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Distinguished colleagues and dear participants of the 24th International Conference of the Montenegrin Sports Academy. Under the theme "Sports Science, Medicine & Health - Innovations, Achievements, Synergy and Challenges: A Bridge to the Future of Excellence in Sports," this conference highlights the vital role of interdisciplinary research in advancing both theory and practice.

This Book of Abstracts stands as a testament to the scientific rigor, innovation, and collaborative spirit demonstrated throughout the event. The contributions collected here showcase important developments across sport science, medicine, health, and performance, addressing both current challenges and future directions. We are proud that the city of Budva and Montenegro have hosted such a meaningful and dynamic academic gathering, and extend our sincere gratitude to all authors, reviewers, speakers, and organizers whose dedication made this conference a success. Their work has enriched the global sport science community and strengthened international cooperation. May the insights presented in this volume continue to inspire further research, innovation, and excellence in sport.

We warmly invite you to join us again at the next conference in 2027, as we continue building bridges toward the future of sport sciences.

Editors

OPEN ACCESS

Abstracts from 24th International Conference of Montenegrin Sports Academy **Budva Sports Science, Medicine & Health Forum 2026: "Innovations, Achievements, Synergy and Challenges – A Bridge to the Future"**

16th - 19th April 2026, Budva, Bečići – Montenegro

Edited by Dusko Bjelica[1], Damir Sekulic[2], Maja Pajek[3], Marin Ćorluka[4]

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MEETING ABSTRACTS FROM MSA 24th CONFERENCE
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Invited speakers

S1

Using Sport Management to Support Human Needs as Artificial Intelligence Advances

Robert C. Schneider[1]

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As technology advances, particularly in the form of Artificial Intelligence (AI), human needs achievement is at risk of being compromised (Human & Watkins, 2023). Needs models such as the Maslow Hierarchy of Human Needs require individual efforts through lived experiences (experiences) as part of the process to achieve said needs (Maslow, 1943). Any apparent mastery of a human needs, influenced by AI, in fact is artificial and does not include the degree of individual growth resulting from the experiences normally associated with human needs achievement. Understanding similar challenges brought on by technological advances in the form of the smart phone (Haidt, 2024) can serve as a broad guide in addressing AI threats to the experiences component necessary to meet human needs. Higher education, with a focus on sport management, can play a role in preserving the experiences component. The following three recommendations will be discussed to preserve the human need of autonomy in the face of ongoing AI advances: (a) strategies to prevent one's over-reliance on AI, (b) the incorporation of experiential learning into higher education best teaching practices, using the discipline of sport management as an example, and (c) increasing sport experiences across communities.

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S2

Rethinking the Core: The Neck's Hidden Role in Posture, Balance, and Visual Orientation

Ziva Majcen Rosker[1]

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Purpose: Core stability models traditionally emphasize lumbopelvic region; however, anatomical, biomechanical, and neurophysiological evidence indicates that cervical spine plays a fundamental role in posture. This work synthesizes findings from systematic literature review supporting vertically integrated neurofascial model in which the core begins at cranial base and extends caudally to pelvis. Methods: The content is based on systematic search conducted in PubMed/MEDLINE, Scopus, Web of Science, CINAHL, and SPORTDiscus. Included studies examined cervical spine function (e.g., deep cervical muscle activation, proprioception, movement control (MC), and cervico-vestibular integration) and reported outcomes related to trunk muscle activity, balance, visual orientation, movement variability, and athletic performance. Methodological quality was appraised using design-specific tools, and owing to heterogeneity across populations and outcomes, findings were synthesized narratively. Results: Evidence demonstrates dense proprioception of deep cervical musculature, projections to vestibular and reticulospinal pathways, and functional coupling between cervical and trunk muscles. Manipulation of cervical input alters postural sway, perceived verticality, trunk muscle activation, and MC. Clinical studies link neck pain with impaired sensorimotor control and balance disturbances. In athletes, cervical MC and joint position sense are associated with sprint acceleration and maximal velocity. Conclusion: Postural stability reflects a cranio-caudal sensorimotor axis rather than an isolated lumbopelvic cylinder. The cervical spine acts as a mechanical anchor and neuromotor regulator influencing trunk stiffness, balance, and locomotor performance, with implications for rehabilitation, injury prevention, and athletic training.

S3

Pushing the Limits: How a Congested Schedule Affects Performance in Elite Football

Peter Kačúr[1]

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Neurocognitive diagnostics and training are increasingly used across applied performance settings, reflecting recent innovations but also creating interpretive challenges around transfer. PURPOSE: The aim is to outline evidence-informed methodological considerations that improve the interpretation of transfer-related findings and support more transparent evaluation beyond trained tasks. METHODS: Selected recent evidence (reviews and representative controlled studies) was synthesised to identify recurring design and reporting issues relevant to transfer. The presentation primarily adopts a cross-sectional perspective, including assessments under contrasting conditions where feasible. It uses applied examples from sport and tactical contexts to illustrate profiling, monitoring, and protocol standardisation under field-relevant constraints. RESULTS: Key considerations include selecting outcomes aligned with real task demands; ensuring task representativeness and perception–action requirements; familiarisation and measurement reliability; and the potential influence of fatigue, time pressure, and contextual constraints on assessment. In addition, selected neurocognitive training approaches are considered to illustrate how near and intermediate outcomes can be organised as bridges toward performance measures, supporting a more realistic evaluation of generalisation beyond the trained task. CONCLUSION: An evidence-informed methodological framework may facilitate more consistent use of neurocognitive diagnostics and training in practice and inform the design of future longitudinal or experimental studies intended to evaluate transfer with greater interpretability.

S4

Pushing the Limits: How a Congested Schedule Affects Performance in Elite Football

Antonio Tessitore[1], Andrea Perazzetti[2], Masar Gjaka[3], Francesca Martusciello[1], Giovanni Esposito[4], Mauro Mandorino[5]

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Nowadays, professional football clubs face a congested calendar, impacting team outcomes and posing risks to players' health. PURPOSE: To analyze matches played in the first half of the 2025/26 season by Italian Serie A clubs within the Italian Championship, Italy Cup, and UEFA cups (Champions-, Europa- Conference- League). METHODS: The

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analysis examines matchday start times (sub-optimal: 12:00-13:00; optimal-stable: 15:00-16:00; peak-performance: 17:00-19:00; alert/nervous peak: ≥20:00) and two consecutive match sequences with short time intervals (≤3-days and ≤4-days). An independent samples t-test was conducted, dividing clubs into those competing solely in Italian competitions (ITcomp) and those also in UEFA Cups (IT+UEFAcomp). RESULTS: IT+UEFAcomp played significantly more matches ($p<.001$; range 25-28) than ITcomp (range 20-23). Significant differences were identified for ≤3-day matches ($p<.001$) and ≤4-day matches ($p=0.007$), as well as for sub-optimal ($p=0.012$) and alert/nervous peak ($p = 0.007$), while no significant differences were found for peak-performance and optimal-stable. CONCLUSION: IT+UEFAcomp clubs face a significantly higher match load, which could adversely affect performance, particularly in matches scheduled within ≤3-day interval. Furthermore, the high number of matches played by these clubs in peak-performance and alert/nervous peak start times could increase players' susceptibility to higher injury risk and reduced recovery.

S5

Blood Flow Restriction (BFR) Training as a Tool for Adaptation and Recovery: From Mechanisms to Clinical and Sports Applications

Robert Trybulski[1]

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Background: Blood flow restriction (BFR) training has gained increasing attention for sports performance, rehabilitation, and the prevention of metabolic disease. Initially, research focused primarily on local muscular adaptations in the restricted limbs. However, accumulating evidence suggests that BFR elicits broader, systemic neuromuscular and vascular responses that extend beyond the site of occlusion. Purpose: The purpose of this research program was to comprehensively examine the potential of BFR training by: (1) evaluating its effects on non-restricted muscles, (2) exploring its applicability in clinical populations, particularly individuals with type 2 diabetes, (3) assessing its effectiveness as a post-exercise recovery modality, and (4) comparing short-term versus longer-term vascular and muscular adaptations induced by repeated ischemic stimuli. Methods: A combination of study designs was employed, including a scoping review with an evidence gap map, randomized controlled trials, and experimental interventions with acute and two-week ischemic protocols. Outcome measures included muscle strength and power, microvascular perfusion, muscle architecture, biomechanical tissue properties, recovery indices, and selected metabolic and cardiovascular parameters. Results: The findings indicate that BFR training can induce adaptations not only in the restricted muscles but also in non-restricted muscle groups, supporting the presence of systemic mechanisms. In clinical populations, BFR appears to be a safe, low-load training modality capable of improving insulin sensitivity, glucose metabolism, and selected cardiovascular outcomes. When applied as a recovery strategy, BFR accelerates the restoration of functional performance and improves subjective recovery. Short-term ischemic interventions primarily produce transient changes in perfusion and neuromuscular performance, whereas repeated ischemic exposure may initiate more sustained vascular and muscular adaptations. Conclusions: BFR training represents a versatile intervention with wide-ranging applications, spanning elite sport, recovery optimization, and clinical practice. These findings suggest that BFR should not be viewed solely as a hypertrophy-oriented method, but rather as a systemic stimulus capable of modulating muscular and vascular function. Future research should focus on optimizing training parameters and elucidating long-term clinical and performance-related outcomes.

