

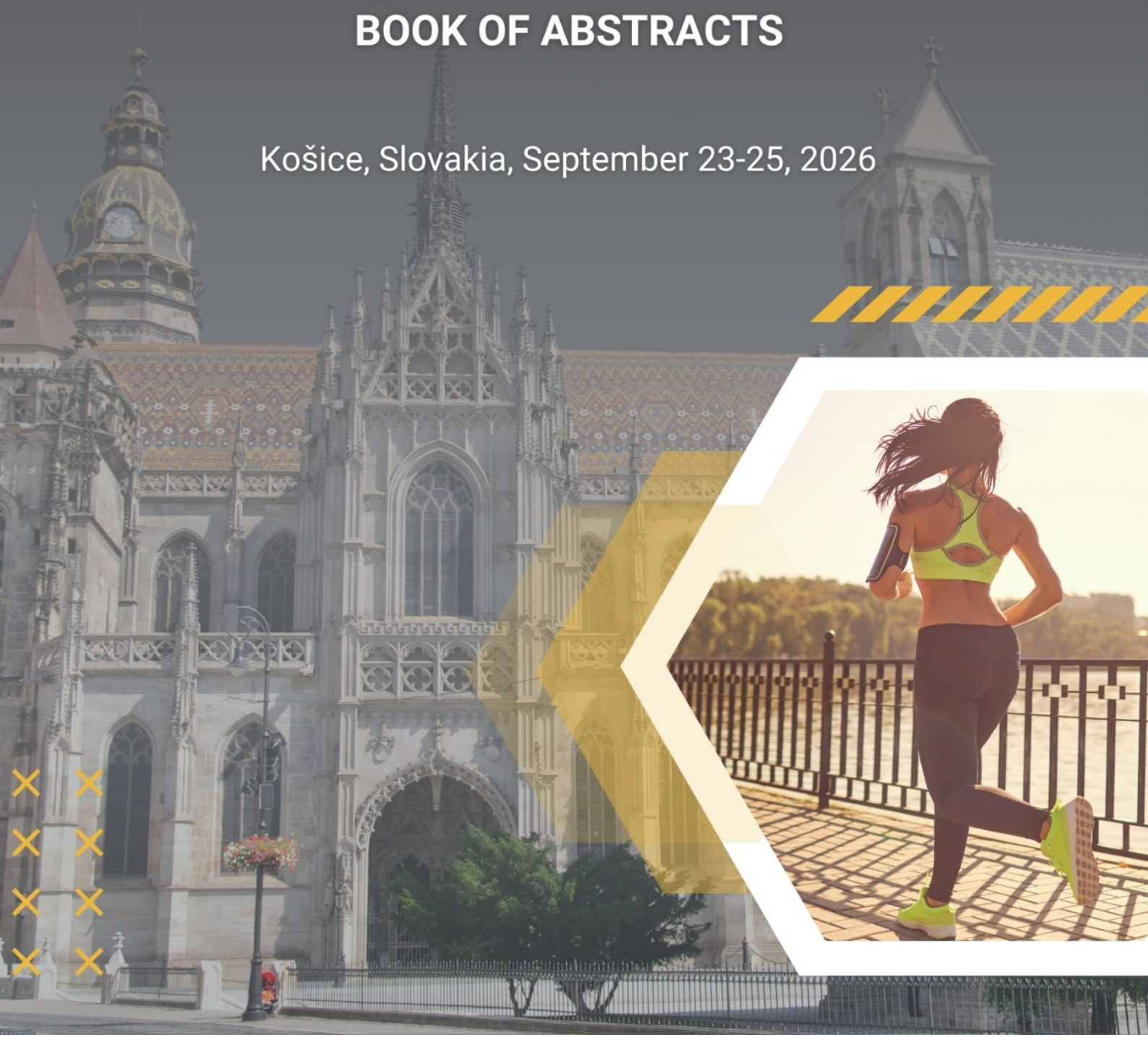


6th International Scientific Conference

PHYSICAL ACTIVITY, HEALTH AND QUALITY OF LIFE

BOOK OF ABSTRACTS

Košice, Slovakia, September 23-25, 2026



UNIVERZITA PAVLA JOZEFA ŠAFÁRIKA V KOŠICIACH
ÚSTAV TELESNEJ VÝCHOVY A ŠPORTU



6th International Scientific Conference
„Physical Activity, Health and Quality of Life”

Košice, Slovakia, September 23-25, 2026

Book of Abstracts

Viktória Ali Taha (ed.)

Košice 2026

**6th International Scientific Conference „Physical Activity, Health and Quality of Life
Košice, Slovakia, September 23-25, 2026**

Book of Abstracts

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Dear colleagues and friends

It is our great pleasure to welcome you to Košice for the 6th International Scientific Conference "Physical Activity, Health and Quality of Life", organised by the Institute of Physical Education and Sport of the Pavol Jozef Šafárik University in Košice in cooperation with Uniwersytet HP im. Jana Długosza w Częstochowie, Lesya Ukrainka Volyn National University, University of Pécs, and University of Rzeszów.

The importance of physical activity for individual and public health has never been more evident. Contemporary societies face a combination of challenges associated with insufficient physical activity, sedentary lifestyles, population ageing, increasing demands on mental health and well-being, and rapidly changing technological and social environments. At the same time, advances in research, digital technologies and new approaches to health promotion are creating new opportunities to understand, support and sustain active lifestyles across different populations and throughout the life course.

Against this background, the conference provides an interdisciplinary platform for researchers, academics and practitioners to share current knowledge, research findings and practical experience related to physical activity, health and quality of life. Its broad thematic scope reflects the complexity of these issues and encourages dialogue across disciplines, linking perspectives from sport sciences, health sciences, psychology, education, social sciences and related fields.

Particular value lies in bringing together diverse perspectives and methodological approaches. Understanding physical activity today requires us to look beyond individual behaviour and consider the wider social, environmental, organisational and technological conditions that shape opportunities to be active. We therefore hope that the conference will not only facilitate the presentation of new research, but also stimulate discussion, international cooperation and new ideas for future interdisciplinary projects.

This Book of Abstracts reflects the scientific contribution to the sixth edition of the conference and brings together work authored or co-authored by 112 contributors. Their submissions represent a wide range of topics, research approaches and professional perspectives, highlighting the interdisciplinary and collaborative character of the conference. We sincerely thank all authors for sharing their work and contributing to the scientific programme, as well as our partner universities and collaborating institutions for their continued support and cooperation.

Our special thanks go to the reviewers, editors, members of the Scientific and Organising Committees, session chairs and technical support team whose work has contributed to the preparation and successful organisation of the conference.

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Conference Program

23 SEPTEMBER 2026, WEDNESDAY

16:20 – 18:00	Guided city tour – meeting point – St. Elisabeth Cathedral main entrance
18:30 – 19:30	Dinner
19:30 – 22:00	Round Table Discussion: New Perspectives on International Scientific Collaboration

24 SEPTEMBER 2026, THURSDAY

8:00 – 8:45 historic auditorium	Registration
9:00 – 9:30 historic auditorium	Opening ceremony
9:30 – 11:00 historic auditorium	<i>Plenary session</i> <i>Chairs: prof. PaedDr. Elena Bendíková, PhD.; prof. dr hab. Jacek Wąsik</i> Environmental determinants and drivers in physical activity research Prof. Mgr. Josef Mitáš, Ph.D. Physical activity of university and secondary school students in the V4 countries in the last decade Prof. Dr. Pongrác Ács Exercise as the first medicine – why should physical activity precede pharmacotherapy from an early age? Mgr. Jarosław Herbert, Ph.D., Assistant Professor
11:00 – 11:15	Coffee break
11:15 – 12:30 historic auditorium	<i>Session I</i> <i>Physical Activity, Health and Well-being Across the Lifespan</i> <i>Chairs: dr. hab. prof. UR Emilian Zadarko; dr hab. Zbigniew Barabasz, prof. PANS</i> Lessons from the Blue Zones: Physical Activity in Older Adults and Longevity Principles from Okinawa Tatiana Kimáková, Filip Komanický, Alena Buková Sleep Quality in Female University Students: Effects of Aerobic and Combined Exercise Training Ferdinand Salonna, Patrik Berta, Petra Melicharová, Dávid Kaško, Zuzana Küchelová, Vlasta Demečková, Mária Ryniková, Alena Buková A composite performance score in children attending early sport specialization and early sampling programs Richard Melichar, Tomáš Perič Physical activity as a determinant of Health, Functional Performance, and Quality of Life Peter Kalanin

	Association between Physical Activity-related Health Competence and Physical Activity among Adolescents in the Visegrad Countries Alexandra Makai, Ferdinand Salonna, Ján Junger, Marcin Weiner, Ewelina Niżnikowska, Viktória Prémusz, Pongrác Ács Discussion, Q&A
11:15 – 12:30 large meeting room	<i>Session II</i> <i>Exercise Physiology, Performance and Innovative Approaches in Sport</i> <i>Chairs: prof. Mgr. Josef Mitáš, Ph.D.; doc. PaedDr. Ivan Uher, MPH, PhD.</i> Physiological and Mood Response to a Single 60-Minute Nirvana Fitness Session in Young Women Robert Podstawski, Krzysztof Boryślawski, Bożena Hinc, Paweł Jastrzębski, Emilia Bałdyga, Anna Podstawska, Aneta Omelan, Attila Szabo The Effect of a 6-Minute Strength-Endurance Effort on the Effectiveness of Cardiopulmonary Resuscitation Robert Podstawski, Krzysztof Boryślawski, Paweł Jastrzębski, Jadwiga Snarska, Emilia Bałdyga, Attila Szabo Portable Resistance in Mixed-Reality Boxing: Higher Exercise Intensity with Preserved Enjoyment and Flow Jacek Polechoński, Aleksandra Daniel, Małgorzata Dębska-Janus, Anna Witkowska, Jarosław Cholewa Diagnostics of Strength Abilities of Paralympic Athletes Kamil Povrazník Discussion, Q&A
12:45 – 14:15	Lunch
14:15 – 15:15 historic auditorium	<i>Session III</i> <i>Physical Activity, Postural Health and Pediatric Health, Physical Education and Educational Innovation</i> <i>Chairs: dr hab. Robert Podstawski, prof. UWM; dr hab. Jarosław Cholewa, prof. AWF</i> Assessment of Risk Factors for Hypertension in Preschool Children Jarosław Herbert, Vasylyna Petrovets, Weronika Pigóra, Aleksandra Wiazicka, Piotr Matłosz Pediatric Flatfoot: A Review of Diagnosis, Development, and Intervention Options Filip Komanický, Michal Rafajdus, Tatiana Kimáková Undergraduate Education of Future Physical and Sport Education Teachers in the Field of Postural Health Elena Bendíková, Robert Rozim Between Reconstruction and Cooperation: The Beginnings of Contacts Between the Łódź Sports Community and Slovak Athletes After World War II (1945–1949) Julian Jaroszewski

	Innovative Trends in Improving the Quality of Preparation of Future Primary Education Teachers in the Context of the Educational Area of Health and Movement Robert Rozim, Miroslav Bendík Discussion, Q&A
15:15 – 15:30	Coffee break
15:30-16:00 small meeting room (2nd floor)	<i>Session IV</i> <i>Poster session</i> <i>Chairs: prof. dr. hab. Eligiusz Małolepszy, Monika Bigosińska, PhD.</i> 1. Association of Preoperative Self-Efficacy with Physical Activity after Total Hip Replacement in Osteoarthritis Julius Evelley, Peter Polan, Alena Bukova, Iveta Nagyova 2. Occupational Differences in Adiposity Profiles and Self-Reported Physical Activity: A Cross-Sectional Comparison of Production Workers, Administrative Employees, and Teachers Paweł Kożuch, Katarzyna Sztafa-Cabata 3. Recovery Methods and Their Effectiveness in Restoring Performance and Reducing Fatigue in Elite Female Volleyball Players Agata Horbacz, Michaela Il'ková, Mária Majherová 4. Phase-Specific Biomechanical Differences Between Countermovement and Abalakov Jumps in Male Volleyball Players Krzysztof Frączek, Dominik Stanisławczyk, Wojciech Grzyb 5. Relative Importance of Body Composition Parameters as Determinants of Functional Performance in Older Women: A Pilot Study Krzysztof Frączek, Sławomir Drozd, Monika Musijowska, Edyta Kwilosz, Agnieszka Kijowska, Renata Dziubaszewska 6. Relationship Between Leisure-Time Physical Activity, Cardiorespiratory Fitness and Heart Rate Recovery in University Students Emilian Zadarko, Maria Zadarko-Domaradzka, Anna Radwańska, Edyta Nizioł-Babiarz, Mariusz Ozimek, Maciej Huzarski, Monika Musiejowska, Edyta Kwilosz, Zbigniew Barabasz 7. Predictive Potential of Gymnastics in the Development of Physical Literacy in Children Milena Švedová 8. Quality of Life among Ukrainian University Students: Educational and Social Determinants of Physical and Mental Health Anatolii Tsos 9. Body Composition and Cardiorespiratory Fitness in Relation to Eating Disorders Risk among University Students Monika Musijowska, Edyta Kwilosz, Grzegorz Sobolewski, Emilian Zadarko, Maria Zadarko-Domaradzka 10. Assessment of the Diet Quality of Primary School Children Using the Pro-Healthy Diet Index (pHDI-10, Pro-Healthy-Diet-Index-10) Monika Bigosińska, Izabella Adamowicz

