VIII International Scientific Seminar
PHYSICAL ACTIVITY AND FUNCTIONAL EFFICIENCY

in the context of worldwide cooperation

April 23-25, 2025

Košice, Slovakia

Organizer:

Institute of Physical Education and Sport at Pavol Jozef Šafárik University in Košice, Slovakia

Institute of Sport, Academy of Physical Education in Katowice, Poland

Partner:

Institute of Physical Education and Health

Academy of Applied Sciences in Racibórz, Poland

Book of abstracts

Editor: Jarosław Cholewa

CONFERENCE PROGRAM

April 23 (WEDNESDAY)

14:00 – 15:00 PARTICIPANTS REGISTRATION (Hotel Zlate Kosice)
16:00 – 16:15 OPENING CEREMONY
16:15 – 17:15 PLENARY SESSION I
17:30 – 18:30 PLENARY SESSION II
19:00 – GALA DINNER (Villa Regia Restaurant)

April 24 (THURSDAY)

8:00 – 9:00 BREAKFAST
9:30 – 12:00 RECREATIONAL WORKSHOPS
12:30 - 14:00 PLENARY SESSION III
14:00 – LUNCH
15:00 – TRIP TO THE VINEYARD

April 25 (FRIDAY)

8:00 – 9:00 BREAKFAST
10:00 – 12:00 ROUND TABLE DEBATES
12:00 – SUMMARY AND CLOSING OF THE CONFERENCE

23 April (Wednesday)

OPENING CEREMONY

16:00 – 16:15

Chair of the Scientific Committee, VIII International Scientific Seminar

PHYSICAL ACTIVITY AND FUNCTIONAL EFFICIENCY in the context of worldwide cooperation

dr hab. Jarosław Cholewa prof. AWF Katowice

Director of Institute of Physical Education and Sport at Pavol Jozef Šafárik University, Košice, Slovakia

Mgr. Alena Buková, PhD., Ass. Prof.; UPJS Košice

PLENARY SESSION I

16:15 – 17:15

Chaired by:
doc. PaedDr. Ivan Uher, PhD., MPH (UPJS Košice)
dr Andrzej Samołyk (ANS Racibórz)

Alena Bukova (Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice): **Physical Activity and Interrelated Lifestyle Factors as Core Domains of Research and Academic Training at the Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice.**

Jacek Polechoński (Institute of Sport, Academy of Physical Education in Katowice): **Extended reality in research projects and teaching at the Academy of Physical Education in Katowice.**

PLENARY SESSION II

17:30 – 18:30

Chaired by:
Mgr. Agata Horbacz, PhD., Ass. Prof. (UPJS Košice)
Dr Małgorzata Dębska-Janus (AWF Katowice)

Marcin Warchoła, Jarosław Noworól, Małgorzata Dziechciaż (Faculty of Health Care, The Bronisław Markiewicz State University of Applied Sciences in Jaroslaw): **Between theory and practice – Directions of scientific and educational development of the Faculty of Health Care of the Bronisław Markiewicz State University of Applied Sciences in Jaroslaw.**

Joanna Cholewa, Jarosław Cholewa (Academy of Physical Education in Katowice): **Is physical activity an alternative to rehabilitation for patients with Parkinson's disease?**

Aleksander Kasprzyk **(**Department of Technical and Economic Sciences, State Vocational University of prof. Stanisław Tarnowski in Tarnobrzeg): **Challenges Confronting Higher Education in the Context of Evolving Educational Needs.**

24 April (Thursday)

PLENARY SESSION III

12:30 – 14.00

Chaired by:
Mgr. Alena Buková, PhD., Ass. Prof. (UPJS Košice)
dr hab. Jacek Polechoński (AWF Katowice

Agata Horbacz, Richard Melichar, Ľuboš Vojtaško, Dávid Kaško, Marcel čurgali, Ján Junger (Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice; Department of Academic Sports, Institute of Languages, Social, Sciences, and Academic Sports, Technical University of Košice): **Physical activity of students at selected universities in Eastern Slovakia after the relaxation of COVID-19 pandemic measures.**

Andrzej Samołyk, Włodzimierz Wiązek, Marek Kociuba: (Institute of Physical Education and Health, University of Applied Sciences, Racibórz; Department of Physical Education and Sports, General Tadeusz Kościuszko Military University of Land Forces, Wrocław): **Assessment and development of functional motor competence in military cadets - the potential role to promote physical military readiness and reduce injury risk.**

Małgorzata Dębska, Maria Niestrój-Jaworska, Michał Rozpara (Department of Physical Activity and Health Promotion, Academy of Physical Education in Katowice): **Health-enhancing physical activity in adults - diagnosis, recommendations and determinants**.