S6

Beyond gyms: public spaces as scalable solutions for physical activity promotion

Damir Sekulic[1]

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Public green spaces, such as parks and open urban environments, represent widely accessible yet underutilized resources for promoting physical activity, particularly among older adults. Previous research consistently demonstrates that access to natural environments is associated with higher levels of physical activity, improved mental well-being, and enhanced social interaction. Despite this, structured exercise programs are still predominantly conducted in indoor environments, with limited integration of natural public settings. The aim of this presentation is to critically examine the potential of natural public resources as a platform for recreational exercise, with a particular focus on their application in programs targeting older populations. The presentation is based on (i) a synthesis of current scientific evidence on "green exercise" and public-space-based physical activity, and (ii) insights from an ongoing research project investigating the effects of a structured outdoor multicomponent exercise program in older women. Emerging evidence suggests that exercising in natural environments may enhance adherence, reduce perceived barriers to participation,

and provide additional psychosocial benefits compared to traditional indoor programs. Furthermore, public spaces enable scalable, low-cost interventions with high ecological validity. Natural public environments represent a promising and sustainable framework for future development of recreational exercise programs. Integrating these resources into physical-exercising practice may contribute to more accessible, cost-effective, and socially inclusive physical activity interventions, particularly in aging populations. Keywords: green exercise, public space, older adults, physical activity, outdoor exercise, health promotion.

S7
Sport as a Mechanism for Social Inclusion and Social Capital Development

Elona Mehmeti[1]

[1]Sport University of Tirana

Sport is widely acknowledged as a strategic social institution capable of promoting inclusion, building social capital, and improving community cohesiveness among various communities. This presentation looks at how organized sports promote social inclusion by bringing marginalized groups together and facilitating structured contact through shared goals, cooperation, and collective identity. Drawing on current research and findings from the EnBa project, which includes the Sports University of Tirana, the analysis investigates the key mechanisms by which sport generates social impact: psychological empowerment, life-skills development, social network formation, and cultural identity construction. Special emphasis is placed on the various types of social capital generated by sport, such as bonding (within-group cohesion), bridging (connections across varied social groupings), and linking. While sport has the potential to improve well-being, remove social obstacles, and increase involvement among vulnerable populations, research indicates that inclusive effects are not guaranteed. Programme design, leadership methods, and institutional support all play an important role in determining social effect. The presentation contends that when carefully constructed to promote justice, cooperation, and psychological safety, sport operates not only as recreation but as a strong tool for social growth, intercultural conversation, and community resilience in increasingly varied cultures. Key words: Sport for development, social inclusion, social capital, community cohesion.

S8
Impact of Different Nutritional Strategies on Body Weight and Maximal Strength

Gaetano Raiola[1]

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Resistance training adaptations depend partly on energy intake and macronutrient distribution, yet comparative evidence on dietary strategies in trained individuals is limited. Purpose: The aim of this study is to compare the effects of three nutritional strategies on body weight and maximal strength in trained individuals undertaking a standardized resistance program. Methods: Thirty physically active adults (18–40 years; with at least six months of resistance-training experience) were assigned to three groups (n = 10 each): a balanced normocaloric diet; a 20% hypocaloric high-protein diet; and a normocaloric carbohydrate-cycling approach with higher carbohydrate intake on training days and lower intake on rest days. All completed an identical 8-week program of squat, bench press, and deadlift at 85% 1RM. Body weight and 1RM were assessed pre- and post-intervention. Data were analyzed with paired t-tests and repeated-measures ANOVA (group × time). Results: A significant main effect of time was observed for body weight and all strength measures ($p < 0.001$), indicating overall improvement. A significant group × time interaction ($p < 0.001$) showed differential adaptations. The hypocaloric high-protein group showed the greatest body-weight reduction (2–3%). Strength increased in all groups (5–10% 1RM). carbohydrate cycling slightly favored squat and bench press, whereas the hypocaloric group favored deadlift. Conclusion: All strategies supported strength development. Hypocaloric high-protein intake favored weight reduction, while carbohydrate cycling slightly enhanced strength.

S9
Physical Activity and neuropathy in prediabetes

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Diabetic neuropathies are the most frequent and debilitating complication of diabetes, contributing to increased morbidity and mortality, reduced quality of life, and augmented healthcare costs. Prediabetes is characterised by increased glycaemia, as compared with normoglycaemia, yet below the cutoff values for the diagnosis of diabetes. Importantly, persons with prediabetes are at increased risk of progressing to diabetes and related morbidities. Similarly to early-stage diabetes, prediabetes has also been found to be associated with peripheral neuropathy, specifically distal sensorimotor polyneuropathy (DSPN) and cardiovascular autonomic neuropathy (CAN). These neuropathies impose a significant burden on patient's health and quality of life. So far, lifestyle interventions, particular those that include physical activity or exercise, have been found the most effective for preventing the progression from prediabetes to diabetes. Despite significant scientific efforts, further research is required to establish therapies that can effectively halt or reverse prediabetes and prediabetic-related neuropathies progression. The effect of physical activity and exercise, particularly that of moderate intensity combined exercise, may counteract insulin resistance and the related mitochondrial disfunction, oxidative stress and inflammation, all of which involved in Schwann cells and small size neural cells deterioration present in prediabetic-associated neuropathy. Accordingly, exercise holds promise and stands as a first line of action for primary and secondary prevention of neuropathies, and the prevention of progression to diabetes, in persons with prediabetes. Recommendations are warranted.

S10

FOCUS on Sports in Cardiology: Understanding the Cardiovascular Impact and Management in Athletes

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Sports cardiology has emerged as a dynamic subspecialty addressing the interface between vigorous physical activity and cardiovascular health. Although exercise is fundamental to cardiovascular disease (CVD) prevention, intensive training induces complex cardiac adaptations and may, in rare cases, unmask pathological conditions associated with increased risk for adverse events, including sudden cardiac death (SCD). This article reviews the cardiovascular impact of athletic training, examines modern diagnostic and risk stratification tools, discusses evolving guideline-based management strategies including shared decision-making, and highlights recent research that informs safe participation in sport for athletes with and without cardiac abnormalities. Emphasis is placed on evidence-based clinical practice and multidisciplinary care. Keywords: sports cardiology, athlete's heart, cardiovascular adaptation, sudden cardiac death, pre-participation screening, shared decision-making.

S11

A Contribution to the Study of the Relationship Between Sport and Climate Change in Montenegro

Velibor Spalević[1]

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Climate Climate change represents one of the most significant contemporary global challenges, with increasingly visible impacts across various sectors of society, including sport. The relationship between sport and climate change is bidirectional: sporting activities are affected by extreme weather conditions, while the sports sector itself contributes to the overall environmental footprint through energy consumption, infrastructure maintenance, and event organization. The aim of this paper is to analyze perceptions of the impact of climate change on sport in Montenegro, with particular emphasis on energy consumption and the maintenance of sports facilities. The research was conducted using a mixed-methods approach, including a survey of 68 respondents, three semi-structured interviews, and a focus group

with six participants. SWOT and GAP analyses were applied to identify key system weaknesses and development opportunities. The results indicate a high level of awareness of climate change (91.2%) and its impact on sport (76.5%). Respondents recognize the effects of extreme temperatures, severe weather events, and drought on infrastructure and maintenance costs, particularly in relation to increased electricity consumption, damage to sports fields, and the growing dependence of winter centers on artificial snowmaking. Most respondents support the development of adaptation plans (98.5%) and increased investment in sustainable sports infrastructure (100%). In conclusion, climate change in Montenegrin sport represents an operational and financial challenge requiring a systemic approach, improved energy efficiency, and long-term adaptation planning. Keywords: climate change; sport; energy efficiency; sports infrastructure; adaptation; sustainable development.