	11. Promoting Physical Activity among Senior School Students through Fitness and Sports Tourism in Extracurricular Settings Liudmyla Vashchuk, Olena Demianchuk 12. Tourism in Poland as Presented in the Lwów Periodical Sport, 1922–1927 Eligiusz Małolepszy, Teresa Drozdek-Małolepsza 13. Activities of the Stanisławów District Football Association (1934–1939): Football in a Multiethnic Society Eligiusz Małolepszy, Krzysztof Kościański, Teresa Drozdek-Małolepsza 14. Coubertin's Idea of the International Olympic Academy and Its Implementation – The Case of Poland and Slovakia Renata Urban 15. Assessment of University Students' Physical Activity Based on Subjective and Objective Measurements in the Hungarian Sample of a V4-Country Study Tamás Beregi, Alexandra Makai, Viktória Prémusz, Arnold Koltai, Eszter Hallósy, Pongrácz Ács 16. Selected aspects of motor skills among young footballers at junior competition level in Poland Mariusz Ozimek, Jerzy Lipczyński, Emilian Zadarko, Zbigniew Barabasz, Maria Zadarko-Domaradzka 17. Motives and barriers to physical activity among women in military service in the context of socio-occupational variables Jolanta Pilarczyk, Dorota Sadowska, Justyna Krzepota 18. Coping Styles, Perceived Stress, and Salivary Cortisol Concentrations – A Comparison of Female Students and Women Over 40 Years of Age Agata Szlachetka, Magdalena Bartnicka, Krzysztof Wrześniewski, Tomasz Pałka, Ewa Sobiło-Rydzik, Monika Bigosińska, Anna Kurkiewicz-Piotrowska 19. Physical Activity, Health-Related Quality of Life and Psychological Distress among Physical Education and Sport Academic Staff: Ukraine and Central Europe Svitlana Indyka, Natalia Bielikova, Anatolii Tsos 20. Prolonged Sitting and Its Consequences: Preventing Harm Through Movement Breaks Filip Komanický, Tatiana Kimáková, Michal Rafajdus
18:30 – 01:00	Gala Dinner
25 SEPTEMBER 2026, FRIDAY	
09:00 – 10:00 small meeting room IPES	<i>Session V</i> <i>Physical Activity, Health, Nutrition and Human Performance</i> <i>Chairs: prof. MUDr. PhDr. Peter Kalanin, PhD. et PhD., MHA, MPH, DBA; prof. Anatolii Tsos, DrSc.</i> What Makes an Employer Attractive? Exploring the Underlying Structure of Employer Preferences with a Focus on Health and Well-Being Viktória Ali Taha

	Usable data yield of a consumer wrist-worn monitor in a 12-week aerobic training study in female university students Patrik Berta, Ferdinand Salonna, Dávid Kaško, Zuzana Kuchelová, Alena Buková Concentration Performance Among Secondary School Students: Differences by School Type and Gender in the Context of Physical Activity Marcel Čurgali, Kristína Čurgali, Jessica Oravcová, Nora Halmová Mediterranean Dietary Patterns among Female University Students: Baseline Data from the GutGirl Study Dávid Kaško, Alena Buková, Ferdinand Salonna, Patrik Berta, Petra Melicharová, Zuzana Küchelová, Vlasta Demečková, Mária Ryníková Changes in Dietary Habits during a 10-Week Physical Activity Intervention among Female University Students Zuzana Küchelová, Alena Buková, Ferdinand Salonna, Patrik Berta, Petra Melicharová, Dávid Kaško, Elina Kasumova, Vlasta Demečková, Mária Ryníková Bilateral Differences in Impact Force and Segmental Acceleration during the ITF Taekwon-Do Turning Kick Tomasz Góra, Jacek Wąsik Discussion, Q&A
10:00 – 10:30	Closing ceremony
10:30 – 12:00 small meeting room IPES	Closed Working Meeting: Opportunities for Joint Cross-Border Projects

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INVITED LECTURES



× × 6th International Scientific Conference

× × **PHYSICAL ACTIVITY,**
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× ×

Environmental Determinants and Drivers of Physical Activity Research

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Purpose: Over recent decades, physical inactivity has reached a global pandemic responsible for >5 million deaths in high, middle, and low-income countries each year. Existing physical activity guidelines and interventions have limited and biased effects, consequently further increasing health inequities. Most interventions have primarily relied on educational and information-based programs targeting the individual with little consideration of the social and physical environments. Therefore, interventions based on ecological models and targeting individuals, social environments, physical environments, and policies must be implemented to achieve population change in physical activity. Multilevel research and interventions require combine concepts and methods of multiple disciplines to promote active living is in its early stages but is expanding rapidly. Research on physical activity is done in specific places, therefore studying characteristics of places that facilitate or hinder physical activity, is a priority in most developed countries. Behavior represents the interaction of the person and the environment domains, which is useful when searching for variability of environments and policies that may influence active living. Current research is focused on the most strongly associated policies and environmental variables with implication in urban planning and including all actors of creation active neighborhoods in decision process. The results of research done on physical activity and built environment indicates that some urban factors (particularly those of mixed-use development) are significantly related to increased levels of physical activity which has social, health and economic consequences.

Conclusion: Appropriate design of urban environments might potentially produce 90 min/week of residents' activity, which is 60% of the 150 min/week globally accepted physical activity guidelines. A recommendation for practice from international pooled analyzes is to make the creation of activity supportive environments a regular function of public health agencies globally through work with other sectors, including environmental sustainability groups, and residents to promote physical activity supportive development to reduce energy consumption, greenhouse gas emissions, and air pollution, while achieving health and economic benefits.

Keywords: built environment; active living; urban policy; behavioral change

Physical Activity among University and Secondary School Students in the V4 Countries over the Last Decade

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Introduction: Physical activity and sedentary behaviour during adolescence and young adulthood are important determinants of lifelong health and quality of life. Understanding how these behaviours change over time is essential for developing effective health promotion strategies. This study provides a ten-year perspective on physical activity among secondary school and university students across the Visegrad Four (V4) countries.

Material and Methods: Harmonized cross-sectional surveys conducted in 2015 and 2025 included 4,372 secondary school and university students from the Czech Republic, Hungary, Poland, and Slovakia. Physical activity and sitting time were assessed using the International Physical Activity Questionnaire – Long Form (IPAQ-LF). Temporal trends and differences according to age, gender, educational level, and country were examined.

Results: Over the ten-year period, physical activity and sedentary behaviour showed a modest overall improvement, particularly through a reduction in prolonged sitting and in the proportion of students combining insufficient physical activity with excessive sedentary time. However, the positive trend was not uniform across the region. Younger secondary school students demonstrated less favourable activity patterns than older students, while substantial differences between the four V4 countries persisted.

Conclusions: The ten-year V4 comparison suggests that progress in physical activity and sedentary behaviour among secondary school and university students is possible, but also highlights groups and settings where further action is needed. The findings underline the importance of moving beyond individual responsibility and creating school, university, community, and policy environments that make active living an accessible and sustainable part of everyday life. A coordinated Central European perspective may provide an important opportunity to learn from national differences and translate successful approaches across the Visegrad region.

Keywords: physical activity, sedentary behaviour, secondary school students, university students, Visegrad countries, health, quality of life

Funding: The research was funded by the project “Physical Activity Patterns Among High School and University Students in the V4 Countries – a Comparative Study”, co-financed by the International Visegrad Fund under the Visegrad Grants programme (Agreement No. 22420149).

Exercise as the First Medicine – Why Should Physical Activity Precede Pharmacotherapy from an Early Age?

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Introduction: Physical activity is one of the most important modifiable factors influencing health and development from early childhood. Regular movement supports physical, metabolic, psychosocial, and cognitive health and plays an important role in the prevention of non-communicable diseases. Therefore, promoting an active lifestyle should begin in the preschool years, when lifelong health behaviours start to develop.

Results: This lecture discusses current recommendations and evidence concerning physical activity among preschool children, with particular attention to children aged 5–6 years. Although children are generally perceived as naturally active, research indicates that a substantial proportion do not achieve recommended levels of moderate-to-vigorous physical activity (MVPA). Importantly, estimates of compliance with physical activity recommendations vary considerably depending on the measurement method and accelerometer cut-points used. This methodological issue is illustrated using findings from a systematic review of studies conducted among Polish children and adolescents.

The presentation also summarises results from studies using objective accelerometer measurements in Polish preschool children. These findings indicate relatively low compliance with recommended MVPA levels, differences between boys and girls, and variation in physical activity between weekdays and weekends and between kindergarten and home environments. The results demonstrate that children's physical activity is strongly influenced by the opportunities for movement provided by their everyday environment.

Conclusions: Physical activity should therefore be considered a fundamental component of early prevention and health promotion. This does not imply replacing necessary pharmacological treatment with exercise, but rather emphasises the importance of movement in reducing modifiable health risks before disease develops. Parents, teachers, educational institutions, and communities should create environments that encourage children to move every day. Start early, move every day, create opportunities, and be a role model.

Keywords: physical activity, preschool children, prevention, accelerometry, health promotion



ORAL PRESENTATIONS



× × 6th International Scientific Conference

× × **PHYSICAL ACTIVITY,
HEALTH AND QUALITY OF LIFE**

What Makes an Employer Attractive? Exploring the Underlying Structure of Employer Preferences with a Focus on Health and Well-Being

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Introduction: Employer attractiveness is a multidimensional concept encompassing economic, developmental, organizational, and psychosocial characteristics of employment. Alongside traditional factors health promotion, work-life balance, mental well-being, and support for physical activity are increasingly incorporated into employer value propositions. However, it remains unclear whether health- and well-being-related attributes constitute a distinct dimension of employer attractiveness or whether they are embedded within broader perceptions of supportive working conditions. The aim of the study was therefore to explore the underlying structure of employer attractiveness preferences and to determine the position of health- and well-being-related attributes within this structure.

Material and Methods: The study used data from a cross-sectional questionnaire survey of 113 respondents. Participants evaluated 17 employer attractiveness attributes using a five-point importance scale. The attributes included traditional employment characteristics, such as salary, job security, career development opportunities and organizational reputation, as well as work-life balance, occupational health and safety, organizational support for a healthy lifestyle, mental health and well-being, and physical activity. The original scale demonstrated high internal consistency.

Results: Measurement Systems Analysis (Kaiser–Meyer–Olkin test) for the data selected for factor analysis was considered favorable. Furthermore, Bartlett’s test of sphericity strongly rejects the null hypothesis that all correlations between variables are zero and thus the data contain correlations that PCA or factor analysis can explain. According to Kaiser’s criterion, we would therefore retain three components (with eigenvalues > 1). Together, the first three components explain 65.74% of the variability. We can call the first component “General Employer Attractiveness”. The second component, “Employee-Oriented Value vs. Employer Image,” highlights the contrasting importance of salary, benefits packages, support for physical activity, health, and well-being versus organizational reputation, prestige, and, to some extent, innovation. The third component, “Physical-Activity Support vs. Supportive Working Conditions,” similarly distinguishes support for physical activity from work–life balance, the work environment, and occupational safety and health.

Conclusions: The findings provide a more differentiated understanding of employer attractiveness by examining how individual employment attributes are organized into broader preference dimensions. Identifying whether health and well-being constitute an independent dimension of employer attractiveness may help organizations determine whether such initiatives should be communicated as a distinctive component of the employee value proposition or as part of a broader supportive work environment.

Keywords: employer attractiveness; employee value proposition; workplace well-being; employer branding; exploratory factor analysis

Undergraduate Education of Future Physical and Sport Education Teachers in the Field of Postural Health

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Introduction: Postural health is a fundamental prerequisite for the proper functioning of the musculoskeletal system and overall quality of life. Due to digitalization and increasingly sedentary lifestyles, there is a rising prevalence of school-aged pupils diagnosed with poor posture (PP), muscular imbalances, and back pain. In this context, the school environment represents an ideal setting for early intervention, which must be preceded by targeted diagnostics. Physical education (PE) teachers are increasingly becoming key coordinators in promoting students' postural health. However, to effectively implement preventive and compensatory elements into the teaching process, they must be adequately prepared during their university studies. The aim of this research was to implement an educational program for university students enrolled in the Physical Education study program within pre-service teacher training, focusing on the acquisition of knowledge and skills in the field of postural health, followed by a practical intervention during their teaching practice.

Materials and Methods: The research sample consisted of 42 students enrolled in either single-major or double-major Physical Education study programs who voluntarily agreed to participate in the study. The participants engaged in the educational program during the 2025/2026 academic year, completing 30 hours of theoretical and practical education (TPE) focused on postural health. This program was conducted under the expert guidance of professionals specializing in school pedagogy and higher education. As part of a sub-task following the completion of the TPE, the students utilized standardized procedures to assess the status of selected musculoskeletal system factors in school-aged pupils. Subsequently, they implemented targeted interventions aimed at the prevention and correction of poor posture. Standardized procedures and quantitative methods were applied for data processing and analysis.