Ivan Uher, Iveta Cimboláková, Tatiana Kimáková, Milena Švedová (Institute of Physical Education and Sport, Pavol Jozef Šafárik University, Košice; Department of Public Health and Hygiene, Pavol Jozef Šafárik University, Košice; Institute of Technology and Business in Prešov): **Embodied Transformation): A Framework for Identity-Based Change through Interoception, Present-Moment Experience, and Neuroplasticity.**

Oskar Placek (Department of Tourism and Recreation, Academy of Physical Education in Katowice): **Nintendo Switch as an attractive alternative to classic physical recreation.**

April 25 (Friday)

ROUND TABLE DEBATES

10:00 – 12:00

Chaired by:
Dr hab. Jarosław Cholewa (AWF Katowice)
Dr hab. Joanna Cholewa (AWF Katowice)

Jarosław Cholewa, Miłosz Witkowski (Department of Tourism and Recreation, Academy of Physical Education in Katowice, Institute of Physical Education and Health, University of Applied Science): **The effectiveness of physical activity programs in enhancing functional performance for neurodegenerative diseases.**

Joanna Cholewa (Institute of Sport Science, Academy of Physical Education in Katowice): **The impact of physical activity interventions on neurodegenerative biomarkers.**

Małgorzata Dębska-Janus, Michał Rozpara (Institute of Sport Sciences, Academy of Physical Education in Katowice): **Dispositional optimism as a determinant of health behaviors.**

Aleksander Kasprzyk (Department of Technical and Economic Sciences, State Vocational University of Prof. Stanisław Tarnowski in Tarnobrzeg): **Effects of Nordic Walking on balance and functional mobility in older adults.**

Dávid Kaško (Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice): **The Impact of Recreational Cold Water Immersion on Functional Efficiency and Physiological Adaptation.**

Maria Niestroj-Jaworska, Jacek Polechoński (Department of Physical Activity and Health Promotion; Academy of Physical Education in Katowice; Institute of Sport Sciences, Academy of Physical Education, Katowice): **Musculoskeletal disorders and work ability in female medical staff.**

Oskar Placek (Department of Tourism and Recreation, Academy of Physical Education in Katowice): **Tourists' Expectations For Services Offered by PTTK Mountain Huts in the Silesian Voivodeship.**

Jacek Polechoński, Kamil Braś Małgorzata Dębska-Janus (Institute of Sport Sciences, Academy of Physical Education in Katowice; Student Scientific Circle of Physical Activity and Tourism in Virtual Reality, Academy of Physical Education in Katowice): **Assessment of physical activity during header training of young soccer players in virtual reality and its impact on the transfer of skills from the virtual to the real environment.**

Michał Rozpara (Institute of Sport Sciences, Academy of Physical Education in Katowice): **Energy expenditure during CrossFit training in healthy participants.**

Andrzej Samołyk, Włodzimierz Wiązek, Marek Kociuba: (Institute of Physical Education and Health, University of Applied Sciences, Racibórz; Department of Physical Education and Sports, General Tadeusz Kościuszko Military University of Land Forces, Wrocław): **High-Intensity Functional Training (HIFT) - the impact of this type of training in strength and conditioning programs among various populations on health and fitness outcomes.**

Marcin Warchoła (Faculty of Health Protection, The Bronisław Markiewicz State University of Applied Sciences in Jaroslaw): **Games and activities with nordic walking poles as a pedagogical innovation in physical education classes in early school education.**

Jagoda Cholewa (Faculty of Law and Administration, University of Silesia in Katowice): **Legal Aspects of Participation in Cross-Border Sports Events**.

Table of contect

Cholewa Jarosław[1,2], Miłosz Witkowski[2]

The effectiveness of physical activity programs in enhancing functional performance for neurodegenerative diseases.