S12

Interaction of Physical Activity, Motor Competence and Cognitive Abilities in Preschool Children: A Multidimensional Perspective

Borko Katanić[1,2]

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Purpose: The aim of this study was to examine the interaction between physical activity, motor abilities and skills, cognitive abilities, and weight status in children. The research conducted focused on: (i) the effects of different physical exercise programs on motor and cognitive status; (ii) the association between motor abilities and skills with cognitive abilities; (iii) differences in motor and cognitive parameters between normal-weight and obese children, as well as between boys and girls; and (iv) differences in anthropometry and weight status between boys and girls. Methods: The research was based on monitoring preschool children aged 4 to 6 years. Anthropometry was assessed using eight parameters, while weight status was evaluated based on Body Mass Index (BMI) according to the cut-off values of the World Health Organization (WHO). Motor abilities and skills were evaluated using the test batteries Bruininks–Oseretsky Test of Motor Proficiency (BOT-2), Körperkoordinationstest für Kinder / Body Coordination Test for Children (KTK), Test of Gross Motor Development (TGMD-2), while reaction time was assessed with BlazePod™ (Play Coyotta Ltd., Aviv, Israel) technology, and cognitive abilities were assessed using the School Readiness Test (TZS+). Results: The analysis reveals a positive correlation between motor abilities and skills, and cognitive performance in children. Different patterns of motor and cognitive development were also observed depending on weight status and sex, with certain differences identified between normal-weight and obese children, as well as between boys and girls. Furthermore, the findings suggest that different physical exercise programs may have specific effects on improving motor and cognitive status. Conclusion: This research highlights the importance of an integrated approach that combines physical activity, motor skill development, and cognitive progress, with the goal of promoting early development and enhancing long-term educational and health outcomes.

S13

Tandem Teaching and Project-Based Learning in Primary Physical Education: A Research Perspective from Slovakia

Gabriela Luptáková[1], Branislav Antala[1]

[1]Comenius University in Bratislava, Faculty of Physical Education and Sport, Slovakia

Background: The quality of primary physical education (PE) is often challenged by inconsistent instructional delivery and varying levels of teacher specialization. This presentation merges two contemporary pedagogical approaches investigated within the Slovak primary school context: team teaching (tandem) configurations and Project-Based Learning (PBL). The objective is to evaluate how these instructional shifts impact students' physical fitness, motor competence (MC), and self-perceived physical literacy (PL). Methods: Two distinct research phases were conducted in the Bratislava region. Phase I utilized a quasi-experimental cluster-randomized trial (N = 266; grades 1–4) comparing five teaching models: single PE teacher (PET), Generalist Teacher + Sports Coach (GT+C), GT+PET, Assistant Teacher + PET (AT+PET), and GT+AT. Assessments included standardized fitness tests, MOBAK subscales, and the PLAYself questionnaire. Phase II was a pilot study (N = 19; grade 4) evaluating a PBL intervention focused on jump-rope choreography, analyzed via paired-samples t-tests. Results: Findings from the tandem teaching interventions indicated that no single model was universally superior. However, configurations involving a specialist PET or assistant support (AT+PET, GT+AT) yielded the most favorable gains in strength and endurance. A significant paradox was observed in the GT+C model: while it supported objective skill development, it resulted in a moderate decline in

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students' self-perceived physical literacy (Δ = -9.16, r = 0.43). Regarding the PBL intervention, results showed significant improvements in rhythmic motor proficiency for the total cohort in both two-foot basic jumps (d = 1.18) and alternating foot steps (d = 0.87), demonstrating the feasibility of achieving rigorous motor objectives through creative, student-led collaboration. Conclusions: The integration of specialist knowledge through collaborative teaching and student-centered PBL offers a robust pathway for improving primary PE. While tandem models involving specialists enhance objective fitness and motor competence, the detrimental impact of coach-led instruction on self-perception suggests that pedagogical expertise is vital for maintaining student motivation. Furthermore, PBL effectively bridges the gap between motor skill acquisition and affective development. These findings advocate for policy shifts toward co-teaching as a standard practice and the broader implementation of PBL to foster holistic physical literacy. Keywords: Primary Physical Education, Tandem Teaching, Project-Based Learning, Motor Competence, Physical Literacy. Acknowledgment: This study is supported by VEGA 1/0748/26: 'Project-Based Learning in Physical and Sports Education and Its Impact on the Motor, Cognitive, and Affective Development of Pupils in Primary and Lower Secondary.

S14

Physical Education and its Innovations: Challenges and Path Forward to the Future

Branislav Antala[1], Gabriela Luptáková[1]

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Today, we confront the "silent epidemic" of sedentary lifestyles and physical inactivity. Just a few generations ago, physical activity was an integral part of daily existence; today, inactivity has become the norm. Physical inactivity is a significant current problem with substantial health, economic, and social consequences. A fundamental question is: what should be done to secure a sustainable future for physical activities, physical education (PE), and school sport? What are the global innovation trends in PE to help eliminate crises in well-being, equality, sedentary lifestyles, and the physical inactivity of children and youth? We consider the most important global PE innovation trends against sedentary lifestyles and physical inactivity of children and youth to be: (1) supporting internationalization; (2) building active schools; (3) focusing on quality PE; (4) developing physical literacy; (5) embracing inclusion; (6) using new technologies and Artificial Intelligence; and (7) implementing holistic educational strategies. Global innovation in PE is marked by a shift towards a more holistic, inclusive, quality, and technologically integrated approach, moving beyond traditional competitive sports to prioritize lifelong health, mental well-being, and personalized learning. This study is supported by VEGA 1/0748/26: 'Project-Based Learning in Physical and Sports Education and Its Impact on the Motor, Cognitive, and Affective Development of Pupils in Primary and Lower Secondary Education.'.

Oral Presentations

O1

Enhancement of perceptual-decisional processes in Karate through the integration of fighting games: effects on reactivity, accuracy, and response control

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The discipline of Karate requires high levels of oculo-manual reactivity, rapid decision-making, and the ability to select effective motor responses within extremely short time frames. Currently, the scientific literature shows a lack of evidence evaluating the impact of competitive digital environments, such as fighting games, on athletes' perceptual-decisional adaptation and on the transfer of these skills to real combat performance. Purpose: The aim of the study is to analyze the effectiveness of a training protocol that integrates structured fighting game sessions in improving oculo-manual reactivity, decision-making speed, response accuracy, and perceptual outcomes compared to an exclusively traditional training program. Methods: The eight-week study involved 60 Karate practitioners, divided into a Control Group and an Experimental Group. Oculo-manual reactivity was assessed using the Reactive Intelligence Wall test, with evaluations conducted at three different time points. At the same time, a perceptual questionnaire based on a Likert scale (1–5) was administered to investigate attention, decision-making readiness, action awareness, and training

transferability. Results: The results showed a significant Group × Time interaction ($p < 0.05$), with the Experimental Group demonstrating a progressive reduction in reaction time from pre- to post-test (from 0.56 ± 0.07 s to 0.48 ± 0.06 s). The Control Group showed no significant changes over time. Perceptual questionnaire scores also increased significantly in the Experimental Group. Conclusion: The integration of fighting games into Karate training promotes positive adaptations in perceptual-decisional processes, objectively improving oculo-manual reactivity in a manner consistent with athletes' subjective perceptions.

O2

A Longitudinal Analysis of Motor Performance Development in School-Aged Youth: A Composite Index Approach

Luboslav Siska[1], Jaromir Sedlacek[1,2], David Stun[2], Jaroslav Brodani[1], Jozef Zentko[1]

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Understanding the developmental dynamics of motor performance during adolescence is essential for evidence-based physical education and youth sport practice. Purpose: The aim of this longitudinal study was to examine the development and determinants of motor performance across lower secondary school years. Methods: 51 pupils underwent anthropometric assessment and completed five motor tests (sit-ups, standing broad jump, medicine ball throw, 50 m sprint, and Cooper test) in the 5th, 7th, and 9th grades. Exploratory factor analyses and Linear mixed-effects models with random intercepts for participants were applied to account for repeated measurements across time. Results: Exploratory factor analysis supported a unidimensional structure of motor performance, with all five tests loading strongly on a single factor (loadings ranging from |0.572| to |0.897|), which justified the creation of a composite motor performance index. In the developmental model without BMI, significant main effects of grade, gender, and sport participation were observed (all $p < .001$), along with significant interaction effects, indicating differences in motor performance across school years and between subgroups. After including BMI as a covariate, most grade and group effects were attenuated, while BMI emerged as a significant predictor of motor performance ($p = .024$). Model comparison demonstrated improved explanatory relevance when BMI was included. Conclusion: Motor performance develops across adolescence and differs according to gender and sport participation; however, BMI plays a central role in explaining these differences. Body composition should therefore be considered when interpreting developmental trajectories of motor performance in school-aged youth. Keywords: physical development, physical fitness testing, performance index, factor, mixed-effects modeling.