Results: The findings reveal several key insights. The students place a high level of importance on emphasizing musculoskeletal assessments in standard teaching practice to identify postural deviations and preserve postural health. Furthermore, they advocate for the development of standardized postural health diagnostic methodologies, the integration of postural exercises into the instructional process, and an adequate time allocation for university courses focused on postural health. The educational program successfully contributed to the acquisition and expansion of both theoretical knowledge and practical skills through active workshops tailored for school practice.

Conclusion: Ensuring the postural health of the school-aged population requires a proactive approach that begins during the pre-service education of future physical education and sports teachers. In this context, undergraduate training specifically tailored to postural health plays a critical role in equipping students with the necessary knowledge and practical skills in this domain. Investing in the professional

competencies of future PE teachers in the field of postural health will ultimately yield long-term benefits by reducing the prevalence of musculoskeletal impairments among school-aged pupils.

Keywords: postural health, health, health-oriented program, undergraduate education, students.

Funding: *The presented scientific study is part of the project KEGA 014KU-4/2025, titled "Pre-graduate education of physical education and sports teachers from the perspective of developing their movement literacy with an emphasis on postural health."*

Usable Data Yield of a Consumer Wrist-Worn Monitor in a 12-Week Aerobic Training Study in Female University Students

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Introduction: Feasibility of consumer wrist-worn monitors is usually reported as wear compliance. We asked how much usable data reaches the analyst, expecting the export rather than wearing behaviour to limit yield.

Material and Methods: Sixty-nine healthy female university students entered a 12-week aerobic training study. Fifty-two completed it, 17 being lost to antibiotics or attrition, and 41 supplied usable data from a wrist-worn monitor (Xiaomi Smart Band 10). No standard tool reads this export, so purpose-built R software produced a continuous heart-rate stream, daily summaries and session records. A valid day required 10 h of recording coverage. Early and final 7-day windows, anchored to entry and the last valid day, needed four valid days each and supplied the nocturnal resting heart rate compared across the intervention. Analysis was descriptive.

Results: Coverage was high, with a median of 93.7% valid days (IQR 86.2–98.4) and 23.2 h of daily recording (device-on time, not verified wear). Twelve (29%) had no exported data at all for 49–76 days after entry, retaining a median 16.5 rather than 71.0 days. An early window was usable for only 27 of 41 (66%), against all 41 for the final window. Sampling density varied 13-fold, reflecting device configuration and physical activity. Session records existed for only 22 (54%).

Conclusions: Wearing the device was not the limiting factor. Export completeness, sampling density and provenance were. Such trials should inspect one export per participant early, since truncated histories are unrecoverable. Analysis windows must be anchored to individual entry dates, and exposure derived from the continuous stream rather than session records.

Keywords: wearable monitoring, data quality, feasibility, heart rate, aerobic training

Funding: This study was carried out within VEGA project 1/0424/25.

Concentration Performance Among Secondary School Students: Differences by School Type and Gender in the Context of Physical Activity

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Introduction: Attention, as a cognitive function, is one the cognitive processes frequently studied during adolescence. It contributes to a wide range of tasks and influences the likelihood of success in academic, athletic, and social domains. This study aims to investigate differences in attentional concentration and its association with physical activity (PA) among students attending secondary schools with distinct educational orientations: one specializing in sports and the other in tourism.

Material and Methods: The study sample consisted of high school students (N = 482). Differences in students' concentration performance were assessed using two-way ANOVA. Associations between concentration performance and physical activity (PA) were assessed using Pearson's correlation.

Results: We found significant differences in concentration performance ($p < 0.001$) in favor of students at the Sports Secondary School (SS) with a low effect size ($\eta^2 = 0.055$) and, simultaneously, in favor of girls ($p < 0.001$) with a low effect size ($\eta^2 = 0.050$). Among boys, we found a weak positive correlation between concentration performance and the volume of Extracurricular Physical Activity (EXPA) in minutes per week ($r = 0.139$; $p < 0.05$).

Conclusions: The higher concentration performance of students specializing in sports in our study suggests a possible link between PA levels and adolescents' attention. However, subjectively reported PA volume in minutes per week is not a sufficient indicator to confirm these relationships. It is more appropriate to also consider the intensity and energy expenditure of adolescents' physical activity (METy), or indicators of physical fitness assessed by motor tests.

Keywords: cognitive functions, extracurricular physical activity, adolescent

Bilateral Differences in Impact Force and Segmental Acceleration during the ITF Taekwon-Do Turning Kick

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Introduction: Bilateral differences in kicking performance are commonly assessed by comparing peak force and peak kinematic variables identified independently, although these variables may occur at different phases of the movement. This study investigated bilateral differences in impact force, effective mass, and segmental accelerations assessed specifically at the instant of maximum impact force during the ITF Taekwon-Do turning kick.

Material and Methods: Sixteen adult male black-belt practitioners with at least 10 years of Taekwon-Do training experience performed maximal-effort turning kicks with both legs. Impact force was recorded using a force platform, while triaxial accelerometers synchronized with the force platform measured accelerations of the thigh, shank, and foot. Bilateral differences and associations between segmental accelerations and maximum impact force were examined using non-parametric statistical methods with false discovery rate (FDR) correction. All participants identified the right leg as their preferred kicking leg based on habitual kicking preference.

Results: The right leg produced greater maximum impact force than the left leg (2268.10 vs. 1561.20 N; pFDR = 0.0077) and demonstrated greater foot and shank accelerations at the instant of maximum force (both pFDR = 0.0077). For the right leg, maximum impact force was significantly associated with foot acceleration ($p = 0.692$, pFDR = 0.048). The association between bilateral differences in impact force and thigh acceleration did not remain statistically significant after FDR correction ($p = 0.577$, pFDR = 0.078) and was therefore considered exploratory.

Conclusions: Bilateral differences in ITF Taekwon-Do turning-kick performance were observed in maximum impact force and distal-segment accelerations at the instant of peak force. Assessing segmental accelerations at a force-defined, time-matched event may provide a more specific characterization of the segmental dynamics underlying impact force. These findings should be interpreted in the context of the uniform right-leg kicking preference of the participants.

Keywords: biomechanics; effective mass; impact force; inertial measurement units; inter-limb asymmetry; segmental acceleration; Taekwon-Do; turning kick

Assessment of Risk Factors for Hypertension in Preschool Children

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Introduction: Hypertension is one of the leading risk factors for cardiovascular diseases, including ischaemic heart disease, stroke, and chronic kidney disease. Lifestyle behaviours established during preschool age often persist into adulthood, making early identification of modifiable risk factors essential for prevention. The aim of this study was to assess the prevalence of selected risk factors associated with hypertension in preschool children aged 5–6 years from Rzeszów, Poland.

Material and Methods: The study included 128 preschool children aged 5 and 6 years. The assessed variables comprised systolic and diastolic blood pressure (SBP, DBP), body mass index (BMI), body fat percentage (FAT), waist-to-height ratio (WHtR), moderate-to-vigorous physical activity (MVPA), and daily and weekly screen time. Blood pressure and anthropometric parameters were measured using validated instruments, while physical activity was assessed with an ActiGraph wGT3X-BT accelerometer worn continuously for seven consecutive days.

Results: Children with hypertension demonstrated less favourable BMI, FAT, WHtR, and MVPA values than normotensive peers. Elevated body fat was the strongest predictor, increasing the likelihood of hypertension by 3.3-fold. Excessive weekly screen time was also associated with a higher risk of hypertension, increasing the probability by approximately 1.35-fold compared with children meeting recommended screen time limits.

Conclusions: Abnormal body composition, insufficient physical activity, and excessive screen time are important modifiable risk factors for hypertension in preschool children. Early screening and interventions promoting healthy lifestyles may reduce the future burden of cardiovascular diseases.

Keywords: hypertension risk factors, preschool children, accelerometers.

Between Reconstruction and Cooperation: The Beginnings of Contacts Between the Łódź Sports Community and Slovak Athletes After World War II (1945–1949)

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Introduction: This study seeks to examine the process of re-establishing sporting contacts between the sports community of Łódź and Slovak athletes in the years 1945–1949. This period coincided with profound social, political, and economic transformations that took place in Central Europe following the end of the Second World War. These changes shaped both the functioning of sport and the possibilities for developing international cooperation. Initially spontaneous sporting contacts were gradually replaced by relations regulated and supervised by state authorities.

Results: The article presents the process of rebuilding the sporting movement in Łódź after 1945. Against this background, it discusses the first initiatives aimed at renewing contacts with Slovak athletes, who competed both as members of the Czechoslovak national team and in Slovak national representative teams. This process was initiated in December 1945 by boxers participating in the Poland–Czechoslovakia match held in Poznań. By 1949, athletes from Łódź had competed against Slovak sportsmen in international and inter-state boxing, athletics, and football competitions.

Conclusion: The intensification of cooperation among socialist states from 1948 onwards resulted in a growing number of sporting contacts between athletes from Łódź and Slovakia, particularly football players and boxers. These mutual visits and sporting encounters contributed not only to improving the athletic performance of the participants but also to strengthening ties within the socialist bloc that was emerging under the dominant influence of the Soviet Union.

Keywords: sporting contacts, sports competition, Łódź, Slovakia, post-war sport.

Physical Activity as a Determinant of Health, Functional Performance, and Quality of Life

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Introduction: Physical inactivity is a major modifiable risk factor for cardiovascular disease, functional decline, disability, and reduced quality of life. Primary care provides an appropriate setting for identifying insufficient physical activity and integrating movement-based interventions into preventive healthcare. To examine the association between self-reported physical activity, cardiovascular risk indicators, and functional performance in a real-world adult primary care population, and to discuss its implications for healthy ageing and quality of life.

Material and Methods: This observational study included 863 adults examined in primary care between 2021 and 2026. Participants were classified as having low, moderate, or high physical activity according to World Health Organization-based criteria. Clinical and laboratory parameters were obtained from medical records. Functional mobility was assessed using the Timed Up and Go test in a subgroup of 214 participants. Differences between physical activity categories were evaluated using appropriate statistical methods.

Results: Of the 863 participants, 249 reported low, 353 moderate, and 261 high physical activity. Mean low-density lipoprotein cholesterol progressively decreased across these categories, from 3.68 mmol/L in the low-activity group to 3.39 mmol/L in the moderate-activity group and 3.12 mmol/L in the high-activity group ($p < 0.001$). Higher physical activity was also associated with more favourable functional performance in participants assessed using the Timed Up and Go test. The findings indicate that even moderate physical activity may provide clinically relevant benefits compared with a predominantly inactive lifestyle.

Conclusions: Physical activity represents an integrative marker of cardiometabolic health and functional capacity in adults. Its routine assessment in primary care may support early identification of individuals at risk of cardiovascular disease, mobility impairment, and future loss of independence. Incorporating brief physical activity assessment, functional screening, and individualised exercise counselling into standard clinical practice could contribute to healthier ageing, preservation of autonomy, and improved quality of life.

Keywords: physical activity; functional performance; primary care; LDL cholesterol; Timed Up and Go; quality of life; healthy ageing

Mediterranean Dietary Patterns among Female University Students: Baseline Data from the GutGirl Study

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Introduction: Mediterranean-style eating is associated with a range of health benefits and may also support a favourable gut microbial environment. Nevertheless, adherence to this dietary pattern can be challenging during university life, which is frequently accompanied by irregular eating habits. This study examined the baseline dietary profile of female university students participating in the GutGirl study from the perspective of Mediterranean diet adherence.

Material and Methods: A cross-sectional analysis was performed using pre-intervention data from 72 female university students enrolled in the GutGirl randomized controlled trial at Pavol Jozef Šafárik University in Košice, Slovakia. Dietary intake was assessed using the FFQ-6 questionnaire. An adapted eight-component Mediterranean Diet Adherence Score (aMED8; 0–8 points) was calculated using sample medians as cut-off values. The score included six beneficial food groups and two inverse components: red and processed meat and animal fats. Descriptive statistics were applied.

Results: Overall adherence to the Mediterranean dietary pattern was modest. The mean aMED8 score was 3.46 points, with scores distributed across the entire scale from 0 to 8. Half of the participants achieved no more than 3 points, while the most common score was 2. The dietary profile was dominated by vegetables (0.373 ± 0.201) and whole grains (0.273 ± 0.257). In contrast, fish and seafood represented the least frequently consumed beneficial component (0.034 ± 0.061). Nuts and seeds (0.105 ± 0.175), legumes (0.130 ± 0.159), and fruit (0.155 ± 0.123) were also consumed considerably less frequently than vegetables. For the inverse components, the mean frequencies were 0.110 ± 0.109 for red and processed meat and 0.246 ± 0.164 for animal fats. Values were expressed as daily consumption frequencies, with 1 indicating consumption once per day.

Conclusions: The findings indicate a dietary pattern only partly consistent with Mediterranean diet principles. Although vegetables and whole grains were relatively prominent, several characteristic components—particularly fish and seafood, nuts and seeds, legumes, and fruit—were underrepresented. These results highlight specific opportunities for nutrition interventions aimed at female university students and provide a baseline for subsequent analyses linking diet with physical activity and gut microbiome characteristics in the GutGirl study.

