 3 consecutive days for a total of 150 trials.

**Results & Conclusions:** The present findings suggest that practicing with an external focus of attention results in greater motor learning relative to an internal attentional focus. However, the current study did not reveal evidence for autonomous conditions providing an additive motor learning effect when combined with an external focus. Limitations of the present study and future directions are discussed.

# Physical activity in the classroom: schoolchildren's perceptions of existing practices and new opportunities

**PARK M[1], UIBU M[2], MÄGI K[1], KULL M[1].**

**[1]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]INSTITUTE OF SOCIAL STUDIES, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** Engaging key stakeholders, including students into the process of school-based physical activity (PA) intervention planning is considered important. The present study was part of the preparatory phase of the Estonian Schools in Motion pilot programme and aimed to examine students' perspective of PA opportunities in the classroom.

**Methods:** In this study, 17 focus group interviews were conducted, with a total of 92 Estonian students aged 8 to 15 participating from three different schools.

**Results:** The results demonstrate that although PA is not yet a natural part of academic lessons in Estonia, students are eager and motivated to practise more PA. Even though they do not associate PA and academic lessons in general, they can come up with a wide range of activities that could make learning process more physically active.

**Conclusions:** Students could identify several activities from incidental and content-related movement to games and energy breaks which helps to broaden the scope of classroom PA. These findings can be valuable input for highlighting, developing, and designing methods for integrating movement into the study process.

# The influence of music in volleyball training for the development of motor coordination for seven-year-olds

**GAILĪTIS D.D[1], BULA-BITENIECE I[2].**

**[1]LATVIAN ACADEMY OF SPORTS EDUCATION**
**[2]ATHLETIC CLUB JULES VERNE, RIGA, LATVIA**

**Aim of the study:** Evaluation of the impact of music recommendations in an obstacle course on motor coordination, ability to combine movements for seven-year-old volleyball players.

**Methods:** Methods that were used was: - Analysis of literature sources - Control exercises - Pedagogical experiment - Video Analysis - Mathematical statistical analysis

**Results & Conclusions:** Research hypothesis "If appropriate music will be used in the training process during the preparation period, the students' coordination of movements and ability to combine movements will be improved, more successfully than in training processes without music." is confirmed, as the students in the experimental group with music improved their coordination during the training and performed on average 5.1% better than the students in the control group without music. All the numbers are also mathematically reliable, as demonstrated by Pearson correlation, and the results from the Student's t-test confirm that the music has shaped the performance of the learners in a significantly different strap for the two groups.

# Session 3: Physiotherapy and Health II

**April 26, 2024**
**Room: Seminar room 3014**

## Access to evidence-based physiotherapy in Estonia - preliminary results of an on-going study

**MEDIJAINEN K**

**INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** To provide a brief overview of the preliminary results of an ongoing study, regarding the implementation of evidence-based physiotherapy (EBP), attitudes towards it and ratings of the respective competences among Estonian physiotherapists.

**Methods:** This is a cross-sectional survey-based study with a data collection period of 2022-2027. Answers from Estonian 91 physiotherapists to a last part of the full survey, the Upton's Evidence-Based Practice Questionnaire (UEBPQ) form the foundation of current abstract.

**Results:** Estonian physiotherapists claim to provide EBP, however preliminary results of UEBPQ indicate EBP implementation scores and respective competency ratings to be below the positive score threshold, despite the attitude towards EBP is positive. The competencies rating was statistically significantly higher in group with more than 5 years of qualification ($p<0.05$). Evidence-based practice competencies rating, and the total score revealed weak positive association with the duration of the qualification (respectively $r=0.258$; and $r=0.208$; $p<0.05$,). Despite most physiotherapists report to have access to scientific databases, then majority of physiotherapists report reading 1-3 scientific paper per month, with 62% of the respondents declaring to base their clinical decisions on the research results less than 5 times per month.

**Conclusions:** Preliminary results reveal that Estonian physiotherapists have a positive attitude towards EBP, however there seems to be a discrepancy in its implementation in clinical practice.

# Access to rehabilitation following total hip arthroplasty

**PRUUNSILD G.**

**TARTU UNIVERSITY HOSPITAL**

**Aim of the study:** The aim of the study was to describe and analyse primary elective total hip arthroplasty (THA) one-year rehabilitation in Estonia during 2010-2020, focusing on physical therapy (PT) use, its regional differences, and temporal changes.

**Methods:** This retrospective cohort study used population-wide health claims data acquired from the Estonian Health Insurance Fund, including patients aged ≥18 years with a record of a primary elective THA performed in Estonia between January 2010 and December 2020. The data was further validated using the Nordic Medico-Statistical Committee's Classification of Surgical Procedures codes and operation dates. Rehabilitation related funding codes on health care claims were converted to clinically relevant estimates – received acute and post-acute PT hours.

**Results:** The study included a total of 12,514 patients. Their median acute length of stay was 7 days. 98.1% (12,278/12,514) of the included patients received PT by a median of 2 hours during the acute phase. Post-acute PT was accessible to 65.2% (8,163/12,514) of patients, and they received a median of 6.5 hours. For half of the population observed, the rehabilitation process had finished 22 days after the end of the acute phase. There were 2.4-fold regional disparities in median received post-acute PT hours. Post-acute PT remained unchanged during these 11 years.

**Conclusions:** Despite most of the observed population having access to post-acute rehabilitation, the rehabilitation process was relatively short and there existed regional disparities in received PT. Post-acute PT remained unchanged during 2010-2020. These findings highlight the necessity for further evidence-based recommendations regarding post-acute rehabilitation in Estonia.

# Primary elective total knee arthroplasty rehabilitation during 2010-2021 in Estonia

**LEPPIK K[1], MÄRTSON A[2], PROMMIK P[2].**

**[1]INSTITUTE OF SPORT SCIENCES AND PHYSIOTHERAPY, UNIVERSITY OF TARTU, ESTONIA**
**[2]INSTITUTE OF CLINICAL MEDICINE, UNIVERSITY OF TARTU, ESTONIA**

**Aim of the study:** To describe and analyse rehabilitation received in one year after primary elective total knee arthroplasty (TKA) during 2010-2021 in Estonia, with a focus on physical therapy (PT) and occupational therapy (OT) use, its regional differences, and temporal trends.

**Methods:** This population-based retrospective cohort study was based on data from the Estonian Health Insurance Fund and included patients who had undergone primary elective TKA between 2010 and 2020.

**Results:** 10,185 patients' data were analysed; 99.2% of patients received rehabilitation within a year after primary elective TKA (median of 6.5 hours). Acute care lasted a median of 7 days; during it, 98.5% of patients received PT and 0.4% OT. During the post-acute phase, 67.5% of patients received PT, 78.7% in inpatient and 44.3% in outpatient settings. 15.1% of patients received post-acute OT, 98.9% in inpatient and 1.7% in outpatient settings. Within the first two weeks, PT had ended for 81.9% and OT for 96.2% of patients. There was a 1.01-fold regional difference in the proportion of patients who received PT and 1.8-fold in the median total hours of PT received; as for OT, the differences were, respectively, 5.4-fold and 1.4-fold. During the study period, the proportion of patients who received OT increased by 9.3 percentage points, and the median total hours of OT received decreased by 1.8 hours.

**Conclusions:** Rehabilitation was received primarily in the form of inpatient PT and it showed up to 5.4-fold regional differences and varying temporal trends during the observed 11 years.