O3

Menthol mouthwash improves thermal comfort and perceived exertion without affecting anaerobic performance

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Menthol stimulates cold-sensitive TRPM8 receptors with previous research exploring its ergogenic effect on endurance exercise, while less is known about repeated supramaximal efforts. Purpose: We examined whether repeated menthol mouthwash during recovery alters thermal perception, perceived exertion, body temperatures, anaerobic performance and vastus lateralis EMG activity. Methods: Twenty-six athletes completed two randomized sessions 48-h apart. Each session involved two 30-s Wingate tests separated by 5 a min recovery period, where five 10-s mouthwashes of menthol solution (0.1%) or distilled water (control) were used. Results: Menthol improved thermal sensation and thermal acceptability of the body (all $p< 0.01$) and it attenuated the need for a colder environment ($p= 0.008$). Rate of perceived exertion was also improved ($p< 0.001$). Tympanic and skin temperature were not affected (all $p> 0.05$). Anaerobic performance declined from the first to the second Wingate bout ($p< 0.001$), but menthol didn't affect peak power, mean power, power drop, pedaling cadence, or total work (all $p> 0.05$). Vastus lateralis EMG of the whole epoch or the 10-s intervals were not affected (all $p> 0.05$). Conclusion: Following repeated Wingate tests, menthol made the exercise feel more tolerable by improving thermal acceptability and lowering perceived exertion. Contrary, those perceptual improvements did not translate into measurable changes in power output or in vastus lateralis EMG. Keywords: Menthol, Wingate, thermal comfort, perceived exertion, anaerobic performance, EMG.

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O4

Impact of a Multicomponent Exercise Program on Body Composition, Functional Fitness and Health Perception in Older Adults

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Regular physical activity is considered a key determinant of healthy aging, yet many older adults experience declines in functional capacity and perceived health. Multicomponent exercise programs have been proposed as an effective strategy to address these age-related changes. Purpose: The aim of this study was to evaluate the effects of a structured multicomponent exercise program on body composition, functional fitness, and health perception in adults aged 60 years and older. Methods: Forty-four community-dwelling adults aged 60 years and older participated in a supervised 5-month multicomponent exercise program conducted two times per week (45 minutes per session). The intervention integrated bodyweight exercises, light-resistance training using sticks and light handheld loads, as well as balance, mobility, flexibility, and low-to-moderate intensity aerobic activities. Functional fitness was assessed using the Senior Fitness Test battery, body composition was evaluated through standardized procedures, and health perception was measured using self-reported scales. Pre–post comparisons were performed to examine intervention-related changes. Results: The intervention led to improvements in selected body composition indicators and functional fitness components, particularly those related to lower-body strength, flexibility, and aerobic endurance. Participants also reported enhanced overall perceived health following the program. Additional analyses explored potential sex-related differences in adaptation patterns. Conclusions: Structured multicomponent exercise is a practical and effective tool to support functional independence and perceived health in older adults, underscoring its relevance in community-based healthy aging initiatives.

O5

The effect of Fatigue Induced by Repeated Sprints With Different Deceleration Intensities on Lower Limb Strength and Power in Youth Football Players

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[1] Purpose: This study examined the effects of fatigue induced by two repeated sprinting protocols with different deceleration intensities on lower limb strength and power in youth football players. [2] Methods: Ten male U17 players from the second division performed two repeated sprint protocols, with (25 x 15 m + 5 m deceleration) and without restricted high-intensity deceleration (25 x 15 m + 15 m deceleration). Countermovement jump, drop jump, and maximal isometric hamstring strength at 30 degrees were measured before and after protocols. [3] Results: After both protocols, countermovement jump height and reactive strength index significantly decreased. Moderate effects were observed for contraction time, center of mass displacement, and drop jump variables, but without statistical significance. Maximal isometric hamstring strength showed moderate but nonsignificant changes. No significant differences were found between the two sprint protocols for any measured variable. [4] Conclusion: Repeated sprint exercise induces comparable impairments in lower limb performance regardless of deceleration intensity. Countermovement jump height seems to be a suitable indicator of fatigue, while the drop jump reactive strength index may be more sensitive to high-intensity deceleration loading.

O6

Short Educational Interventions to Enhance Graphomotor Skills in Early Childhood: A Pre-Post Study on a Distributed Sample in Italian pre-schools

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The development of graphomotor skills is a key prerequisite for handwriting acquisition and broader early childhood development. Purpose. This study evaluated the effectiveness of short, targeted educational interventions designed to enhance graphomotor abilities in preschool children, using a distributed sample from three different pre-schools in south Italy. Methods. 47 children aged 3 to 5 years completed a pre-post evaluation using the standardized "Mano alla Forma" (Hand to the Shape) test (Ambrosini, 2023), which assesses Spatial Organization, Graphomotor Organization, and Motor Quality. Interventions lasted 12 weeks and included manipulative tasks, structured graphomotor exercises, and multisensory activities aimed at improving eye-hand coordination, stroke control, and spatial organization. Data were analyzed through descriptive statistics and pre-post comparisons. Results. Findings show significant improvement in global percentile scores and across all domains. The number of children classified as "inadequate" or "at risk" decreased, while those within the "normative" range increased. Improvements were consistent across the distributed sample, indicating effectiveness in different educational contexts. Conclusion. Short, intentional, and replicable educational interventions can meaningfully support graphomotor development in preschool children. Results highlight the importance of integrating graphomotor activities into pre-school curricula and suggest further research with larger samples and more robust methodological approaches to strengthen the emerging evidence base.

O7

Scientific and Educational Roles of Kinesiology: The Italian Model within the European Perspective

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Previous research highlights how sedentary lifestyles and hypokinesia are reshaping socio-health systems. It also emphasizes the strategic role of physical activity in health promotion, disease prevention, and lifelong education. At the same time, regulatory reforms in Italy and Europe are redefining the scientific and professional positioning of kinesiology within sport and exercise sciences. Purpose This study examines the evolution of kinesiology in Italy and its alignment with European research and professional standards to reinforce its scientific and professional role in education and public health. Methods: A documentary analysis was conducted through the systematic examination of primary legislation, implementing decrees, and European databases on professional qualifications. A comparative analysis assessed Italian regulation alongside models in other EU Member States, focusing on university training pathways, certification systems, alignment with European qualification frameworks, and coherence with European Research Council classification schemes. Results: The findings reveal a progressive reduction of historical fragmentation through the establishment of a dedicated scientific-disciplinary grouping in exercise and sport sciences, clearer legal distinction between the kinesiologist and the sport worker, adoption of a specific professional classification code, and increasing alignment with European research domains. This process enhances coherence between research, higher education, and professional regulation. Conclusion: Ongoing reforms contribute to consolidating kinesiology's scientific identity, strengthening professional legitimacy, and promoting harmonization with European standards in research evaluation, qualification recognition, and public health and sport policies.

O8

Precision Exercise Medicine in Rehabilitation: Integrating Phenotype-Based Strategies and Repetitions-in-Reserve for Systemic Health

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Precision Exercise Medicine (PEM) represents a paradigm shift from standardized exercise protocols to individualized prescriptions informed by genetic, epigenetic, and phenotypic characteristics. Skeletal muscle is vital for movement, metabolism, cognition, and immunity. Genetic markers such as ACTN3, ACE-I/D, and MSTN influence strength and endurance responses, while epigenetic modifications mediate long-term adaptation. These insights underscore the need for adaptive training strategies that go beyond traditional one-size-fits-all models. Purpose: This review explores how PEM principles can be applied in training practice through harmonized intensity terminology and adaptive methods. Methods: A narrative literature review was conducted using Embase, PubMed, and Google Scholar. The review summarizes current models explaining training intensity and evaluates practical tools for individualized prescription. Results: Harmonization of intensity terminology supports personalization across training domains. The five-level in-

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tensity model endorsed by ACSM and ESSA integrates perceptual descriptors, Ratings of Perceived Exertion (RPE), and Repetitions in Reserve (RIR). Intensity ranges include very low (≥6 RIR, RPE 6–8), low (4–5 RIR, RPE 9–11), moderate (2–3 RIR, RPE 12–13), high (1–2 RIR, RPE 14–16), and very high (0 RIR, RPE ≥17). These tools enable real-time adjustments based on fatigue, recovery, and systemic goals such as cognitive resilience and immune modulation. Conclusion: PEM shifts exercise prescription from static regimens to adaptive, data-informed strategies. Even without genomic profiling, coaches can apply PEM through phenotype stratification, digital monitoring, and RIR-guided resistance training. Future directions include machine learning for tolerance prediction and broader application in cardiovascular, neurocognitive, and immune health.