Keywords: Mediterranean dietary pattern, female university students, dietary habits, FFQ-6, aMED8, physical activity, gut microbiome

Funding: This work was supported by the Scientific Grant Agency of the Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences (VEGA), grant No. 1/0424/25.

Lessons from the Blue Zones: Physical Activity in Older Adults and Longevity Principles from Okinawa

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Introduction: Okinawa, once heralded as "the land of immortals," has long been the gold standard for longevity research. As of 2026 this status faces a documented crisis: Okinawa fell from 4th to 26th among Japan's 47 prefectures in male life expectancy in 2002, and post-war cohorts show the highest obesity prevalence in the country the "Okinawa paradox." We asked what genuinely protected pre-war Okinawan longevity, and which of it is transferable.

Material and Methods: PubMed, Web of Science and Scopus were searched (2000-2026) for evidence on the traditional Okinawan diet, community structures (moai, ikigai) and Okinawan movement practices, prioritizing quantified cohort and trial evidence over descriptive or ecological data; claims lacking independent replication were flagged explicitly rather than presented as established.

Results: The pre-war Okinawan diet supplied 69% of daily calories from sweet potato and was 10-15% below caloric requirement, associated with 80% lower coronary heart disease mortality and 40% lower cancer mortality than the United States. Community structures were culturally well documented but only weakly quantified: the closest mortality evidence for a sense of life purpose came from a mainland Japanese cohort (60% higher cardiovascular mortality without it), not an Okinawan sample. Three movement practices showed measurable benefit: Okinawan karate/kobudo improved leg strength (+28.8% after 5 weeks) and bone density in long-term practitioners; the traditional Radio-Taiso routine was associated with lower dementia risk in a cohort of 11,219 older adults (HR 0.82); and floor-transfer ability, built into low-furniture living, predicts mortality (21% lower risk per point on the sitting-rising test).

Conclusions: What is transferable from Okinawa is not the place itself but a small set of behaviors: a mildly plant-heavy diet, brief daily group movement and functional strength built into ordinary living. We propose these as a practical, low-cost basis for physical activity promotion in Slovak older-adult populations.

Keywords: Blue Zones, Okinawa, healthy ageing, traditional diet, sitting-rising test

Funding: This work was supported by the KEGA grant 014UPJŠ-4/2024: Monitoring of selected risk factors influencing the lifestyle of university students.

Pediatric Flatfoot: A Review of Diagnosis, Development, and Intervention Options

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Introduction: Flexible flatfoot is common in early childhood and usually physiological, yet a striking mismatch exists between its prevalence and how it is treated: pathological flatfoot affects under 1% of children aged three to six, while roughly ten times as many are already fitted with arch supports. We asked which risk factors and interventions are supported by evidence, and what should be recommended instead of routine orthotic treatment.

Material and Methods: PubMed, Web of Science, Scopus and the Cochrane Library were searched (2000-2026) for prevalence data, risk-factor meta-analyses, exercise-therapy trials and orthotic trials concerning pediatric flexible flatfoot.

Results: Flexible flatfoot prevalence among children aged three to six is 44%. A meta-analysis of 15 studies (14,483 children) identified younger age, male sex and joint laxity as non-modifiable risk factors, alongside two modifiable ones: wearing closed sports shoes (OR 2.97) and low weekly activity (roughly a fourfold higher risk below 3 hours per week). A 2025 systematic review of 11 randomized trials (419 children) found that exercises targeting the intrinsic foot muscles were most effective, with a minimum eight-week duration before arch structure changed; in one of the pooled trials, 72 children receiving corrective exercise alone showed improved arch index, navicular drop and radiographic arch angle. A 2022 Cochrane review of 16 randomized trials found no evidence that foot orthoses alter the natural development of a painless flat foot.

Conclusions: Most flexible flatfoot in this age group reflects normal development rather than pathology. The evidence supports simple, low-cost intervention footwear choice, activity level and targeted foot-strengthening exercise over routine orthotic fitting, and we propose a traffic-light framework for deciding when specialist referral is warranted.

Keywords: pediatric flatfoot, risk factors, exercise therapy, foot orthoses, screening

Funding: This work was supported by the KEGA grant 014UPJŠ-4/2024: Monitoring of selected risk factors influencing the lifestyle of university students.

Changes in Dietary Habits during a 10-Week Physical Activity Intervention among Female University Students

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Introduction: Exercise programmes may influence health-related behaviours beyond physical activity itself, including dietary habits. However, it remains unclear whether different types of exercise lead to changes in the consumption of specific food groups among university students. This study examined changes in the frequency of consumption of selected food groups following a 10-week exercise intervention and assessed whether these changes differed between aerobic training, combined strength–aerobic training, and control groups.

Material and Methods: The study included 48 female university students participating in the GutGirl project. Participants were allocated to an aerobic training group, a combined strength–aerobic training group, or a control group. Dietary habits were assessed before and after the intervention using the Food Frequency Questionnaire (FFQ-6). Changes over time and differences between groups were analysed using paired-samples t-tests and mixed-design analysis of variance (ANOVA). Statistical significance was set at $p < 0.05$.

Results: Significant changes over time were observed in the consumption frequency of whole-grain products, starchy vegetables, milk and dairy products, and salty snacks. A significant group effect was identified only for starchy vegetable consumption. The interaction between time and group was significant for milk and dairy products, indicating that changes in their consumption differed according to group allocation. No statistically significant effects were found for the remaining food groups.

Conclusions: The consumption frequency of several food groups changed during the study period. However, most of these changes were not associated with the type of exercise intervention. Exercise alone may therefore be insufficient to produce broader changes in dietary habits among female university students. Programmes combining regular physical activity with targeted nutrition education may offer a more comprehensive approach to promoting healthy lifestyle behaviours in this population.

Keywords: female university students, dietary habits, food frequency, aerobic training, combined training, exercise intervention, nutrition

Association between Physical Activity-related Health Competence and Physical Activity among Adolescents in the Visegrad Countries

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Introduction: Physical Activity-related Health Competence (PAHCO) is a multidimensional concept describing the competencies required for maintaining a physically active lifestyle. Although physical inactivity among adolescents remains a major public health concern, evidence on the relationship between PAHCO and physical activity in the Visegrad countries is limited. Therefore, this study aimed to assess PAHCO levels and examine their association with physical activity among adolescents from the V4 countries.

Material and Methods: A cross-sectional study was conducted among 2,085 adolescents (mean age 17.04 ± 1.40 years; 69.1% female students) from the Czech Republic ($n = 437$), Hungary ($n = 634$), Poland ($n = 339$), and Slovakia ($n = 675$). Physical Activity-related Health Competence was assessed using the 12-item PAHCO questionnaire, while physical activity was measured using the International Physical Activity Questionnaire – Long Form (IPAQ-LF). Descriptive statistics and Spearman's rank correlation analyses were performed using IBM SPSS Statistics 29.0, with statistical significance set at $p < 0.05$ and for multiple comparisons set at $p < 0.0028$.

Results: The average PAHCO scores corresponded to 81.2% of the maximum attainable score for movement competence, 71.0% for control competence, and 70.1% for self-regulation competence. Spearman's correlation analyses demonstrated weak but statistically significant positive associations between all PAHCO dimensions and physical activity indicators (all $p < 0.001$). The strongest associations were observed between self-regulation competence and recreational moderate-to-vigorous physical activity without walking ($p = 0.294$), followed by control competence ($p = 0.263$) and movement competence ($p = 0.192$).

Conclusions: Adolescents from the Visegrad countries demonstrated relatively high movement competence and moderate levels of control and self-regulation competence. Weak but statistically significant positive associations were observed between all PAHCO dimensions and physical activity, indicating that higher PAHCO was associated with higher levels of physical activity.

Keywords: Physical Activity-related Health Competence, PAHCO, physical activity, adolescents, Visegrad countries.

A Composite Performance Score in Children Attending Early Sport Specialization and Early Sampling Programs

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Introduction: This study examined whether children attending early sport specialization and early sampling programs differed on a composite score of physical fitness and motor competence. We also assessed the sensitivity of the comparison to the inclusion of individual tests.

Material and Methods: The cross-sectional study included 270 children aged 6–12 years from ten clubs. This secondary analysis used complete data from 264 children; six had missing data for at least one of the nine tests. Children attended programs classified as early sport specialization (ESS; $n = 168$) or early diversification (ED; early sampling; $n = 96$). A study-specific composite was calculated as the mean of nine equally weighted z-scores, with higher values indicating better performance. Analysis of covariance adjusted for age and allowed the ESS–ED difference to vary by sex. The adjusted group difference was averaged over the sample's age and sex distribution. Small-sample cluster-robust confidence intervals accounted for clustering within clubs. In a leave-one-test-out sensitivity analysis, the composite was recalculated after excluding each test in turn while retaining the same participants and standardization.

Results: The adjusted mean difference (ESS minus ED) was 0.02 (95% confidence interval $[-0.41, 0.45]$; $p = .891$). Excluding individual tests yielded estimates from -0.03 to 0.07 , with all confidence intervals including zero.

Conclusions: No clear ESS–ED difference was detected in the composite score, and omitting individual tests had little influence on the estimate. However, the wide confidence interval and small number of clubs limit precision and do not establish equivalent performance.

Keywords: children, early sport specialization, early sampling, composite score, sensitivity analysis

Physiological and Mood Response to a Single 60-minute Nirvana Fitness Session in Young Women

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Introduction: Evidence regarding the effects of Nirvana Fitness on women's psychological well-being and physiological responses remains scarce. The aim of the study was to evaluate the effects of a single 60-minute Nirvana Fitness session on physiological responses and mood states in young women.

Material and Methods: The study involved 105 female students aged 18.1–23.0 years (mean age: 20.07 ± 1.14 years). Physical activity was assessed using the Polish short version of the International Physical Activity Questionnaire (IPAQ). Anthropometric and body composition measurements were obtained using bioelectrical impedance analysis prior to the training session, and mood states were evaluated using the Profile of Mood States (POMS) questionnaire.

Results: Participants demonstrated moderate physical activity levels and normal BMI, although body fat percentage approached the upper reference range. The 60-minute NF session was characterized by low-to-moderate physiological intensity (HR_{avg} = 112.4 bpm; ~376 kcal expenditure), with low estimated VO₂ and respiratory responses. Significant improvements in mood were observed, including reductions in emotional tension, depression, anger, and fatigue, as well as increased vigor (all $p < 0.001$). A trend toward reduced confusion was also noted ($p = 0.057$).

Conclusions: A single 60-minute Nirvana Fitness session elicited significant improvements in mood despite low physiological intensity and minimal cardiorespiratory strain. The intervention reduced negative mood states and increased vigor, indicating strong short-term psychological benefits. Nirvana Fitness may support psychological well-being and reduce stress; however, improvements in body composition are likely to require additional resistance training or higher-intensity exercise.

Keywords: Nirvana Fitness, mood states, physical activity, young women, physiological responses

The Effect of a 6-Minute Strength-Endurance Effort on the Effectiveness of Cardiopulmonary Resuscitation

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Introduction: Evidence regarding the impact of prior physical exertion on the effectiveness of cardiopulmonary resuscitation (CPR) remains limited. This study aimed to assess the effect of a 6-minute strength-endurance effort performed at a power output of 160 W on CPR effectiveness.

Material and Methods: The study involved 31 paramedic trainees, including 24 men aged 19–24 years (20.65 ± 1.32) and 7 women aged 19–21 years (20.14 ± 0.69). CPR performance was assessed on a medical manikin before and after physical exertion. Levels of physical activity were evaluated using the standardized and validated International Physical Activity Questionnaire (IPAQ). Body composition was analyzed using bioelectrical impedance analysis.

Results: Male participants demonstrated significantly higher levels of physical activity (1976.7 MET-min/week) compared with female participants (970.0 MET-min/week; $p < 0.001$). Body mass index indicated overweight status in men (25.4 kg/m^2) and normal body weight in women (23.2 kg/m^2). Mean body fat percentage was 20.7% in men and 31.7% in women ($p < 0.002$). The waist-to-hip ratio remained within the normal range in men (0.9) but slightly exceeded the recommended value in women (0.9). Body composition analysis indicated that fat-free mass should increase by 1.3 kg in men and 3.4 kg in women. During the exercise test, female participants were unable to maintain the target power output of 160 W and completed a shorter rowing distance than male participants.

Conclusions: Male paramedic trainees demonstrated more favorable body composition, higher physical activity levels, greater strength-endurance abilities, and higher CPR effectiveness than female trainees, both before and after physical exertion. Female participants sustained only relatively low power output during the 6-minute effort. The strength-endurance effort significantly reduced CPR effectiveness in both sexes, with a more pronounced decline observed among women.

Keywords: chest-compression quality, paramedic trainees, physical fatigue, strength endurance abilities

Portable Resistance in Mixed-Reality Boxing: Higher Exercise Intensity with Preserved Enjoyment and Flow

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Introduction: Mixed-reality (MR) exercise can be an engaging form of physical activity, but increasing exercise intensity without compromising the user experience remains a challenge. Portable elastic resistance may offer a practical way to increase physical demands while preserving freedom of movement. This study aimed to assess whether two levels of body-worn elastic resistance increase physiological and perceived exercise intensity during MR boxing and whether they affect enjoyment and flow.