[1] Department of Tourism and Recreation, Academy of Physical Education in Katowice
[2] Institute of Physical Education and Health, University of Applied Science

Introduction: Neurodegenerative diseases like Parkinson's disease, Alzheimer's disease, and multiple sclerosis lead to a progressive decline in cognitive and motor functions. In recent years, interest in non-pharmacological interventions, particularly physical activity programs, has grown as a way to alleviate symptoms and enhance patients' quality of life.
Objective: The aim of this study was to assess the effectiveness of physical activity (PA) programs in improving functional performance among individuals with neurodegenerative diseases.
Methods: A systematic literature review was conducted, analyzing studies published between 2010 and 2024 from the PubMed, Scopus, and Web of Science databases. Included were randomized controlled trials assessing the impact of exercise programs (aerobic, resistance, balance, and coordination training) on motor and cognitive functioning in patients with neurodegenerative conditions.
Results: The analysis revealed that regular PA significantly enhances balance, gait, muscle strength, and the capacity to perform daily activities. Some studies also indicated improvements in cognitive function. The most favorable outcomes were observed in interventions that combined various types of exercise conducted over a minimum duration of 12 weeks.
Conclusions: PA programs are effective and safe complementary therapies for individuals with neurodegenerative diseases. Regular exercise can significantly enhance physical functioning and, in some cases, cognitive performance. These findings support incorporating structured PA into standard care practices for this patient population.

Keywords: physical activity, neurodegenerative diseases, functional performance, exercise therapy.

Cholewa Joanna[1], Agnieszka Gorzkowska[2]

The impact of physical activity interventions on neurodegenerative biomarkers.

[1] Institute of Sport Science, Academy of Physical Education in Katowice
2 Medical University of Silesia, Katowice

Introduction: Neurodegenerative diseases are marked by progressive neuron loss and the accumulation of pathological biomarkers, including amyloid-beta, tau proteins, and neuroinflammatory markers. Although pharmacological treatments are limited in effectiveness, recent research has investigated the potential of physical activity to impact the underlying biological mechanisms of these disorders.
Objective: This study aimed to evaluate the effects of physical activity interventions on neurodegenerative biomarkers in individuals at risk for or diagnosed with neurodegenerative diseases.
Methods: Using the PubMed, Scopus, and Web of Science databases, a systematic review of studies published between 2010 and 2024 was conducted. Eligible studies included randomized controlled trials and longitudinal observational studies that measured the effects of exercise interventions (aerobic, resistance, or multimodal training) on biomarkers such as amyloid-beta, total and phosphorylated tau, brain-derived neurotrophic factor (BDNF), and inflammatory cytokines.
Results: Findings indicated that regular physical activity is linked to favorable changes in several neurodegenerative biomarkers. Notably, consistently reported increases in BDNF levels and decreases in inflammatory markers (e.g., IL-6, TNF-α) were observed. Some studies also showed reductions in amyloid-beta accumulation and modulation of tau pathology, particularly in individuals participating in moderate to vigorous aerobic exercise for 12 weeks or more.
Conclusions: Physical activity interventions demonstrate promising potential in modulating biomarkers linked to neurodegenerative processes. These biological changes may underlie the clinical improvements in cognitive and motor functions, reinforcing the inclusion of structured exercise as a preventive and therapeutic strategy in managing neurodegenerative diseases.

Keywords: physical activity, neurodegeneration, biomarkers, exercise interventions

Małgorzata Dębska-Janus, Michał Rozpara

Dispositional optimism as a determinant of health behaviors

Institute of Sport Sciences, Academy of Physical Education in Katowice, Katowice, Poland

Aim: The aim of this study is to examine dispositional optimism as a differentiating factor in health-related behaviours among Polish health sciences students.
Material and methods: A cross-sectional study was conducted with 216 health-sciences students. Dispositional optimism was verified using the Life Orientation Test-Revised (LOT-R), while the intensity of health behaviors was diagnosed using the Health Behavior Inventory scale (HBI). Basic descriptive statistics, ANOVA and and Multinomial Logistic Regression (MLR) were employed to analyze the data.
Results: The variation in health care (HBI) was significant concerning the level of dispositional optimism ($F(2, 213) = 5.09$, $p = .007$, $\eta^2 = 0.05$). This was identified as a significant predictor of health behaviors, with optimistic students being five times more likely to exhibit high levels of health care compared to their less optimistic peers.
Conclusions: The study reveals that a moderate and high level of self-efficacy and optimism promotes more frequent engagement in health-promoting behaviors. This study indicates indirectly the potential use of these traits as predictors in health promotion programmes. The results emphasize the need to incorporate methods that strengthen this disposition in health education to improve health behaviors.