O9

Exposure to Individual Peak Match Demands Within a Competitive Microcycle

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This study aimed to quantify individual peak match demands using both a distance-based metric and Player Load across different time windows, and to examine whether training sessions within a competitive microcycle adequately expose players to these demands. Peak demands were also compared between the first and second halves of match-play. Methods: External load data were collected from professional football players using wearable tracking technology. Individual peak demands were identified using rolling 1, 3, and 5-minute windows for a distance-based metric and Player Load. Peak values were calculated separately for the first half, the second half, and the whole match. Training sessions from MD-4 to MD-1 were analyzed using the same methodology. Training exposure was expressed as a percentage of individual peak match demands. Differences across match segments and training days were examined using linear mixed-effects models, with training day or match segment included as fixed effects and player identity included as a random effect. Results: Peak match demands over longer durations occurred predominantly during the first half, with 3- and 5-minute distance peaks approximately 4-7% higher than second-half values. In contrast, 1-minute peaks were similar between halves. Training exposure showed a clear hierarchical structure across the micro cycle. For distance-based demands, MD-3 elicited the highest exposure, reaching approximately 94-97% of peak match values, while MD-4 ranged between 85-90%. MD-2 and MD-1 showed a progressive reduction (approximately 80 to 88 per cent). For Player Load, MD-3 reached approximately 92% to 95% of peak match values, with lower exposure observed on MD-2 and MD-1 (approximately 78% to 86%). Linear mixed-effects modelling revealed a significant effect of training day for 3- and 5-minute Player Load ($p < 0.01$), but not for 1-minute values. Key words: Training load, micro cycle, football, sessions.

O10

Physical Performance in the Last 15 Minutes in a Semi-Professional Italian Football Championship

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In competitive football, maintaining physical performance in the final period (15') of the match is crucial to the final result. Purpose: To assess whether stabilising the weekly training protocol, with comparable structure, volume and intensity, is associated with improvements in physical performance. Methods: Preliminary study with a single group, 15 semi-professional footballers from an Italian Serie D championship were monitored during official matches using GPS technology. Data were compared between the first five matches of the season and a subsequent phase after a training protocol. Two external load volume parameters were analysed: total distance covered and sprint distance (>= 18 km/h for at least 1 s). Pre-post comparisons were performed using paired t-tests. Results: Total distance covered increased by 9% ($p = 0.027$), while sprint distance increased by 51.2% ($p = 0.005$). Conclusion: Considering the positive results and therefore the effectiveness of the training protocol, the study will be continued with the inclusion of a control group.

O11

Classroom active breaks in primary schools: a systematic review of protocols, timing and implementation characteristics

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In recent years, attention has grown on integrating movement routines during the school day to promote more active lifestyles and combat sedentary behavior in children. Scientific literature has focused mainly on the effects of active breaks (AB) on different outcomes, such as physical activity levels, attention, behavior, and learning. However, the description of the protocols effectively implemented in school settings is fragmented and not very systematic. Purpose: The aim was to analyze and describe the AB protocols implemented in primary schools, with particular attention to duration, frequency, type of activities, methods of implementation and context, comparing these characteristics between different countries. Methods: A systematic review of the literature was conducted using the PRISMA 2020 method. The search was carried out in PubMed, Scopus and ERIC databases. Studies were selected by removing duplicates, screening titles and abstracts, and evaluating full texts. Data extraction focused primarily on the characteristics of the AB protocols rather than their effects. Results: A total of 223 records were identified. After removing duplicates and screening titles and abstracts, 46 articles were included for full-text analysis. The results highlighted considerable heterogeneity in AB protocols in terms of duration, frequency, intensity and type of activity, as well as differences related to national and educational contexts. Conclusion: The review aimed to provide an overview of how AB are designed and implemented in primary schools. A systematic description of the protocols will support the development of replicable and contextualized models, useful for educational practice and future research.

O12
Gyrotonic Method in Improving Coronal Imbalance

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Coronal imbalance is a common postural and functional alteration associated with musculoskeletal asymmetries, reduced movement efficiency, and increased risk of pain and injury. Purpose: The aim of this study is to evaluate the Gyrotonic method, which is a movement system that emphasizes three-dimensional spinal mobility, neuromuscular coordination, and controlled resistance. Methods: Thirty participants (n = 30) from the University of Sports, Tirana were enrolled in a 3-month intervention consisting of supervised Gyrotonic sessions performed several times a week. A structured Gyrotonic training program improved coronal imbalance in adults presenting with measurable frontal plane asymmetry. Coronal balance was assessed pre-intervention using standardized postural and biomechanical measurements, along with secondary outcomes including trunk symmetry, range of motion, and perceived functional stability. Results: The data showed statistically significant improvements in coronal alignment after the intervention period. Participants demonstrated reduced lateral trunk deviation, improved symmetry between the right and left sides of the body, and improved neuromuscular control in the frontal plane. Secondary outcomes showed concurrent improvements in movement quality and functional stability, suggesting that postural changes were associated with significant motor adaptations rather than isolated structural corrections. Conclusion: The findings support the effectiveness of the Gyrotonic Method as a non-invasive, movement-based intervention for improving coronal imbalance. By integrating multidirectional spinal movement with controlled muscular engagement, Gyrotonic training appears to address both structural and neuromotor contributors to frontal plane asymmetry. Further research with larger samples and long-term follow-up is recommended to confirm these results and explore clinical applications in rehabilitation and preventive care. Key words; gyrotonic method, posture, training.

O13
Comprehensive Non-Pharmacological Management and Its Effects on Physical Performance in Patients with Chronic Kidney Disease

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Introduction: Chronic kidney disease (CKD) is associated with reduced physical capacity, muscle weakness, and impaired motor performance, contributing to increased morbidity and reduced quality of life. Multidisciplinary non-pharmacological strategies integrating exercise, nutritional counselling, and psychological support may improve functional

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outcomes. This study evaluated the effectiveness of a structured multidisciplinary intervention on motor performance in patients with CKD. Methods: Eleven patients (7 males, 4 females) aged 48–78 years with CKD were included in this prospective interventional study. Motor performance was assessed before and after a 3-month intervention using the standardized SLOFit test battery. The program included supervised exercise twice weekly (60 minutes per session), six visits with a dietitian, and six visits with a psychologist. The exercise protocol emphasized strength, flexibility, and coordination training. Pre- and post-intervention outcomes were compared. Results: After 3 months, significant improvements were observed in waist circumference ($p = 0.038$), curl-ups ($p < 0.001$), and figure-eight running ($p = 0.044$). Non-significant improvements were observed in body mass, flexed arm hang, plate tapping, vertical jump, handgrip strength, and the 6-minute walk test. Overall, positive trends across multiple motor domains were observed. Conclusion: A 3-month structured multidisciplinary non-pharmacological intervention was associated with significant improvements in selected motor performance parameters and waist circumference in patients with CKD. Improvements in trunk muscular endurance and agility suggest that exercise can positively influence functional capacity in this population. The findings support the integration of structured exercise program, in combination with nutritional counselling and psychological support, into routine CKD care to potentially improve long-term clinical outcomes.

O14

Performance Indicators in Elite Croatian Women's Handball: A longitudinal Analysis

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The analysis of performance indicators in modern sport has an increasingly important impact on a better understanding of trends in sports games, including handball. Purpose:The aim of this study was to determine which defensive, offensive, and transition variables influence the final team ranking between successful and less successful teams. Methods:The analysis included a total of 3,044 matches of the First Croatian Women's Handball League (1st HRL) from 2011 to 2020, covering nine competitive seasons. Twenty seven variables describing offensive play, defensive play, transition phases, and goalkeeper performance were analyzed. Teams were classified as successful or less successful according to their final placement in the season. Results: The results showed statistically significant differences between successful and less successful teams in the combination of the observed variables (Wilks' Lambda = 0.42; $p < 0.001$). Out of the 27 variables analyzed, 16 significantly differentiated the observed groups. The most important factor of success were: goalkeeper efficiency ($p=0.00$, $F=63.46$), shooting efficiency ($p=0.00$, $F=58.35$), accuracy of shots from outside positions 9 meters ($p=0.00$, $F=43.03$) and higher number of fast break attempts ($p=0.00$, $F=24.67$). Conclusion:The results of this study should serve as important guidelines for coaches and practitioners and contribute to the systematic development of young female handball players, with the aim of preparing future elite athletes.

O15

Four Paths Through Lifestyle Intervention: A Case Series from the Stop Chronic Kidney Disease Prevention Program

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Purpose: To examine individual response trajectories in a comprehensive lifestyle program for chronic kidney disease prevention and identify factors associated with differential outcomes. Methods: Four participants (2 males, 2 females; ages 44-78; chronic kidney disease stages II-III) were selected to represent partial outcome spectrum. The program combines psychological support, nutritional counselling, supervised exercise, and education. Assessments include body composition, kidney function markers, physical exercise testing and psychological tests. Results: Case 1 (male, 44, post-critical illness, regular cyclist) achieved 9.7 kg weight loss, improved kidney function, proteinuria resolution. Case 2 (male, 56, post-COVID, minimal baseline activity) showed good dietary adherence but experienced hospitalization towards the end of active phase of the program. He gained weight and his kidney function declined. Case 3 (female, 78) achieved improved body composition, resolved proteinuria, and marked anxiety reduction despite modest kidney function decline. Case 4 (female, 50) showed partial progress despite family caregiving disruptions. Conclusion: Outcomes in lifestyle intervention for chronic kidney disease are multidimensional, encompassing weight, kidney function, body composition and function, and psychological wellbeing. Baseline physical activity and medical stability emerged as potential success moderators. Engagement alone did not guarantee positive outcomes.