Material and Methods: Thirty-six university students (20 women and 16 men; age 22.14 ± 1.48 years) completed three 10-minute simulated boxing bouts against an artificial intelligence-controlled opponent using the Golden Gloves application and a Meta Quest 3 headset in MR mode. Trials were performed without resistance (NR), with lower resistance (LR), and with higher resistance (HR) generated by the WearBands portable elastic resistance system. Exercise intensity was assessed using heart rate (HR), percentage of estimated maximum heart rate (%HRmax), and the Borg 6–20 Rating of Perceived Exertion (RPE). Enjoyment was assessed using the short Physical Activity Enjoyment Scale (PACES), and flow using the short Flow State Scale (FSS).

Results: Increasing elastic resistance progressively increased mean HR from 156.61 ± 15.26 beats/min (NR) to 164.97 ± 13.99 (LR) and 169.75 ± 13.42 beats/min (HR) ($p < 0.001$). Mean %HRmax increased from $81.34 \pm 7.83\%$ to $85.68 \pm 7.21\%$ and $88.17 \pm 6.96\%$, respectively ($p < 0.001$). RPE also increased significantly from 10.86 ± 2.32 to 13.50 ± 2.13 and 15.83 ± 1.84 points ($p < 0.001$). In contrast, enjoyment remained stable across conditions (PACES: 5.67 ± 1.08 , 5.72 ± 1.08 , and 5.77 ± 1.18 ; $p = 0.859$), as did flow (FSS: 4.22 ± 0.46 , 4.17 ± 0.49 , and 4.22 ± 0.44 ; $p = 0.615$).

Conclusions: Portable elastic resistance provides a simple way to progressively increase the physiological and perceived intensity of MR boxing without reducing enjoyment or flow during a single exercise session. This approach may allow the physical demands of MR exercise to be adjusted independently of the digital task while preserving a positive user experience.

Keywords: mixed reality, boxing, elastic resistance, exercise intensity, enjoyment

Diagnostics of Strength Abilities of Paralympic Athletes

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Introduction: Complex condition diagnosis of athletes is very important for maintaining the health of athletes primarily and secondarily for maintaining and increasing their sports performance. In our contribution, we want to demonstrate the methodology of a complete fitness diagnosis of the strength abilities of the paralympic athletes in alpine skiing. The results are important for planning their individual fitness training in eliminating strength imbalances.

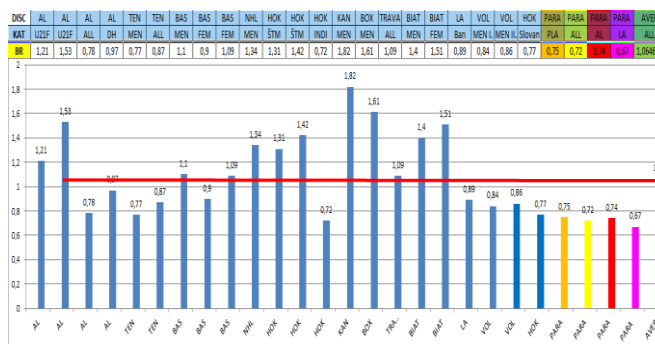
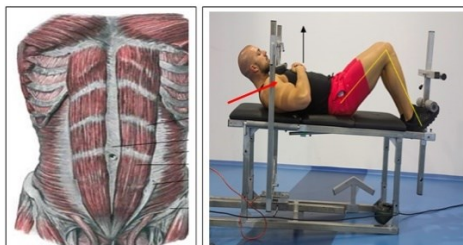
Material and Methods: To determine strength capabilities, we used the isometric method of digital strength measurement with a strain gauge (Mobile PowerTest System) of rectus abdominis muscles, spinal extensors, quadriceps and hamstrings. We compared the results with athletes without a physical handicap.

Results: The results showed individual deviations of paralympic athletes in absolute strength, strength coefficient and strength imbalance. Compared to athletes without handicap, their rectus abdominis muscle strength was below average, spinal extensor strength above average, strength imbalance below average. Quadriceps strength.....

Diagnosis of rectus abdominis muscles.

Comparison of strength coefficients in different sports

7. Priame Brušné svaly



Conclusion: Exact, complex condition diagnosis of Paralympic athletes is important especially for maintaining their health, individual fitness training and increasing sports performance.

Keywords: paralympic athletes, strength diagnostics

Quality of Life and Psychosocial Resources among Couples Facing Fertility Challenges: Insights from the FAIR-HU Study

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Introduction: Fertility challenges represent a complex health issue extending far beyond reproductive outcomes, affecting psychological well-being, relationships, social functioning, and overall quality of life. Individual coping resources and the broader social context may influence how women and men experience and adapt to this demanding life situation. The FAIR-HU (*Fertility Awareness Integrative Research – Hungary*) multicentre study explores reproductive health from an integrative perspective, encompassing fertility awareness, health literacy, lifestyle, and psychosocial well-being. The present analysis aimed to identify factors associated with fertility-related quality of life among couples facing fertility challenges, with particular attention to psychological and social stress, gender differences, and personal coping resources.

Material and Methods: The analysis included 605 participants, of whom 40.1% were men. Fertility-related quality of life was assessed using the FertiQoL questionnaire, while fertility-related stress and coping strategies were evaluated using the COMPI Fertility Problem Stress Scales and Coping Strategy Scales. Sociodemographic characteristics and personal resources, including religious affiliation and religious practice, were also considered. Associations were examined using correlation analyses and multivariable linear regression. The FAIR-HU study is registered at ClinicalTrials.gov (NCT06795568).

Results: Fertility-related distress emerged as the strongest factor associated with poorer quality of life, while social stress and gender differences also played an important role. At the same time, the findings indicate that quality of life may be shaped not only by the burden associated with fertility challenges but also by the resources individuals draw upon when coping with them. Religious affiliation itself was not independently associated with overall fertility-related quality of life, although weak positive associations were observed with relational quality of life and positive reappraisal coping. Prayer was positively associated with quality of life in the multivariable model, suggesting that personally meaningful spiritual practices may represent a potential coping resource for some individuals.

Conclusions: The FAIR-HU findings highlight the multidimensional nature of quality of life among couples facing fertility challenges. Psychological distress, social context, gender, and individual coping resources appear to interact in shaping well-being throughout the fertility journey. These findings support a broader approach to reproductive health that extends beyond biomedical outcomes and recognizes mental well-being, relationships, and individually meaningful coping resources. Integrating person-centred and psychosocially sensitive support into fertility care may contribute to better quality of life for both women and men.

Keywords: fertility challenges, reproductive health, quality of life, psychosocial health, stress, coping, spirituality, FAIR-HU

Funding: *The research was funded by the National Research, Development and Innovation Office of Hungary (NKFIH) under the NKFI FK-147404 project.*

Innovative Trends in Improving the Quality of Preparation of Future Primary Education Teachers in the Context of the Educational Area of Health and Movement

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Introduction: The new State Educational Programme will come into effect in all primary schools in Slovakia from September of the 2026/2027 school year. In this context, the authors highlight the urgent need to improve the quality of teacher education programmes. In the study, they present their findings from the undergraduate preparation of future primary education teachers in the context of innovative trends in theory and practice within the educational area of Health and Movement, focusing on the key components of the educational area Health and Movement (Health and Lifestyle, Movement Competencies, Physical Fitness and Motor Performance, Sport and Physical Activity, and Protection and Safety of Life and Health) implemented within the subject Physical and Sports Education.

Material and Methods: Since 2023, the project has involved 98 female students and 3 male students enrolled in the Master's degree programme in Primary Education Teaching. The main outcome was the organisation of a school event focused on health and movement.

Results: The system of undergraduate teacher preparation incorporates these approaches into compulsory forms of education, including tandem teaching involving primary education teacher students and physical education teacher students. At the same time, students are offered developmental forms of education through professional seminars and workshops that respect innovative and effective teaching approaches aimed at expanding the professional competencies of future teachers. These include digital skills, as well as professional, organisational, and marketing approaches to organising school sports events and the implementation of a sports event for primary school pupils.

Conclusions: The authors recommend incorporating the implemented developmental forms of education into the preparation of primary education students for the teaching profession in order to improve their professional competencies in the subject of Physical and Sports Education.

Professional seminars and workshops were part of the grant project KEGA No. 014KU-4/2025 Undergraduate Education of Physical and Sports Education Teachers Aimed at Development of Their Movement and Physical Literacy with an Emphasis on Postural Health.

Keywords: health and movement, primary education, school sports

Sleep Quality in Female University Students: Effects of Aerobic and Combined Exercise Training

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Introduction: Exercise may help improve sleep, but it remains unclear whether different types of training have different effects in university students. This study compared changes in sleep quality following aerobic training, combined strength and aerobic training, and no structured training in female university students.

Material and Methods: In this randomized controlled study, 46 participants were assigned to combined strength and aerobic training (E1), aerobic training (E2), or a control group. The interventions took place over 12 weeks, from October to December 2025. Sleep quality was measured before and after the study period using the Pittsburgh Sleep Quality Index (PSQI). Changes over time and differences between groups were examined using mixed-design ANOVA.

Results: PSQI scores improved across the sample over time ($F(1, 43) = 5.22$, $p = 0.027$, $\eta^2 = 0.108$). The time $\times$ group interaction was not significant ($F(2, 43) = 0.45$, $p = 0.641$, $\eta^2 = 0.020$). Descriptively, the largest reduction in PSQI score occurred in E1 ($\Delta = -0.94$), followed by E2 ($\Delta = -0.69$) and the control group ($\Delta = -0.29$).

Conclusions: Sleep quality improved during the study period, with numerically larger changes in both training groups. Because the differences in change between groups were not statistically significant, the findings do not establish an effect of either exercise programme on sleep quality. Larger studies are needed to assess whether training type influences the extent of improvement.

Keywords: Pittsburgh Sleep Quality Index; aerobic exercise; combined training; sleep; female university students.

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POSTER PRESENTATIONS



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× ×
× × **PHYSICAL ACTIVITY,**
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Assessment of University Students' Physical Activity Based on Subjective and Objective Measurements in the Hungarian Sample of a V4-Country Study

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Introduction: Regular physical activity (PA) plays a fundamental role in maintaining university students' health. The World Health Organization (WHO) recommends 150–300 minutes of moderate- to vigorous-intensity physical activity (MVPA) per week for adults. This study aimed to assess university students' physical activity levels and examine compliance with WHO recommendations using subjective and objective measurement methods.

Materials and Methods: As part of a 2025 study conducted among secondary school and university students in the Visegrád countries, the physical activity level of Hungarian university students aged 18–29 years was analysed (n = 900). Data were collected using the self-reported International Physical Activity Questionnaire (IPAQ). In a subsample of 42 participants, a hip-worn ActiGraph GT3Xbt accelerometer objectively measured MVPA and daily step counts. Results were compared with WHO recommendations, and statistical analyses were performed using IBM SPSS Statistics 28.0.

Results: The mean age of the sample was 21.91 ± 2.39 years; 14.8% were male and 85.2% were female. Substantial differences were observed between self-reported and objectively measured physical activity. Self-reported data considerably overestimated activity levels, while accelerometry and step counting provided more reliable estimates. In the total sample, self-reported MVPA was 2049 ± 1648 minutes, while among the 42 participants who also underwent accelerometer-based assessment, self-reported MVPA was even higher at 2582 ± 2275 minutes. In contrast, objectively measured weekly MVPA in this subsample was only 422 ± 189 minutes. Thus, participants in the objectively assessed subsample overestimated their physical activity by more than sixfold. A moderately strong positive correlation was found between self-reported and accelerometer-measured MVPA ($r = 0.566$; $p < 0.001$). Among participants reporting smart-device step counts, the mean daily value was 9239 ± 5475 steps, compared with 9051 ± 3511 steps measured objectively, with a moderately strong positive correlation ($r = 0.616$; $p = 0.002$).

Conclusion: Self-reported physical activity data may contain substantial systematic bias. Objective methods, particularly accelerometry, should therefore be more widely applied in future research. Larger studies using objective measurements could support the development of correction models to improve the accuracy of self-reported physical activity estimates.

Keywords: physical activity, IPAQ, accelerometer, step count, MVPA

Assessment of the Diet Quality of Primary School Children Using the Pro-Healthy Diet Index (pHDI-10, Pro-Healthy-Diet-Index-10)

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Introduction: Nutrition and physical activity are the two pillars of a healthy lifestyle that contribute to maintaining good health into old age.

Material and Methods: The study group consisted of 279 children aged 10-15 years attending primary schools in urban and rural areas of the Małopolska Province. Dietary preferences were assessed using the FFQ-6 (Food Frequency Questionnaire with 6 response categories). The Pro-Healthy Diet Index (pHDI-10) includes 10 food groups with potentially beneficial effects on health and is used to evaluate the pro-health quality of the diet. pHDI-10 scores ranging from 0 to 33 points were classified as low, 34 to 66 points as moderate, and 67 to 100 points as high. The interpretation of the index is as follows: the higher the score, the greater the intensity of health-promoting characteristics in the diet and, consequently, the better the diet quality.