Keywords : health behaviors, dispositional optimism, psychological resources, students

Agata Horbacz[1], Richard Melichar[1], Ľuboš Vojtaško[2], Dávid Kaško[1], Marcel Čurgali[1], Ján Junger[1]

Physical activity of students at selected universities in Eastern Slovakia after the relaxation of COVID-19 pandemic measures

[1] Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice, Slovakia
[2] Department of Academic Sports, Institute of Languages, Social, Sciences, and Academic Sports, Technical University of Košice, Slovakia

Introduction: Prolonged physical inactivity can decrease physical fitness and increase risk factors for metabolic, cardiovascular, and oncological diseases. Monitoring students' physical activity is essential to prevent negative lifestyle changes and declining health.
Problem and Aim: This study aims to analyse students' physical activity using the International Physical Activity Questionnaire (IPAQ) in two Eastern Slovak universities over an academic year following the COVID-19 pandemic.
Methods: After filtering out incomplete and inaccurate responses, we analysed 253 valid IPAQ questionnaires completed by students from Sports Activities at P.J. Šafárik University in Košice and Physical Education at the Technical University in Košice. Besides physical activity, we assessed their sitting time during school and leisure.
Results: We observed a significant difference in intense physical activity levels between UPJŠ and TUKE students ($p < 0.05$). However, no significant differences were found in moderate, low, or total physical activity levels. Statistically significant variations in sedentary time existed between UPJŠ and TUKE students on both weekdays ($p < 0.05$) and weekends ($p < 0.001$).
Conclusion: Our findings underline the importance of promoting and enhancing regular physical activity participation among university students in response to the COVID-19 aftermath and as an integral aspect of a healthy lifestyle.

Keywords: IPAQ, students, lifestyle, COVID-19

Aleksander Kasprzyk

Effects of Nordic Walking on balance and functional mobility in older adults

Departament of Technical and Economic Sciences, State Vocational University of prof. Stanisław Tarnowski in Tarnobrzeg

Introduction: Nordic walking is a physical activity that is gaining popularity, particularly among older adults, as an effective method for improving functional fitness. In addition to its health benefits, such as enhancing cardiovascular endurance and increasing muscle strength, it can significantly promote health among seniors. This study aims to analyze the impact of Nordic walking on balance and functional mobility in older adults.
Objective: This study assesses how regular participation in Nordic walking activities influences balance, functional mobility, and quality of life in older adults from Tarnobrzeg. Additionally, the study aims to determine how this activity can reduce the risk of falls and improve the ability to perform daily tasks.
Methods: The study involved 60 seniors aged 65 to 80 who participated in a 6-month Nordic walking program. Participants underwent functional tests, including balance assessments (Tinetti test), functional mobility tests (6-minute walk test), and quality of life questionnaires. Additionally, physical measurements, muscle strength, and cardiovascular endurance were taken.
Results: The findings showed a significant improvement in balance, mobility, and muscle strength among the participants. Seniors who regularly practiced Nordic walking demonstrated better outcomes in balance and functional mobility tests, reported a higher quality of life, and reported fewer complaints of pain. A decrease in the risk of falls was also noted among the participants.
Conclusions: Regular Nordic walking participation significantly improves functional mobility and balance, leading to greater independence in daily activities and a reduced risk of falls. This form of exercise effectively enhances the quality of life for seniors and could be recommended as part of rehabilitation and preventive programs for this age group.

Keywords: Nordic walking, balance, functional mobility, older adults, physical activity.