O16

Effects of eccentric vs traditional resistance training on strength and jumping performance in soccer players: A systematic review with meta-analysis

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Purpose: This study aimed to systematically review and meta-analytically compare the effects of different eccentric resistance training methods with traditional resistance training on performance-related outcomes in soccer players. Methods: A literature search followed meta-analytic guidelines using predefined PICOS criteria. Searches were conducted in PubMed, Web of Science, and Scopus using "(soccer OR football) AND (eccentric) AND (randomi* OR trial* OR control*)". Only randomized controlled trials published in peer-reviewed English-language journals were included. Effect sizes were calculated using Hedges' g and pooled with random-effects models. Results: The pooled analysis showed no significant differences between eccentric and traditional resistance training for improvement of maximal lower-body strength ($g = -0.10$; $p = 0.154$), while eccentric methods were more beneficial for power outcomes ($g = -0.15$; $p = 0.041$). Eccentric interventions demonstrated an advantage over only soccer training for strength ($g = -0.63$; $p < 0.001$) and power ($g = -0.63$; $p < 0.001$) outcomes, regardless of the eccentric resistance training method used. Conclusion: These findings indicate that eccentric training does not confer superior strength adaptations compared with traditional resistance training. However, eccentric-based interventions likely elicit greater power improvements than traditional training and greater improvements of strength and power outcomes than soccer training only. Methodological limitations, related to load prescription and movement tempo standardization, warrant cautious interpretation. Nonetheless, eccentric training should be considered a key component of resistance training, but further high-quality randomized controlled trials are needed to confirm its superiority.

O17

Recreational Exercise Training Improves Balance and Functional Stability in Late Middle-Aged Adults

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Preserving lower limb neuromuscular function during late middle adulthood is critical for delaying functional decline and supporting healthy aging. Purpose: The aim of this study was to examine the effectiveness of a structured recreational exercise program designed to improve static and dynamic balance in adults aged 55-65. Balance plays a central role in maintaining functional independence, reducing fall risk, and supporting quality of life during middle adulthood. Methods: Sixty healthy adults aged 55-65 from Tirana participated in the study and were allocated to two groups with equal gender distribution. The intervention group followed a recreational training program focused on balance development, while the comparison group participated only in testing procedures. The program included specialized balance exercises performed four times per week over a 12-week period. Each session incorporated two to three exercises performed under moderate conditions. Balance performance was assessed before and after the intervention using laboratory-based measurements on the Leonardo Mechanograph platform and functional field tests, including Toe Taps and the Timed Up and Go test. Results: After the intervention period, participants involved in the recreational training program demonstrated improvements in both static and dynamic balance performance. Laboratory assessments indicated enhanced postural control, while functional tests reflected improved coordination and more efficient execution of balance-related tasks in both men and women. Conclusion: A structured recreational exercise program performed over 12 weeks can improve balance and functional stability in adults aged 55-65. Such programs may represent an effective and accessible strategy for promoting active aging and maintaining functional autonomy.

O18

Muscle oxygenation asymmetry between lower limbs in para swimmers with neurological impairment

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Purpose: Near infrared spectroscopy enables non invasive monitoring of muscle oxygenation during exercise, however little is known about limb specific oxygenation patterns in para swimmers with neurological impairments. The aim of this study was to examine differences in muscle oxygenation dynamics between lower limbs in para swimmers with tetraparesis and hemiparesis. Methods: Six competitive para swimmers participated in the study (tetraparesis n=3; hemiparesis n=3). Muscle oxygen saturation (SmO2) of the vastus lateralis was continuously monitored using a wearable NIRS device (Moxy Monitor). Data were collected during a 100 m swimming test and recovery. Variables included desaturation slope, delayed desaturation slope, re saturation slope, baseline SmO2, breakpoint SmO2, minimal SmO2, recovery SmO2, delta desaturation, delta recovery, and breakpoint time. Limb differences were analyzed using the Mann Whitney U test and interpreted with Cohen effect sizes. Results: No statistically significant limb differences were observed ($p>0.05$). However, moderate effects in tetraparesis swimmers were found for desaturation slope (ES=0.67), delayed desaturation slope (ES=0.71), delta desaturation (ES=0.62), and breakpoint time (ES=0.91). In hemiparesis swimmers, the functional limb showed higher baseline SmO2 (ES=0.64) and recovery SmO2 (ES=0.72). A large effect was observed for breakpoint time (ES=2.12). Conclusion: Para swimmers demonstrate limb specific muscle oxygenation responses during swimming. NIRS may provide useful information for individualized training monitoring and rehabilitation in athletes with neurological impairments.

O19

Assistance systems for promoting physical activity of for blind and visually impaired elderly people

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Sport and physical activity are among the most important factors in maintaining independence and preventing degeneration in old age. However, limited or absent vision creates significant barriers to participation. With increasing age, the likelihood of severe visual impairment or blindness rises, making access to movement and exercise more challenging. Purpose: Our project aims to develop accessible assistive technologies that support safe physical activity for older adults with visual impairments. Methods: A participatory, user-centred approach guided the development process. Older adults with visual impairments and members of their social environment were involved throughout all phases. A literature review, qualitative interviews, and a kick-off workshop identified key barriers to physical activity, including complicated touchscreens on fitness equipment lacking haptic feedback, training videos without sufficient audio descriptions, and smartphones or apps that are difficult for the target group to use. These findings informed an iterative co-design process within an open innovation framework. Citizen scientists and students from technical schools contributed to the design and prototyping of assistive systems, with a focus on accessibility, affordability, and ease of use. Results: Several assistive technology prototypes were developed, including a camera-based system providing audio posture feedback, audio-enhanced fitness equipment interfaces, and an interactive exercise mat with pressure sensors, haptic feedback, and Bluetooth connectivity. By emphasizing non-visual interaction, these systems support adapted exercise and balance training. Conclusion: Positive feedback from the target group when using the prototypes suggests that final products will be accepted and used for exercise. Participatory co-design proved effective in creating accessible assistive technologies.

O20

Assessment of Simple and Complex Visual–Motor Reaction Time in Novice Female Boxers

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Reaction time (RT) plays a key factor in boxing. Purpose: To investigate simple (SRT) and complex (CRT) visual-motor RTs in female sport science students starting a short boxing program for novices. Methods: Participants (N=52) were evaluated in two conditions, in both left and right boxing stance, while executing a punch to deactivate a light (Fit-Light™): 1) in SRT, a one-color light required a punch from the lead hand; 2) in CRT, a two-color-coded light prompted a choice between punches delivered with lead or rear hands. Each condition included 12 stimuli, with median RT calculated from 10 valid trials. Results: A 2x2 repeated ANOVA (condition x stance) showed a significant interaction ($p=0.017$), with a shorter RT for SRT ($p<0.001$) and a better performance using the lead hand for right stance in SRT and for left stance in CRT. Furthermore, RT between left and right lead stances and between conditions were highly

correlated. Conclusion: These findings demonstrate that RT was modulated by task complexity and stance side, suggesting that lateralization plays a key role in motor control. Integrating diverse stimulus-response patterns early in training could be essential for optimizing defensive and offensive transitions in female boxers.

O21

Age and Sex Specific Normative Values of Physical Fitness in Kosovar Adolescents Aged 12, 13, 14 and 15 Years

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Understanding public health trends and adolescent development is of particular importance, especially in countries where national reference data on motor performance are lacking, such as Kosovo. The aim of this study was to determine age and sex specific normative values for physical fitness variables, including handgrip strength, standing long jump, backward walking, and the sit and reach test among school-aged students in the Republic of Kosovo, and to compare these values with European reference standards for physical fitness. The study included 1,935 students (997 boys and 938 girls) aged 12 to 15 years, selected from a nationally representative sample. Statistical analyses comprised descriptive statistics, independent samples t-tests, and the calculation of percentile values (P1–P99). The results indicated marked heterogeneity across all motor variables in all age groups. No statistically significant sex differences were observed at ages 12 and 13 in the handgrip strength test, however, from the age of 14 onward, boys demonstrated significantly higher performance levels. Furthermore, significant sex differences were identified between ages 12 and 15 in the standing long jump, backward walking, and sit-and-reach tests, favoring boys. Additionally, percentile results (P1–P99) were compared with the corresponding European physical fitness reference standards. Keywords: adolescents; physical fitness; normative values; statistical analysis; sex differences.