Results: A low diet quality index (pHDI-10) was observed in 96% of the examined children. Similarly low values were found among both boys and girls (96%). No statistically significant differences in pHDI-10 scores were found between children from urban and rural areas. A low pro-health diet index was identified in 95% of children living in urban areas and in 96% of those living in rural areas. No statistically significant differences were observed between groups with regard to sex or place of residence. A weak negative correlation was found between BMI and the diet quality index (pHDI-10) for the entire study group ($r = -0.02$) and among girls ($r = -0.08$). Negative correlations between these indicators were also observed in subgroups based on place of residence (urban: $r = -0.03$; rural: $r = -0.02$). More than half of the children had normal body weight (53%). Overweight was identified in 24% of the participants, class I obesity in 12%, and class II obesity in 5%.

Conclusions: The participants require nutrition education aimed at changing their dietary preferences, as their diets are characterized by a low intensity of health-promoting features.

Keywords: nutrition education, dietary preferences, FFQ-6, diet quality index (pHDI-10)

Association of Preoperative Self-Efficacy with Physical Activity After Total Hip Replacement in Osteoarthritis

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Introduction: Hip osteoarthritis (OA) is a prevalent musculoskeletal disorder that can lead to reduced mobility and affect patients' physical activity (PA). Total hip replacement (THR) is an important treatment option for patients with advanced hip OA and improves functional outcomes. Preoperative self-efficacy may enhance the positive effects of THR on patients' engagement in regular PA. The main aim of this study was to examine the association between preoperative self-efficacy and physical activity after THR in patients with end-stage hip OA undergoing THR.

Material and Methods: The sample consisted of 115 patients (mean age 63.4±9.8 years, female 45.2%) undergoing THR due to end-stage OA. PA was assessed with University of California, Los Angeles activity scale (UCLA), functional status was assessed with Harris Hip Score (HHS), and self-efficacy was assessed with Arthritis Self-Efficacy Scale (ASES). Regression analyses were used to analyse the data (Method Enter).

Results: Final regression model explained 20.2% of the variance in PA level after surgery. Preoperative self-efficacy ($\beta=.19$, $p\leq.05$) together with functional status ($\beta=.21$, $p\leq.05$), and income ($\beta=.21$, $p\leq.05$), contributed significantly to the variability of PA one year after THR.

Conclusions: The higher patients' preoperative self-efficacy in managing OA-related challenges, the more physically active they were one year after THR. Moreover, patients with better functional status and higher income before surgery were more physically active one year after surgery. These findings may have implications for patient education and clinician training. [Funding: APVV-22-0587].

Keywords: self-efficacy, physical activity, arthroplasty, hip osteoarthritis

Phase-Specific Biomechanical Differences Between Countermovement and Abalakov Jumps in Male Volleyball Players

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Introduction: Vertical jumping ability is a key determinant of volleyball performance, particularly during attacking and blocking actions. Successful jumping depends on coordinated biomechanical interactions throughout the movement. Although arm swing consistently enhances jump height, the biomechanical mechanisms underlying this improvement within different phases of the jump remain incompletely understood. Therefore, this study aimed to identify the jump phases most affected by arm swing and the biomechanical variables associated with improved jump performance.

Material and Methods: Twenty-five male volleyball players competing in the Polish first and second-division leagues (age: 22.70 ± 2.20 years, body height: 193.21 ± 7.89 cm, body mass: 87.59 ± 9.00 kg, BMI: 23.43 ± 1.53 kg/m²) performed maximal countermovement jumps without arm swing (CMJ) and with arm swing (Abalakov jump) on dual force platforms (ForceDecks, VALD Performance, Australia). For each jump condition, the trial with the greatest impulse–momentum jump height was selected for analysis. Variables were analysed according to the biomechanical phases of the jump and subsequently interpreted within five functional domains: performance outcomes, movement strategy, eccentric velocity and braking, force–impulse characteristics, and power. Differences between jump conditions were analysed using paired t-tests or Wilcoxon signed-rank tests, with Holm correction for multiple comparisons.

Results: Compared with the CMJ, the Abalakov jump resulted in greater jump height (+9.2%, $p = 0.048$) and take-off velocity (+4.4%, $p = 0.048$), whereas RSI-mod remained unchanged. Phase-specific analysis showed that the most consistent biomechanical changes occurred during the propulsive phase, including increases in concentric impulse/BM (+8.2%, $p = 0.001$), peak power/BM (+14.3%, $p < 0.001$), and the P2:P1 concentric impulse ratio (+70.0%, $p < 0.001$). In contrast, concentric peak force/BM did not differ, while force at zero velocity/BM decreased (–14.3%, $p < 0.001$).

Conclusions: These findings suggest that the performance benefits of arm swing are primarily associated with biomechanical reorganization during the propulsive phase rather than increased force production. Consequently, phase-specific analysis of force–time characteristics may improve the interpretation of force–platform assessments beyond conventional jump-height outcomes.

Keywords: CMJ; arm swing; jump biomechanics; propulsive phase; volleyball

Relative Importance of Body Composition Parameters as Determinants of Functional Performance in Older Women: A Pilot Study

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Introduction: Age-related alterations in body composition may contribute to functional decline in older adults. However, the relative importance of individual body composition parameters as determinants of functional performance is still not fully understood. This pilot study aimed to examine associations between body composition and functional performance in older women and identify key body composition determinants.

Material and Methods: Fifty-seven community-dwelling older women (mean age: 71.7 ± 5.8 years) participated in this cross-sectional study. Body composition was assessed using bioelectrical impedance analysis (BIA; Tanita MC-780), including body fat percentage, muscle mass percentage, body mass index (BMI), and phase angle. Functional performance was assessed using the 30-s Sit-to-Stand (STS) and Timed Up and Go (TUG) tests. Pearson's or Spearman's correlation analyses, multivariable linear regression, and comparisons between the lower and upper tertiles of STS performance were performed.

Results: Significant associations between body composition and functional performance were observed for the 30-s Sit-to-Stand (STS) test, but not for the Timed Up and Go (TUG) test. Body fat percentage was negatively correlated with STS performance ($r = -0.595$, $p < 0.001$), whereas muscle mass percentage was positively correlated ($r = 0.616$, $p < 0.001$). Phase angle was positively associated with STS performance, although this did not reach statistical significance ($r = 0.298$, $p = 0.056$). A multivariable model with body fat percentage and phase angle explained 37.1% of STS performance variance (adjusted $R^2 = 0.371$, $p < 0.001$), with body fat percentage remaining the only significant independent predictor. Women in the upper STS tertile exhibited lower BMI, lower body fat percentage, and higher muscle mass percentage than those in the lower tertile (all $p \leq 0.004$; Cohen's $d = 1.20$ – 1.40).

Conclusions: Among the evaluated body composition parameters, body fat percentage remained the strongest determinant of functional performance in older women, whereas phase angle emerged as a promising biomarker warranting further investigation. These findings support the use of BIA as a complementary tool for functional evaluation in older women. Further prospective studies with larger cohorts are needed to confirm these findings.

Keywords: older women; body composition; bioelectrical impedance analysis; functional performance; sit-to-stand test.

Recovery Methods and Their Effectiveness in Restoring Performance and Reducing Fatigue in Elite Female Volleyball Players

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Introduction: Recovery is an important part of sports training. Active recovery is considered more effective in restoring performance and reducing fatigue, whilst passive recovery allows the body to recover naturally. In practice, various active and passive recovery methods are used, and their selection depends on the nature of the physical exertion and the individual needs of the athlete. The aim of this study is to investigate the use and subjective assessment of the effectiveness of recovery methods in restoring performance and reducing fatigue among elite female volleyball players.

Material and Methods: The research was conducted using an anonymous, non-standardised questionnaire created in Google Forms. The research sample consisted of 54 elite female volleyball players competing in the Slovak Extraliga, aged under 18 years ($n = 23$; 42.6 %), aged 19–23 ($n = 20$; 37.0 %), and aged 24 and over ($n = 11$; 20.4 %). The questionnaire focused on identifying the use and subjective assessment of the effectiveness of recovery methods in restoring performance and reducing fatigue. The assessment included the most frequently used recovery methods available to the respondents. The subjective effectiveness of individual methods was rated on a five-point scale, where 1 represented the lowest and 5 the highest level of perceived effectiveness. The data were analysed using mathematical and statistical methods to identify significant differences. The χ^2 test and Spearman's correlation analysis were used to assess the relationships between individual items within the groups of recovery methods.

Results: The results showed that the most commonly used recovery methods were stretching (88.9 %) and nutritional supplements (79.6 %), whilst electrotherapy (29.6 %) and cryotherapy (7.4 %) were among the least frequently used. Respondents identified massage, sleep, and nutritional supplements as the most effective methods, while cryotherapy received the lowest rating. Overall, recovery was perceived as an effective means of restoring performance and reducing fatigue after training and matches.

Conclusions: The findings suggest the importance of systematically incorporating recovery methods into the training process, as well as the need for more intensive support from sports clubs, which could contribute to optimizing recovery, more effective restoration of performance, and a reduction in symptoms of fatigue.

Keywords: volleyball, recovery, fitness restoration, fatigue

Physical Activity, Health-Related Quality of Life and Psychological Distress among Physical Education and Sport Academic Staff: Ukraine and Central Europe

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Introduction: Academic work in physical education and sport combines professional physical activity with substantial cognitive and psychosocial demands. Differences in working and social environments may influence physical activity (PA), health-related quality of life (HRQoL), and psychological well-being. The aim of the study was to compare PA, HRQoL, and psychological distress among academic staff from physical education and sport faculties or related academic units in Ukraine and Central Europe, with particular attention to gender differences.

Material and Methods: The comparative study included 76 academic staff members from physical education and sport faculties or related academic units: 36 from Lesya Ukrainka Volyn National University (15 women, 21 men) and 40 from universities in Central Europe (26 women, 14 men). PA was assessed using the International Physical Activity Questionnaire (IPAQ), HRQoL using the SF-36 Health Survey, and psychological distress using the Kessler Psychological Distress Scale (K10). Descriptive and comparative statistics, ANOVA, Mann–Whitney U tests, and Spearman correlation analysis were applied.

Results: Ukrainian academic staff demonstrated a high overall PA level; however, their indicators were lower than those of their Central European colleagues. The highest PA values were observed among women working at Central European universities. Among Ukrainian staff, significant gender differences were found in leisure-time and sport-related PA, with higher values in men (Me = 792 vs 346.5 MET-min/week; U = 51; p < 0.01). Central European staff demonstrated generally more favourable and gender-balanced HRQoL profiles. The most pronounced between-group differences were observed among women: Ukrainian women had lower scores for role limitations due to physical and emotional problems than their Central European counterparts. Psychological distress was negatively associated with HRQoL in both groups. Among Ukrainian staff, strong negative correlations were found with vitality ($\rho = -0.82$), mental health ($\rho = -0.79$), and the mental component summary ($\rho = -0.77$; all p ≤ 0.001). Among Central European staff, the strongest negative association was observed with vitality ($\rho = -0.69$; p < 0.001).

Conclusions: Academic staff in physical education and sport from Central European universities demonstrated more favourable PA and HRQoL patterns, while psychological distress showed stronger negative associations with psycho-emotional HRQoL among Ukrainian staff. The findings highlight the need for targeted strategies supporting leisure-time physical activity and psychological well-being, particularly among women working in physical education and sport higher education in Ukraine.

Keywords: physical activity, health-related quality of life, psychological distress, academic staff, physical education and sport.

Prolonged Sitting and Its Consequences: Preventing Harm Through Movement Breaks

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Introduction: No single posture has been shown to be protective, and common ergonomic advice sitting up straight, specialised office equipment largely lacks a supporting evidence base. What is consistently associated with harm is a different variable: prolonged, unbroken sedentary bouts. We asked which claims about sitting hold up, and what dose of movement offsets the risk that remains.

Material and Methods: PubMed, Web of Science, Scopus and the Cochrane Library were searched (2000-2026) for prospective cohorts, randomised controlled trials and systematic reviews addressing posture, ergonomic interventions, sedentary bout length and structured movement breaks.

Results: Cochrane reviews found no evidence of effect for ergonomic training or equipment on musculoskeletal outcomes, and no single spinal posture was consistently associated with pain. Total sedentary volume and the length of unbroken sedentary bouts were independently associated with mortality; risk was highest where bouts exceeded 30 minutes combined with more than 12.5 hours of daily sitting. Randomised crossover data showed that interrupting sitting for one minute every hour lowered systolic blood pressure, while five minutes every 30 minutes also improved postprandial glucose; isolated seated calf-muscle contractions reduced postprandial glucose excursion in a small mechanistic study. A twelve-month cluster-randomised workplace trial reduced daily sitting by 22 minutes through behaviour change alone, rising to 64 minutes with a height-adjustable desk.

Conclusions: Sitting is not inherently harmful, and no single posture protects against it; what matters is breaking up prolonged, unbroken sitting. A protocol of standing for one minute every hour, with no uninterrupted block longer than thirty minutes, is a low-cost intervention directly applicable to university teaching schedules.

Keywords: sedentary behaviour, movement breaks, posture, ergonomics, cardiometabolic health

Funding: This work was supported by the KEGA grant 014UPJŠ-4/2024: Monitoring of selected risk factors influencing the lifestyle of university students.