Dávid Kaško

The Impact of Recreational Cold Water Immersion on Functional Efficiency and Physiological Adaptation

Institute of Physical Education and Sport, Pavol Jozef Šafárik University in Košice

Introduction: Cold water immersion (CWI) is a rising trend among the general population and athletes. Regular practice can lead to physiological adaptations to thermal stress and enhance overall immunity and recovery.
Objective: This study aims to present the physiological basis, potential benefits, and limitations of recreational cold water immersion, particularly regarding functional efficiency and post-exercise recovery.
Material and Methods: A literature review focused on the physiological effects of CWI, including thermoregulation, activation of brown adipose tissue, and hormonal responses. The analysis examined factors influencing the effectiveness and safety of CWI, such as immersion duration, water temperature, body composition, and training level.
Results: CWI activates adaptive mechanisms: metabolic, insulating, and hypothermic. Moderate and consistent exposure to cold water may enhance immune response, improve muscle recovery, and increase tolerance to environmental stress. However, the literature demonstrates significant individual variability and limited reproducibility of outcomes.
Conclusions: Recreational cold water immersion can be beneficial for a healthy lifestyle and recovery routine. However, due to the multifactorial nature of cold exposure, further standardized experimental studies are necessary to draw consistent conclusions.

Keywords: cold water immersion, adaptation, recovery, functional efficiency, thermoregulation, physical activity.

Maria Niestroj-Jaworska[1], Jacek Polechoński[2]

Musculoskeletal disorders and work ability in female medical staff.

[1] Department of Physical Activity and Health Promotion, Academy of Physical Education in Katowice, Poland
[2] Institute of Sport Sciences, The Jerzy Kukuczka Academy of Physical Education, Katowice, Poland

Purpose. The purpose of this study was to assess the relationship between work ability and musculoskeletal disorders among physiotherapists.
Patients and methods. The study included 53 women working as physiotherapists aged 38,8 year (±10,13), body weight 64,68 kg (± 10,65), body height 166,57 (± 6,14) and BMI 23,32 kg/m² (±3,73). Perceived work ability was assessed using the standardized Work Ability Index (WAI) questionnaire. Information about the occurrence and intensity of musculoskeletal disorders was collected using standardized Nordic Musculoskeletal Questionnaire (NMQ).
Results. The majority of women working as physiotherapists rated their work ability as excellent (56.6%), 30.2% of respondents rated it as good, 5.7% as moderate, and 7.5% as low. The surveyed individuals most frequently reported lower back pain (72%) in the last 12 months as well as in the last 7 days (60%). The respondents also frequently reported neck pain (68%). The level of self-assessed work ability significantly differentiated the level of upper back pain in the last 12 months (p=0.040) and ankle/foot pain both in the last 12 months (p=0.020) and the last 7 days (p=0.007). Physiotherapists who rate their work ability as excellent report fewer pain complaints in various parts of the body compared to those who rate it as low.
Conclusions. The results suggest that improving self-assessed work ability may be associated with a reduction in pain complaints, highlighting the importance of preventive and ergonomic measures in the workplace.

Keywords: WAI, NMQ, work ability, musculoskeletal disorders, physiotherapists

Oskar Placek

Tourists' Expectations For Services Offered by PTTK Mountain Hostels in the Silesian Voivodeship

Department of Theoretical Foundations of Tourism, Department of Tourism and Recreation
Academy of Physical Education in Katowice

One of the most essential characteristics of any accommodation facility is providing high-quality services that meet tourists' expectations. Mountain hostels represent a specific type of highly specialized facility, located far from potential competitors. However, it is also increasingly difficult to obtain essential products for daily operations, making it particularly challenging to meet the expectations and needs of tourists in such settings.
This study aimed to determine tourists' main expectations regarding the type of accommodation represented by PTTK mountain hostels. The author conducted the research using a diagnostic survey method with a proprietary questionnaire. The survey was conducted between January and September 2018, collecting 354 correctly completed questionnaires.
The evaluation of expectations involved asking respondents to express their opinions on 29 statements concerning various service aspects of mountain hostels, utilizing a 5-point Likert scale. The analysis revealed that tourists visiting mountain hostels had the highest expectations regarding: cleanliness of bathrooms and sanitary facilities (4.53), access to warm water in the shower (4.49), and the atmosphere in the hostel (4.44). Conversely, the lowest expectations pertained to: the possibility of purchasing souvenirs associated with the hostel (2.27), renting and servicing ski equipment at the hostel (2.55), and the option of renting bedding for an additional fee (2.85). The results are part of a larger research project addressing the quality of services in mountain hostels and the motivations behind engaging in active sport tourism.