O22

Improving perceptual-decision-making processes in Brazilian Jiu-Jitsu through the integration of fighting games: effects on reactivity and inhibitory control

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In Brazilian Jiu Jitsu, despite the importance of perceptual and decision-making processes for performance, training protocols focus primarily on technical execution and physical conditioning, while structured cognitive training and the use of competitive digital tools remain largely unexplored in this discipline. Purpose: The purpose of this study is to examine the effectiveness of an integrated training protocol combining traditional Brazilian Jiu-Jitsu practice with structured fighting game sessions on visuomotor reactivity, decision-making speed and response accuracy. Methods: Sixty Brazilian Jiu-Jitsu practitioners are assigned to a control group and an experimental group in a controlled eight-week intervention. Both groups perform regular Brazilian Jiu-Jitsu training, while the experimental group additionally completes fighting game sessions designed to stimulate rapid decision making. Reactivity is assessed using a Reactive Intelligence Wall Test. Measurements are collected at pre-, mid- and post-intervention. A five-point Likert questionnaire evaluates perceptual aspects related to decision making. Data are analyzed using repeated-measures ANOVA. Results: A significant group by time interaction is observed. The experimental group shows a progressive reduction in reaction time from pre to post (from 0.58 plus or minus 0.08 s to 0.49 ± 0.06 s), with improvements already evident at mid-test. Response errors decrease by 7 to 8%, while no significant changes were found in the control group. Perceptual questionnaire scores increase significantly only in the experimental group. Conclusion: Integrating fighting games into Brazilian Jiu-Jitsu training enhances perceptual and decision-making performance, supporting the use of digital competitive tools as a complementary cognitive training strategy in combat sports.

O23

Comparative analysis of the performance profile of football and basketball athletes: towards a mapping of the specific conditional model for sport

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Soccer and basketball are team sports characterized by different physical demands, which may influence the development of athletes' main physical qualities over time. Purpose: The aim of the present study was to analyze and compare the performance profiles of soccer and basketball athletes, in order to identify potential differences in the conditional (physical) components associated with the two sports. Methods: The sample consisted of 20 amateur athletes (10 soccer players and 10 basketball players). All participants underwent four performance tests: 20 m sprint, Countermovement Jump (CMJ), Running-based Anaerobic Sprint Test (RAST, Mean Peak Power Output), and Pro Agility Test. Data were analyzed using descriptive statistics (mean and standard deviation). Subsequently, a multivariate analysis was conducted to evaluate the effect of the sport on the set of performance variables considered, as well as to identify the contribution of individual performance components. A predictive regression analysis was also applied to examine the ability of the overall performance profile to discriminate between the two sports. Results: The results showed significant differences in the overall performance profile between soccer and basketball players ($p<0.05$). Specifically, significant differences were observed in linear speed and lower-limb explosive power, whereas anaerobic capacity and agility did not show relevant differences between groups. The predictive analysis indicated that only some performance variables significantly contributed to distinguishing between the two sports ($p<0.05$). Conclusion: The results suggest that the type of sport practiced selectively influences specific components of performance, outlining sport-specific physical profiles that are useful for assessment and training programming.

O24

Anthropometric correlates of motor and technical performance in youth female volleyball players

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Anthropometric parameters are important indicators for evaluating and identifying talent in youth volleyball. During early adolescence, when rapid growth and maturation occur, the development of fundamental sports-specific skills is highly influential. Analysing the relationships between sport-performance indicators can provide valuable insights for volleyball coaches. Purpose: This study aimed to examine the correlation between selected anthropometric characteristics and performance-related skills in U-14 female volleyball players. Methods: Twenty (N= 20) female volleyball players under 14 years old participated in this study. A test battery comprising 5 anthropometric parameter tests, 8 motor skills tests, and 6 technical skills tests was administered in accordance with standardized procedures. Results: The statistical analysis was performed using IBM SPSS Statistics 28. Depending on the variable's nature and distributional properties, the Pearson correlation coefficient (p-value) or Spearman's rank correlation coefficient (rho) was applied. Conclusions: The statistical analysis generally shows no significant correlations between anthropometric indicators and the motor or technical skills of volleyball players. Strong significant correlations ($rho > 0.6$; $p < .05$) were observed between the standing long jump and height, standing reach, and block reach, as well as between spiking and height, standing reach, and block reach. A strong but statistically significant negative correlation was found between the running vertical jump with weight and BMI ($rho = -0.59$; $p < .00$). Understanding this correlation helps coaches optimize the training program to enhance sports performance. Keywords: correlations, anthropometric parameters, technical skills, motor skills, volleyball performance.

O25

Sport Events and Tourism Seasonality in Emerging Coastal Destinations: Evidence from Albania

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Sport events are increasingly considered strategic tools for destination marketing and tourism diversification. Purpose: Tourism seasonality is a major challenge for coastal destinations, where visitor arrivals are concentrated during summer months. This study examines whether sports events can help reduce tourism seasonality in emerging tourism destinations.

The research focuses on Albania, where tourism has grown rapidly but continues to show strong seasonal demand patterns. Methods: The study uses an exploratory research design based on secondary data analysis. Monthly tourism arrivals for 2018 to 2025 were compiled from official national tourism statistics. Information on major sports events was collected from event organizers and publicly available sources. The analysis compares tourism seasonality with the timing of major sports events. Results: Tourism demand in Albania is strongly concentrated between June and August. In contrast, major sports events such as the Tirana and Durres Marathons are held in spring and autumn. These events attract international participants and increase destination visibility during periods of lower tourism demand. Conclusion: Sports events may help reduce tourism seasonality by attracting visitors outside the peak tourism period. For emerging coastal destinations, integrating sports events into tourism strategies may support more balanced tourism activity throughout the year.

O26

Institutional change in sport higher education: implementing a tailored 4I gender equality plan

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Purpose: To describe the design and early implementation of a gender equality plan tailored to a sport faculty, and to explain why a context-specific plan is needed for effective, sustainable, and accountable institutional change. Methods: Within the Horizon Europe project SUPPORTER, the faculty conducted a gender equality audit and used a participatory process (analysis, reflection, implementation) to co-design an intersectional, innovative, inclusive and impactful (4I) plan for 2025-2030. Participants included academic staff, researchers, students, administrative staff, and external stakeholders. Results: Baseline data indicated imbalances by role and in decision-making. Academic staff were 64% men and 36% women; researchers 31% men and 69% women; technical and administrative staff 43% men and 57% women. Senior leadership was predominantly male, and some committees had no women members. Priority measures include systematic data collection with annual reporting, support for equal opportunities in recruitment and career progression, balanced representation in committees and leadership, confidential contact persons and anonymous reporting channels, training to recognize harassment and bias, and integration of gender equality topics into coach education. Conclusion: A sport-specific 4I gender equality plan can guide measurable institutional change and support safer, more inclusive academic and sport environments.

O27

Integrating Biological Monitoring for Performance Optimization in Football: From Elite Practice to Emerging Systems

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Monitoring physiological responses and biomarkers in elite football players is associated with improved performance, reduced injury risk, and optimized recovery, while informing coaching decisions and supporting player well-being. Applying these evidence-based protocols in emerging football systems can bridge the gap between research and practice, fostering capacity building and sustainable athlete development. Purpose: This review aims to synthesize current literature on biomarker-based monitoring in elite football, highlighting practical protocols for blood, saliva, and urine analyses, and exploring their adaptation for emerging football systems. Methods: The keywords "football", "biomarkers", "performance", "monitoring", "recovery", and "athlete health" were used to search PubMed, Web of Science, and Scopus. Studies published from 2015 to 2025 reporting biomarker monitoring for training load, fatigue, recovery, immune function, and nutritional status were considered. Results: Elite clubs integrate biomarker monitoring with external load and perceptual measures. Common markers include CK, CRP, cortisol, testosterone, IgA, ferritin, and vitamin D. Sampling is structured across pre-season, in-season, congested fixtures, and injury/return-to-play periods. Individualized monitoring enables early detection of fatigue or overload, guiding tailored interventions. Emerging systems can adopt these practices via structured collaboration among clubs, universities, and medical centers. Conclusion: Implementing biomarker-based monitoring can optimize performance, enhance recovery, and reduce injury risk. Translating elite practices into emerging systems requires evidence-based frameworks, multidisciplinary collaboration, and capacity building to support scientific integration and the sustainable development of football players.