Occupational Differences in Adiposity Profiles and Self-Reported Physical Activity: A Cross-Sectional Comparison of Production Workers, Administrative Employees, and Teachers

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Introduction: Occupational groups characterized by different work demands may differ in both physical activity and adiposity. The aim of this study was to compare adiposity-related indicators, self-reported physical activity, and perceived stress among production workers, administrative employees, and teachers and to examine whether occupational differences in adiposity persisted after accounting for physical activity, perceived stress, age, and sex.

Material and Methods: This cross-sectional study included 165 adults: 31 administrative employees, 99 production workers, and 35 teachers. Body mass index (BMI), body fat percentage (BF%), waist circumference, and visceral fat level were assessed using standardized anthropometric procedures and bioelectrical impedance analysis. Physical activity was assessed using the International Physical Activity Questionnaire – Short Form (IPAQ-SF), and perceived stress using the 10-item Perceived Stress Scale (PSS-10). Between-group comparisons and multivariable regression models adjusted for age, sex, physical activity, and perceived stress were performed.

Results: Production workers had higher BMI than administrative employees (27.82 ± 4.81 vs. 24.63 ± 3.18 kg/m²; $p = .002$), greater waist circumference (95.24 ± 11.94 vs. 86.10 ± 9.56 cm; $p < .001$), and higher BF% than teachers ($28.83 \pm 7.71\%$ vs. $24.99 \pm 7.16\%$; $p = .026$). Despite this less favorable adiposity profile, production workers reported higher total physical activity than administrative employees (4878 [2238–8325] vs. 1760 [948–5094] MET-min/week; $p = .010$). In multivariable models, production workers had significantly higher BMI, BF%, waist circumference, and visceral fat level than both administrative employees and teachers (all Holm-adjusted $p \leq .011$). Neither total physical activity nor perceived stress was independently associated with any adiposity-related outcome.

Conclusions: Production workers demonstrated a less favorable adiposity profile despite reporting higher total physical activity than administrative employees. Occupational differences in adiposity persisted after accounting for age, sex, physical activity, and perceived stress. These findings suggest that total self-reported physical activity alone may be insufficient to explain occupational differences in adiposity and highlight the importance of considering the context and domain in which physical activity is accumulated.

Keywords: occupational physical activity; adiposity; body composition; perceived stress; workers

Tourism in Poland as Presented in the Lwów Periodical Sport, 1922–1927

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Introduction: The aim of this article is to present tourism in Poland as reflected in the Lwów-based periodical Sport between 1922 and 1927. Sport was published in Lwów from 1922 to 1927, with Rudolf Wacek serving as its editor-in-chief. The periodical appeared irregularly, either weekly or every two weeks. A total of 219 issues were published between 1922 and 1927. Sport was the official publication of the Carpathian Skiers' Society (Karpackie Towarzystwo Narciarzy, KTN).

Material and Methods: The periodical primarily published articles, reports, and other materials devoted to various sports disciplines. Its editorial board also addressed issues related to the development of tourism in Poland.

Results: The restoration of Poland's independence fostered the organizational and infrastructural development of tourism. This period saw the consolidation and expansion of specialist tourism organizations, including the Polish Tatra Society (Polskie Towarzystwo Tatrzańskie, PTT), which established, among others, branches in Lwów, Łódź, and Poznań; the Polish Sightseeing Society (Polskie Towarzystwo Krajoznawcze, PTK), which established branches in cities including Bydgoszcz, Grudziądz, Kraków, Lwów, Poznań, Puck, Toruń, and Wilno; and the Carpathian Skiers' Society (KTN). Investment was an important factor in the development of tourism and recreation in Poland. In 1922, the Tourism Section of the Ministry of Public Works allocated funding to a number of tourism-related organizations and projects. These included the construction of an excursion hostel for the PTK; the PTT in Kraków; the Czarnohora Branch of the PTT in Kołomyja for the reconstruction of a mountain shelter; the KTN in Lwów for the reconstruction of a mountain shelter; the PTT Ski Section for the provision of supplies to mountain shelters; and the Academic Sports Association (Akademicki Związek Sportowy, AZS) for an excursion hostel in Zakopane. At the end of 1926, the Lwów Branch of the PTT completed the construction of a mountain shelter in the Gorgany Mountains, in the Łomnica Valley. The shelter was available to tourists and skiers during the 1926/1927 winter season. Congresses organized by tourism and sightseeing societies also contributed to the development of tourism. On 8–9 April 1922, a congress of academic tourism organizations was held in Warsaw. It was chaired by Zygmunt Orłowicz, president of the Academic Tourist Club in Lwów and brother of Mieczysław Orłowicz. The KTN, founded in Lwów in 1907, made a significant contribution to the development of tourism in Poland. Prominent figures associated with the organization included Roman Kordys, Zygmunt Klemensiewicz, Roman Loteczko, Lenkiewicz, and Jakubczyński. The periodical also reported on the organization of tourism events. One of the most important initiatives in specialist tourism was an automobile tourism rally. In 1925, the Małopolska Automobile Club (Małopolski Klub Automobilowy) organized a Tourist Automobile Rally consisting of four one-day stages: Lwów–Kraków, Kraków–Zakopane, Zakopane–Krynica, and Krynica–Lwów. Six cars took part in the rally, and all crews successfully completed the event.

Keywords: Second Polish Republic, Sport periodical, tourism, tourism organizations

Activities of the Stanisławów District Football Association (1934–1939): Football in a Multiethnic Society

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Introduction: The aim of this article is to present the activities of the Stanisławów District Football Association (Stanisławowski OZPN). The Association operated from 1934 to 1939. Its activities covered the territory of the Stanisławów Voivodeship; from 1937 onwards, sports clubs from Stryj County were affiliated with the Lwów District Football Association. The Association also covered part of the Tarnopol Voivodeship, including the counties of Borszczów, Buczacz, Czortków, Kopyczyńce, and Zaleszczyki. This area was inhabited by Polish, Ukrainian, and Jewish populations.

Results: The organizational structure of the Stanisławów District Football Association included several football subdistricts: the Stanisławów subdistrict, which functioned as a competition subdistrict; the Stryj subdistrict (1936–1937); the Pokucie subdistrict (1937–1939); and the Association's Delegation in Kałusz (1939). Several departments operated within the Association, including the Competitions and Disciplinary Affairs Department and the Refereeing Affairs Department. The Stanisławów District Football Association was affiliated with the Polish Football Association (PZPN). In the second half of the 1930s, the Polish Football Association comprised 14 district football associations.

As early as 1934, during the initial period of its activities, the Stanisławów District Football Association had 35 affiliated sports clubs. The Association organized competitions in Classes A, B, and C. During the period 1934–1939, Class A comprised between three and eight sports clubs, while Class B included between 11 and 15 teams. The remaining clubs competed in Class C. Between 1934 and 1939, the following teams participated in Class A, the highest level of competition: Rewera Stanisławów, Strzelec Górka Stanisławów, Stanisławowia Stanisławów, Strzelec Raz Dwa Trzy Stanisławów, Pokucie Kołomyja, Pogoń Stryj, Klub Sportowy Zagłębia Naftowego Rypne, Strzelec Broszniów, Bystrzyca Nadworna, Klub Sportowy Towarzystwa Eksploatacji Soli Potasowych Kałusz, and Ukraińskie Towarzystwo Sportowe Prołom Stanisławów. The Stanisławów District Football Association championship was won by Rewera Stanisławów (1934–1935 and 1937–1938), Pogoń Stryj (1936), and Strzelec-Górka Stanisławów (1939).

The champions of the Stanisławów District Football Association competed for promotion to the Polish Football League. Rewera achieved the greatest success in these competitions in 1934. The team won its quarter-final group and advanced to the semi-finals, where it lost a two-legged tie against Śląsk Świętochłowice (0:5 and 1:0). In the 1936 Polish Junior Championships, the young players of Rewera Stanisławów finished sixth. Another notable achievement was the advancement of the Stanisławów representative team, representing the Stanisławów District Football Association, to the final of the Cup of the President of the Republic of Poland in 1939, where it was due to face Poznań.

Keywords: Second Polish Republic, Stanisławów, football, District Football Association

Body Composition and Cardiorespiratory Fitness in Relation to Eating Disorders Risk among University Students

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Introduction: Eating disorders and maladaptive eating behaviors are recognized as significant health concerns among university students, with potential consequences for physical and psychological well-being and long-term health. Therefore, this study aimed to investigate the associations between selected body composition parameters, cardiorespiratory fitness and eating disorder risk in university students.

Material and Methods: The study included 254 university students from Krosno, Poland. The assessment comprised measurements of body height, body composition using bioelectrical impedance analysis (BIA), and cardiorespiratory fitness (CRF) assessed using the 20-m shuttle run test. Dietary habits were assessed using the My Eating Habits (MEH) questionnaire (Moje Zwyczaje Żywieniowe).

Results: Based on body fat percentage (BF%), almost one-fifth of the participants (19.69%) were classified as obese. According to body mass index (BMI), more than one-third of the students had excess body weight, including 24.02% with overweight and 10.24% with obesity, while 6.7% were underweight. The risk of eating disorders was significantly higher among women ($p = 0.0002$). Significant associations were observed between eating disorder risk and BMI, muscle mass (MM%), skeletal muscle mass (SMM%), body fat (BF%), and visceral fat area (VFATL). Higher BMI, BF%, and VFATL were associated with a greater risk of eating disorders. Among participants with normal body weight, emotional overeating was significantly less prevalent compared with those who were underweight or overweight/obese. Cardiorespiratory fitness (CRF) was significantly negatively correlated with eating disorder risk.

Conclusions: The findings indicate that eating disorder risk is associated with selected body composition parameters and cardiorespiratory fitness among university students, highlighting the need for targeted health education and comprehensive lifestyle interventions tailored to this population.

Keywords: eating disorder risk; body composition; cardiorespiratory fitness (CRF); bioelectrical impedance analysis (BIA); university students

Selected Aspects of Motor Skills Among Young Footballers at Junior Competition Level in Poland

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Introduction: Football is characterised by high dynamics, and players are required to have above-average technical skills, a range of flexible tactical habits, comprehensive physical fitness and conditioning, high-level decision-making processes, speed of action and a high level of specialisation in their position. The purpose of this study is to examine the level of explosive strength in the lower limbs and to assess the physical fitness of young soccer players.

Material and Methods: The study groups consisted of senior junior football teams with a total of 89 participants competing in the Central Junior League (the highest level of junior competition in Poland) and the Małopolska Senior Junior League (provincial level). The scope of the study included measurements of explosive strength of the lower limbs (CMJ, SQUAT JUMP, DROP JUMP, vertical jump from the left and right leg) and fitness tests (endurance - BEEP TEST, speed - 5m, 10m, 20m, 30m, special fitness - Illinois Agility Test, RAST Test).

Results: The individual training regimes did not cause any significant changes in the teams' positions in relation to each other in terms of fitness levels, but they did result in increases in the average performance levels of the tested abilities in the players in each team. With regard to the nature of changes in fitness during the study period, all teams conducted training that had a significant impact on the improvement and development of players in this respect.

Conclusions: Regardless of the level of athleticism, improvements were seen in jumping ability, speed, and endurance. The factor that had the greatest impact on the athletic level of the teams studied was training – its volume and structure. The more specific and tailored to the requirements of the discipline the training was, the greater its effectiveness.

Keywords: soccer, sports training, motor skills

Motives And Barriers to Physical Activity Among Women in Military Service in the Context of Socio-Occupational Variables

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Introduction: The aim of this study was to assess the relationships between motives and barriers to engaging in physical activity (PA) and selected socio-occupational factors among female military personnel.

Material and Methods: The study included 234 women serving in the military. An author-designed questionnaire was used in the study. The analysis included motives and barriers to PA as well as the following variables: age, marital status, education, place of residence, length of military service, number of children, and military rank.

Results: The most frequently reported motives for engaging in PA were taking care of your figure (64.10%), maintaining good health (55.98%), and getting in good shape (55.55%). The chi-square test of independence showed that the frequency distribution of reporting the motive of taking care of figure differed according to marital status ($\chi^2 = 10.67$; $p = 0.014$) and length of military service ($\chi^2 = 6.36$; $p = 0.041$). This motive was reported most frequently by single women, least frequently by divorced and widowed women. In terms of length of service, it was most frequently reported by women who had served in the military for fewer than five years. The most frequently reported barriers to engaging in PA were lack of time (49.57%) and family obligations (38.88%). The chi-square test of independence showed that the frequency distribution of reporting lack of time as a barrier differed according to place of residence ($\chi^2 = 9.079$; $p = 0.020$). Lack of time was reported most frequently by women living in towns with up to 50,000 inhabitants and least frequently by those living in cities with more than 150,000 inhabitants. The frequency distribution of reporting family obligations as a barrier differed according to age ($\chi^2 = 17.66$; $p = 0.001$), marital status ($\chi^2 = 19.76$; $p \leq 0.001$), and number of children ($\chi^2 = 58.04$; $p \leq 0.001$). Family obligations were reported most frequently by women aged 31-40 and by married women. Moreover, family obligations were reported most frequently as a barrier by women with two children and least frequently by women with three or more children.

Conclusions: Identifying the motives and barriers associated with physical activity among woman in military service is essential for gaining a better understanding of PA-related behaviours and for planning measures that promote regular participation in PA.