Keywords: mountain hostels, tourist expectations, service quality, mountain tourism, active sport tourism

Jacek Polechoński[1], Kamil Braś[2], Małgorzata Dębska-Janus[1]

Assessment of physical activity during header training of young soccer players in virtual reality and its impact on the transfer of skills from the virtual to the real environment.

[1] Institute of Sport Sciences, Academy of Physical Education in Katowice, Katowice, Poland
[2] Student Scientific Circle of Physical Activity and Tourism in Virtual Reality, Academy of Physical Education in Katowice, Katowice, Poland

Heading training in football is increasingly controversial, especially in the context of children and adolescents' health. Numerous studies indicate the potential risk of micro-injuries in the brain and their long-term impact on the cognitive functions of young athletes. In response to these concerns, there is growing interest in using modern technologies, such as virtual reality (VR), as a safe alternative to traditional forms of training. The study's main aim was to assess the intensity of physical effort during heading training in virtual and actual reality and to analyze the effectiveness of transferring skills from VR to the actual game environment. Additionally, participants' satisfaction and feeling of flow with physical activity in VR and actual reality, and their attitude to virtual football were assessed. The study involved 24 young players aged around 12. The Oculus Quest 2 set and the Rezzil Player application were used for VR projection. The intensity of physical effort was assessed using a heart rate monitor. The level of satisfaction was estimated based on the Physical Activity Enjoyment Scale, while the flow state was evaluated using the Flow State Scale. Studies show that the intensity of physical effort during short-term (10 minutes) header training in VR is significantly higher than similar physical activity in the real world. Header training in VR increases the speed of the ball being hit in the virtual environment and improves the precision of ball strikes in the virtual and real world. Players rate the pleasure and sense of flow from practicing physical activity in VR higher than similar exercises in the real world. They also speak positively about the usefulness of this form of training. Based on the results of the studies, VR can be a valuable and safe tool that supports the technical development of young football players and minimizes the risk of head injuries. A high level of pleasure and the state of flow can additionally increase the involvement of young athletes in this type of activity.

Keywords: virtual reality, football, children and youth, headers, safety, skill transfer, physical activity, technology in sports, Oculus Quest 2, Rezzil Player

Michał Rozpara[1], Maria Niestrój-Jaworska[2]

Energy expenditure during CrossFit training in healthy participants.

[1] Institute of Sport Sciences, Academy of Physical Education in Katowice, Poland
[2] Department of Physical Activity and Health Promotion, Academy of Physical Education in Katowice, Poland

Introduction. CrossFit is a comprehensive training approach aimed at developing strength and conditioning. It includes elements such as calisthenics, resistance training, and cardio exercises. Primary exercise, such as squat, deadlift, floor press, or thruster, are often used in the main part of a CrossFit workout. The purpose of this study was to evaluate the energy expenditure and intensity of the main part of CrossFit training depending on different types of primary exercises.
Material and methods. The study involved 21 participants (10 women and 11 men) aged 29.9 ± 6.2 years, who practiced CrossFit for 5 to 12 hours per week. The height and weight of the participants were as follows: women – 168.6 ± 11.9 cm and 62.8 ± 5.3 kg; men – 178.6 ± 7.0 cm and 83.0 ± 17.4 kg. Resting and maximum heart rates were, respectively: women – 67 ± 8 bpm and 193 ± 6 bpm; men – 63 ± 8 bpm and 193 ± 5 bpm. A one-group quasi-experimental design was used. The study employed a Polar V800 watch and H7 heart rate sensor (Polar Electro Oy) to measure training heart rate (HRexe), and to estimate energy expenditure (EE) and intensity (INT) during three 30-minute CrossFit training sessions. Each session differed in the primary exercise used during the main part of the workout: deadlift (DL) in the first, floor press (FP) in the second, and thruster (TH) in the third.
Results. HRexe significantly differed depending on the primary exercise used, both among women ($\chi^2 = 13.28$, $p = .001$) and men ($\chi^2 = 8.05$, $p = .018$). Dunn's tests revealed significant differences in HRexe among women between sessions with DL and TH ($p = .030$), as well as FP and TH ($p = .002$). Among men, a significant difference was found only between FP and TH ($p = .043$). Energy expenditure (EE) and training intensity (INT) also varied significantly depending on the primary exercise. For women, EE was: 150.5 ± 31.8 kcal with DL, 146.0 ± 20.5 kcal with FP, and 204.0 ± 36.3 kcal with TH ($\chi^2 = 8.60$, $p = .014$). For men, EE was: 345.0 ± 44.0 kcal with DL, 298.0 ± 58.5 kcal with FP, and 363.0 ± 111.0 kcal with TH ($\chi^2 = 9.46$, $p = .014$). Post hoc comparisons indicated a significant difference in EE only between FP and TH sessions for both women ($p = .011$) and men ($p = .009$). Training intensity for women was: 5.1 ± 1.3 METs with DL, 5.0 ± 0.9 METs with FP, and 6.5 ± 0.9 METs with TH ($\chi^2 = 8.90$, $p = .012$); and for men: 8.1 ± 1.3 METs with DL, 7.6 ± 1.2 METs with FP, and 9.5 ± 2.1 METs with TH ($\chi^2 = 10.09$, $p = .006$). Dunn's pairwise comparisons showed significant differences in intensity between FP and TH for both women ($p = .011$) and men ($p = .006$).
Conclusions. The energy expenditure of a CrossFit workout ranged from 146 to 204 kcal in women and from 298 to 363 kcal in men. Training intensity ranged from 5.0 to 6.5 METs in women and from 7.6 to 9.5 METs in men. The highest values for both energy expenditure and intensity were observed during sessions involving the thruster and deadlift exercises, while the lowest were recorded during sessions with the floor press.

Keywords: CrossFit training, energy expenditure, physical activity intensity, estimation, heart rate monitor.

Andrzej Samołyk[1,2], Włodzimierz Wiązek[2], Marek Kociuba[2]

Assessment and development of functional motor competence in military cadets - the potential role to promote physical military readiness and reduce injury risk.

[1] Institute of Physical Education and Health, University of Applied Sciences in Racibórz, Poland
[2] Department of Physical Education and Sports, General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland

Assessment and development of functional motor competence in military cadets - the potential role to promote physical military readiness and reduce injury risk.
The reduced level of physical fitness among military academy recruits is problematic for developing their physical military readiness and creates a risk of injuries and trauma during training. The common issue with functional motor skills stems from the ongoing decline in health-related fitness and physical activity throughout childhood and adolescence.
Low levels of physical fitness may indicate a more fundamental problem in the physical development of military recruits. It seems that the development of functional motor skills in childhood and adolescence is a necessary prerequisite for advanced training in physical military readiness and military tasks (including marches and runs in uniform and with weapons, overcoming obstacle courses) and is an integral part of maintaining a high level of physical military readiness for officer cadets. In addition, the low level of functional motor competence in individuals undergoing intensive physical fitness training may increase the risk of injuries and contusions, primarily affecting the musculoskeletal system. This leads to restrictions in participation in physical activities, which further reduces the efficiency of cadets.
The formation and development of functional motor competence determine endurance improvement in the circulatory and muscular systems, primarily through repeated exercises during training and sports activities. It also supports strength development in the context of strength and conditioning training. Therefore, it can be assumed that an insufficient level of functional motor competence, along with potential injuries and contusions, constitutes a barrier to achieving satisfactory physical military readiness and performing tasks. In light of the above, a comprehensive assessment of the functional motor skills of cadets appears to be an essential element in preventing injuries and contusions and implementing developmentally appropriate training based on functional motor competence.

Keywords: functional motor competence, physical military readiness, military cadets, injury prevention, physical fitness assessment

Ivan Uher[1], Iveta Cimboláková[1], Tatiana Kimáková[2], Milena Švedová[3]

Embodied Transformation: A Framework for Identity-Based Change through Interoception, Present-Moment Experience, and Neuroplasticity

[1] Institute of Physical Education and Sport, Pavol Jozef Šafárik University, Košice, Slovakia
[2] Department of Public Health and Hygiene, Pavol Jozef Šafárik University, Košice, Slovakia
[3] Institute of Technology and Business in Prešov, Slovakia