Keywords: physical activity, military, soldiers, women

Coping Styles, Perceived Stress, and Salivary Cortisol Concentrations – A Comparison of Female Students and Women Over 40 Years of Age

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Introduction: Stress represents an important public health challenge, with its consequences reflected in both perceived psychological stress and physiological responses. Individual coping styles may influence the response to stressful experiences, with salivary cortisol concentration serving as a biological marker of hypothalamic–pituitary–adrenal (HPA) axis activity. Assessing the relationships between coping styles, perceived stress, and salivary cortisol concentrations across different groups of women may provide insight into individual differences in stress responses and inform preventive approaches to stress management in public health. The aim of the study was to assess the associations between coping styles, perceived stress, and salivary cortisol concentration in female students and women over 40 years of age.

Material and Methods: The study had an observational, cross-sectional, comparative design. A total of 120 women were recruited and assigned to two groups: Group A (female students) and Group B (women over 40 years of age). An unstimulated saliva sample was collected from each participant using the direct spitting method. Salivary cortisol concentrations were determined using an enzyme-linked immunosorbent assay (ELISA). Psychological assessment was performed using validated instruments. Perceived stress was assessed using the Perceived Stress Scale (PSS-10), while coping styles were assessed using the Coping Inventory for Stressful Situations (CISS). The CISS assesses three basic coping styles: task-oriented coping (SSZ), emotion-oriented coping (SSE), and avoidance-oriented coping (SSU). Avoidance-oriented coping comprises two subtypes: engaging in substitute activities (ACZ) and seeking social contact (PKT).

Results: Female students had significantly higher levels of perceived stress (PSS-10; $p < 0.001$) and differed significantly from women over 40 years of age in coping styles, including task-oriented coping (CISS-SSZ; $p = 0.015$), emotion-oriented coping (CISS-SSE; $p < 0.001$), and avoidance-oriented coping (CISS-SSU; $p = 0.002$), as well as the substitute activities subtype (CISS-ACZ; $p < 0.001$). No significant between-group difference was observed in salivary cortisol concentrations ($p = 0.720$). Correlation analysis revealed a positive association between emotion-oriented coping and salivary cortisol concentration among female students ($\rho = 0.318$; $p = 0.048$), whereas no such association was

observed among women over 40 years of age ($p = -0.012$; $p = 0.914$) or in the total sample ($p = 0.060$; $p = 0.515$).

Conclusions: The findings indicate differences in psychological aspects of stress between the study groups despite comparable salivary cortisol concentrations. The association between emotion-oriented coping and salivary cortisol concentration was observed only among female students. These findings support the consideration of individual coping styles in preventive strategies aimed at promoting women's psychological and physical health.

Keywords: salivary biomarkers; salivary cortisol; perceived stress (PSS-10); coping styles.

Predictive Potential of Gymnastics in the Development of Physical Literacy in Children

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Introduction: Gymnastics provides a broad movement foundation for children and contributes to the development of fundamental movement competencies. Previous research has emphasized the importance of gymnastics in developing balance, coordination, flexibility, movement control and other abilities that form an important basis of physical literacy. The aim of this study is to examine the predictive potential of selected characteristics of gymnastics participation in relation to the level of physical literacy in children. The research question is: Which characteristics of gymnastics participation best predict the level of physical literacy in children?

Material and Methods: The research will involve children of younger school age participating in organized gymnastics training. Selected components of motor competence will be assessed using a gymnastics-oriented test battery consisting of four tests: forward bend for flexibility, walking along a bench for dynamic balance, target throwing for accuracy and hand-eye coordination, and a jump for dynamic strength and coordination. Information on gymnastics participation will include training frequency, duration of gymnastics experience and age at which gymnastics training began. Descriptive statistics, correlation analysis and multiple regression analysis will be used to determine the relationships between gymnastics participation and selected indicators of motor competence and to identify significant predictors.

Results: It is expected that greater gymnastics experience and higher training frequency will be positively associated with better performance in the selected motor competence tests. The strongest associations are expected between gymnastics participation and dynamic balance, flexibility, coordination and jumping performance. Multiple regression analysis is expected to identify selected characteristics of gymnastics participation as significant predictors of the observed level of motor competence.

Conclusions: The study is expected to provide empirical evidence concerning the predictive potential of gymnastics participation for the development of selected components of physical literacy in children. The findings may contribute to more targeted planning of gymnastics programmes and support the use of gymnastics as a systematic means of developing a broad movement foundation during childhood.

Keywords: gymnastics, physical literacy, children, flexibility, balance, coordination

Quality of Life Among Ukrainian University Students: Educational and Social Determinants of Physical and Mental Health

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Introduction: University students represent a population particularly exposed to academic, social, and psychological challenges that may affect their health and well-being. Understanding the imbalance between physical and mental health and identifying its determinants is important for developing a supportive university environment. The study aimed to assess physical and mental components of quality of life among Ukrainian university students and to identify their educational and social determinants.

Material and Methods: The study involved 513 students from four Ukrainian universities, including 207 men (40.5%) and 306 women (59.5%), predominantly aged 17–21 years. Quality of life was assessed using the standardized MOS SF-36 Health Survey and summarized as Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. Differences according to sex, year of study, academic specialization, academic achievement, place of birth, and living conditions were analyzed. Statistical analysis was performed using STATISTICA 10 with Mann–Whitney U, Kruskal–Wallis ANOVA, and χ^2 tests; statistical significance was set at $p \leq 0.05$.

Results: A clear asymmetry between physical and mental components of quality of life was identified. Mean PCS was 51.1 points, compared with 44.3 points for MCS, representing a 15.5% lower mental health score. Women demonstrated lower MCS than men (42.8 vs. 46.4), while gender differences in PCS were smaller (50.6 vs. 51.9). During university education, male PCS decreased from 54.3 in the first year to 49.9 in the fourth year, whereas female MCS reached its lowest value in the fourth year (40.9). Students majoring in Physical Education had the highest MCS (47.9) and PCS (51.9). Living conditions were also associated with quality of life: students living in their own houses had higher PCS and MCS than those living in dormitories. A non-linear relationship was observed between academic achievement and mental health, with the highest MCS among students with very good academic performance and lower scores among both excellent and mediocre performers.

Conclusions: The findings reveal a persistent imbalance between physical and mental health, with mental well-being representing the more vulnerable component of students' quality of life. Universities should implement student-centred strategies combining mental health support, regular physical activity, balanced academic workloads, and improved living conditions. Such interventions may enhance student well-being and contribute to sustainable human capital development.

Keywords: quality of life, university students, mental health, physical health, SF-36, educational determinants, social determinants, human capital.

Coubertin's Idea of the International Olympic Academy and Its Implementation – the Case of Poland and Slovakia

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Introduction: The modern Olympic Games have become the most important sporting event for athletes and fans alike. Sports competition has somewhat overshadowed the broader concept of Olympism promoted by Pierre de Coubertin. He did not limit Olympism solely to physical strength but drew on the ancient ideal of kalokagathia. Just as the stadium was a place for building physical strength and fitness, so the academy was to be a place for shaping and developing the mind. Coubertin presented this concept in 1910. At the beginning of the 20th century, the world was not ready for Coubertin's bold ideas, and the plan to establish an international center for Olympic education was abandoned.

Material and Methods: The source research was conducted at Olympic, scientific and educational institutions in Poland and Slovakia. The study employed the methods of source analysis and criticism, the synthetic and heuristic methods, and elements of the comparative method. The aim is a presentation on the development of the International Olympic Academy and the realization of Coubertin's vision for the activities of national academies, using Poland and Slovakia as examples.

Results: The International Olympic Academy was founded in Rome in 1949. Ancient Olympia was chosen as the Academy's headquarters. The official opening of the International Olympic Academy and the first session of the IOA took place on June 16, 1961, in Athens. The continuous expansion of the sessions' scope led to the establishment of national Olympic academies. The first to be established was the Spanish Olympic Academy in 1968, followed by others. The Polish Olympic Academy joined in 1984, and the Slovak Olympic Academy in 1993. Both have realized Coubertin's vision of Olympic education at the highest level.

Conclusions: Research has shown that national Olympic academies are highly active and make a significant contribution to promoting and spreading Olympic values among the Polish and Slovak public through Olympic education.

Keywords: Pierre de Coubertin, Olympic education, Polish Olympic Academy, Slovak Olympic Academy

Promoting Physical Activity Among Senior School Students Through Fitness and Sports Tourism in Extracurricular Settings

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Introduction: Regular engagement in physical activity has been consistently shown to enhance physical fitness, improve psychological resilience to stress, maintain optimal cognitive performance, and positively affect academic achievement among school students. Within this context, physical education serves as a critical component of the educational process, contributing to the promotion of health, functional capacity, and overall well-being in children and adolescents. In recent years, the issue of optimizing physical education in schools has gained increasing scholarly attention, particularly under conditions of social instability and martial law. There is a growing need for innovative extracurricular physical activity programs that are tailored to students' interests and individual needs. Such programs play a key role in fostering intrinsic motivation, encouraging lifelong engagement in physical activity, and shaping health-oriented values and behaviors.

Material and Methods: The study employed a complex methodological approach, including theoretical analysis of scientific and methodological literature, questionnaire surveys, and pedagogical testing. The research focused on assessing the level of physical development and physical fitness of senior school students, designing individualized activity strategies, and determining the optimal parameters of physical loads, including volume, intensity, and recovery duration. The implementation of the programs was supported by continuous monitoring and adjustment based on empirical data.

The experimental study involved the implementation of extracurricular programs incorporating fitness and sports tourism activities. Additionally, participants were introduced to complementary activity modules such as cheerleading, floorball, and frisbee, thereby broadening their motor experience and enhancing engagement. The intervention emphasized the development of students' knowledge concerning a healthy lifestyle and the acquisition of competencies for independent physical activity. Students were actively involved in evaluating different exercise execution techniques, which facilitated the development of self-regulation skills and critical assessment of movement quality. Special attention was given to fostering autonomy in organizing physical activity. Participants were encouraged to independently select exercises, regulate training intensity, and determine the appropriate number of repetitions. Exercise selection was guided by their functional orientation, complexity, and relevance to the development of physical qualities, postural correction, and muscle strengthening.

Conclusions. The findings of the study confirm that motivation is a fundamental determinant of students' engagement in physical activity and their overall physical development. The integration of diverse, student-centered extracurricular activities significantly contributes to the formation of sustained interest in physical culture and sports. Furthermore, the involvement of parents in school-based physical activity initiatives is recommended as an effective strategy for enhancing students' motivation and promoting long-term adherence to active lifestyles. Achieving high levels of physical and cognitive performance requires a coordinated approach based on collaboration between

educational institutions and families, as well as the systematic implementation of modern fitness and sports tourism practices in extracurricular education.

Keywords: physical activity, extracurricular education, senior school students, fitness, sports tourism, motivation, health promotion.

Relationship Between Leisure-Time Physical Activity, Cardiorespiratory Fitness and Heart Rate Recovery in University Students

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Introduction: Regular physical activity is one of the key determinants of cardiorespiratory fitness and cardiovascular function in young adults. The assessment of heart rate responses during and after exercise may provide valuable information regarding exercise tolerance and recovery capacity. The aim of this study was to determine the relationship between leisure-time physical activity and heart rate responses recorded during the 20 m Shuttle Run Test (20mSRT) among university students.

Material and Methods: The study involved 266 university students, including 131 women (49.2%) and 135 men (50.8%), aged 20.4 ± 1.4 years. Leisure-time physical activity was assessed using a standardized questionnaire (MLTPAQ), while cardiorespiratory fitness was evaluated using the 20 m Shuttle Run Test. Maximum heart rate and post-exercise heart rate recovery after 1 and 4 minutes were analyzed. Relationships between physical activity indicators and exercise test outcomes were assessed using Spearman's rank correlation coefficients.

Results: In both sexes, higher levels of physical activity were associated with better performance in the 20mSRT; however, these associations were stronger in men than in women. Among women, total physical activity was positively correlated with the distance covered in the test ($r_s = 0.297$; $p < 0.001$), whereas no significant associations were found between physical activity and maximal heart rate or heart rate recovery indices during the first minute. Among men, vigorous-intensity physical activity ($r_s = 0.385$; $p < 0.001$) and total physical activity ($r_s = 0.356$; $p < 0.001$) were positively correlated with 20mSRT performance. More physically active men also demonstrated faster heart rate recovery after both 1 and 4 minutes. Additionally, among women, the distance covered in the test was positively associated with the decline in heart rate after 4 minutes ($r_s = 0.234$; $p = 0.007$), and physical activity was also positively correlated with heart rate recovery at 4 minutes.

Conclusions: Higher levels of leisure-time physical activity, particularly vigorous-intensity activity, are associated with superior cardiorespiratory fitness as reflected by 20mSRT performance. Among men, greater physical activity is additionally linked to more efficient post-exercise heart rate recovery, whereas in women this relationship is evident mainly in the later phase of recovery. Promoting regular physical activity among university students may contribute to improved cardiovascular fitness and recovery capacity.

Keywords: physical activity, university students, heart rate recovery, 20 m Shuttle Run Test, cardiorespiratory fitness, exercise capacity.

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