This conceptual paper introduces a novel framework grounded in embodied identity (EI), interoceptive awareness (IA), neuroplasticity (NP), and present-moment experience (PME) aimed at supporting sustainable lifestyle change and optimal performance and living. The model responds to limitations in conventional health and behavior-change paradigms, which often emphasize external compliance and symptom management while neglecting the internal mechanisms that drive lasting transformation. Central to this approach is the development of interoceptive sensitivity and alignment between self-perception and behavior, proposing that enduring change emerges from a shift in identity supported by embodied awareness and neural adaptation. Beyond health-related contexts, the model applies to individuals seeking to optimize performance, access flow-zone, sub-zone, state, and unlock their potential in athletic, creative, or professional pursuits. Furthermore, the contribution outlines the development of novel tools – including an interoceptive activation model and a wearable biofeedback integrated monitoring system designed to facilitate present moment embodiment, track physiological and behavioral patterns, and provide personalized insight into the relationship between internal states and daily choices. The model and its supporting tools offer a unified, experiential pathway for transformation and self-optimization. This model represents a significant shift from outcome-driven strategies to identity-driven, experiential engagement with healthful and optimal living, offering a new perspective that can enlighten and inspire future research and practice in these fields.

Keywords: Interoception, Neuroplasticity, Present-moment experience, Health promotion, Preventive Health

Marcin Warchoła

Games and activities with Nordic Walking poles as a pedagogical innovation in physical education classes in early school education.

Faculty of Health Protection, The Bronisław Markiewicz State University of Applied Sciences in Jaroslaw

Introduction. Pedagogical innovation refers to creative and modern solutions implemented in the teaching and educational process, aimed at enhancing the quality of education and better aligning teaching methods with the needs of pupils. It may include the introduction of new methods, work formats, teaching tools, or lesson organization. Such innovations foster greater pupils engagement, support the development of creativity, independence, and cooperation skills. Introducing innovative practices enables teachers to build a more attractive and effective learning environment that responds to the challenges of contemporary education.
Material and methods. The article presents examples of the use of nordic walking poles as an innovative pedagogical tool in early school education, with particular focus on physical education classes. Although nordic walking is traditionally associated with physical activity for adults and seniors, it can be effectively adapted to meet the developmental needs of young children. The poles are used in a variety of movement games and activities that not only improve physical fitness and coordination, but also encourage teamwork, creative thinking, and positive social behaviors.
Results. The article outlines specific games and activities using nordic walking poles that are easy to implement in early primary physical education. It emphasizes that this form of activity is safe, enjoyable, and appropriate for children's physical capabilities.
Conclusions. Furthermore, the use of nordic walking poles plays a preventive role – promoting correct posture, reducing the risk of spinal issues, and encouraging healthy, active lifestyles. As such, this pedagogical innovation supports the holistic development of pupils and can become a valuable element of modern physical education.

Keywords: pedagogical innovation, early childhood education, physical education, nordic walking, movement games, child development.

Jagoda Cholewa

Legal Aspects of Participation in Cross-Border Sports Events

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Introduction. Cross-border sporting events present complex legal challenges related to mass event safety requirements, coordination of security services, protection of participant data, and the determination of applicable law and dispute resolution mechanisms. This work aims to identify divergences in national regulations, reveal legislative gaps, and propose recommendations to harmonize legal frameworks across jurisdictions.
Materials and methods: This study employs a comparative method and normative analysis, supplemented by case studies of several transnational running events. By reconstructing the cooperation mechanisms among state authorities in different jurisdictions, the research assesses the effectiveness of the procedural arrangements adopted in practice.
Results. An examination of mass-event safety requirements reveals harmonizing EU directives and significant national variations, particularly concerning security planning institutions, route certification, and health-sanitary inspections. An analysis of coordination challenges highlights legal obstacles to seamless collaboration among cross-border security services. Data protection considerations, grounded in the GDPR and local implementing acts, demonstrate complexities in the flow of personal information between organizers and public administrations. A review of conflict-of-laws rules and choice-of-law in event regulations shows varied practical efficacy compared to alternative arbitration mechanisms.
Conclusions. The findings highlight the need for coherent, unified legal guidelines for cross-border sporting events to standardize safety protocols, enhance data-protection measures, and establish transparent, efficient procedures for dispute resolution.

Keywords: cross-border sporting events; mass event safety; data protection; conflict of laws;

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