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O28

Health Literacy, Physical Literacy, and Physical Activity: A Structural Comparison of Exercising and Non-Exercising Older Women

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Purpose: Health literacy, physical literacy, and physical activity are critical, interrelated factors influencing healthy aging, yet their structural relationships remain understudied in older female populations. The purpose of this study was to examine the structural differences in the relationships between health literacy (HL), physical literacy (PL), and physical activity (PA) among older females. The aim was to determine how these relationships vary between individuals who engage in regular exercise and those who do not. Methods: A total of 62 females aged 60 and above were recruited and categorized based on their exercising status (exercising vs. non-exercising participants). All participants completed validated assessments measuring HL (via the validated Croatian version of the European Health Literacy Survey Questionnaire)), PL (via the Perceived Physical Literacy Questionnaire for South Eastern Europe), and PA (via the Nordic Physical Activity Questionnaire – short version). The correlation matrices were calculated for each subgroup, and then compared. Results: The results revealed notable structural differences between the two groups. Exercising participants exhibited stronger and more integrated associations among HL, PL, and PA, while in the non-exercising group, only the correlation between HL and PA reached statistical significance. Conclusion: In conclusion, these structural differences suggest that regular physical activity may enhance the interplay between health-related competencies, underlining the importance of exercise in supporting comprehensive health promotion strategies for older adults.

O29

Comparison of on-ice and off-ice 20 m sprint velocity characteristics in male ice hockey players across different playing ages and competetive levels

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Linear speed is a key performance determinant in ice hockey, yet no studies have compared continuous on-ice and off-ice velocity profiles across multiple playing age or competitive levels. Purpose: This study examined continuous velocity curves and discrete time and velocity variables during 20 m sprints performed on ice (skating) and off ice (running) across three competitive levels. Methods: Sixty male ice hockey players (A-Team n = 20, U20A n = 20, U20B n = 20) completed maximal 20 m sprints in both conditions using a motorized resistance device. Bayesian analyses were used to investigate continuous velocity profiles and discrete variables. Results: Running profiles were consistently higher across all groups compared to skating, particularly during early acceleration (P(diff) ~85%), although probabilities of practically meaningful differences (P(diff > SWC) ~11%) indicated uncertainty across the curves. Discrete split times, in contrast, showed stronger evidence (P(diff) = 73–99%) for between-condition differences, confirming that time-based metrics detect certain differences. Between-group comparisons of both continuous and discrete data displayed directional trends consistent with competitive hierarchy, with the strongest evidence observed between adults and lower-level late adolescents for continuous velocity metrics (P(diff > SWC) ~47%). However, the lower probabilities of meaningful differences indicate uncertainty in interpretation. This suggests that continuous profiling may primarily capture individual variability often obscured by discrete outcome measures. Conclussion: Practitioners should therefore rely on discrete metrics for routine team-level monitoring, while using continuous velocity profiling for individualized, phase-specific assessment. Integrating both approaches across longitudinal testing is recommended to support comprehensive performance evaluation and training prescription.

O30

Reinjury incidence and characteristics across six seasons in elite youth cadet football players

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Purpose: The main aim of this study was to describe the incidence, severity and characteristics of reinjuries across six consecutive seasons in an elite youth football academy in the U-17 category. Methods: A prospective injury database from one elite football academy was analysed over six seasons, from 2016/2017 to 2022/2023. All time loss injuries in U-17 (Cadets) players were classified by injury type, body region, mechanism, occurrence during training or match, and reinjury status. Injury incidence was expressed as number of injuries per 1000 hours of exposure while severity was presented as days lost from training and competition. Reinjury rate was calculated as the proportion of reinjuries among all recorded injuries and within each injury category, specifically for injury types and body sites. Results: A total of 331 injuries were recorded, of which 52 were classified as reinjuries, representing 15.7 percent of all injuries. The highest reinjury rates by injury type were observed for concussion (50.0 percent), dislocation or subluxation (26.8 percent), fracture (25.0 percent), and meniscus or cartilage lesions (18.2 percent). However, these results need to be considered with caution, as there were low number of primary injuries in these categories. Muscle injuries have rate of 15% of reinjuries indicating that approximately every sixth muscle injury occurs on the same muscle. The highest reinjury proportions by body region were identified in the shoulder or clavicle (40.0 percent), hand or fingers (25.0 percent), ankle (22.0 percent) and head or face (18.2 percent). Median time loss was higher for reinjuries compared with primary injuries (15 vs 10 days), while mean severity was similar between groups. Conclusion: Reinjuries accounted for a substantial proportion of injuries in elite under 17 football players and were associated with meaningful time loss. Identification of injury types and body regions with higher recurrence supports the need for structured rehabilitation, specifically tailored preventive programs and objective return to play criteria.

O31

Association between Undernutrition and Age at Menarche in Adolescent Girls: A Cross-Sectional Study

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Purpose: Age at menarche is a key indicator of female pubertal development and is strongly influenced by nutritional status. Undernutrition during adolescence may delay pubertal maturation and affect reproductive development. The aim of this study was to evaluate the association between undernutrition and age at menarche among adolescent girls. Methods: A cross-sectional study was conducted among 77 adolescent girls. Anthropometric measurements including weight and height were obtained and body mass index was calculated as kilograms per square meter. Information on menarche status and age at menarche was collected through structured questionnaires. Participants were categorized according to nutritional status based on body mass index. Results: Menarche had occurred in 65 participants (84.4 percent), while 12 girls (15.6 percent) had not yet experienced menarche. The mean age at menarche was 11.29 years. Early menarche at 10 years of age was observed in 16.9 percent of participants, and 58.5 percent experienced menarche at or before 11 years of age. Among girls without menarche, 66.7 percent were classified as underweight, while 33.3 percent had normal body mass index. Conclusion: Undernutrition appears to be associated with delayed menarche and altered pubertal timing. These findings highlight the importance of adequate nutritional status during adolescence for normal pubertal development.

O32

Time to exhaustion at the respiratory compensation point intensity in young competitive cyclists

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Durability in cycling refers to the capacity to maintain a high physiological workload despite increasing fatigue during extended exercise. In cycling, the respiratory compensation point (RCP) represents a high aerobic intensity that is often used to prescribe training and evaluate endurance capacity. Purpose: The purpose of this study was to describe the physiological traits of young competitive cyclists and to examine the relationship between power at the RCP obtained during an incremental cycling test and the duration of a constant-load test

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performed at this intensity. Methods: The incremental protocol started at 100 W with increments of 20 W•min^{-1} until volitional exhaustion. Power at RCP and maximum power output were determined from respiratory and ventilatory variables during the incremental test. The constant-load test was performed at the workload corresponding to RCP until exhaustion, with a body height of 177.7 ± 5.7 cm and a body mass of 65.3 ± 6.2 kg. Results: Mean power at the respiratory compensation point was 306 ± 13 W, corresponding to 4.64 ± 0.28 W•kg^{-1}, while maximum power output reached 408 ± 21 W. Consequently, RCP occurred at 75.0 ± 1.8% of maximum power output. During the constant-load test at RCP intensity, the time to exhaustion averaged 21.8 ± 11.7 minutes. Considerable inter-individual variability in tolerance to this workload was therefore observed. Conclusion: The average duration of exercise at this intensity was about 22 minutes, aligning with previous studies on exercise tolerance near the upper heavy or lower severe intensity range (20–30 min). These results support the use of RCP-based workloads as a practical marker for assessing high-intensity endurance performance and durability in competitive cyclists.

O33

Heart Rate Responses to Variations in Arm Movement Amplitude During Low- And High-Intensity Aerobic Exercise

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The aim of this study was to examine the effects of different arm movement amplitudes combined with low-intensity (LO) and high-intensity (HI) aerobic steps on heart rate (HR). The sample consisted of 18 participants who performed four predefined choreographic sequences representing different combinations of arm and leg intensity (LO–LO, HI–LO, LO–HI, HI–HI). Heart rate was measured immediately after each sequence. The results demonstrated a progressive increase in HR with increasing movement intensity. The highest HR values were recorded when both arms and legs were performed at high intensity, whereas the lowest values were observed when both segments were performed at low intensity, logically. However, changes in arm intensity had a greater influence on HR increase compared with changes in leg intensity, particularly when leg movements were performed at low intensity. The scientific contribution of this study lies in the fact that differences in heart rate responses across specific combinations of aerobic choreography sequences—especially with respect to arm movement amplitude—have not previously been clearly established. In conclusion, larger arm movement amplitudes combined with high-intensity aerobic steps produce the greatest cardiovascular load. These findings may be applied in the design of aerobic training programs and in tailoring exercise intensity to achieve safe and effective cardiovascular stimulation.

O34

Participation in open-skill sports is not sufficient to promote visuomotor functions in 10- to 15-year-old pupils

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Open-skill sports tend to improve perceptual-cognitive and visuomotor functions of children due to their dynamic and changing nature. It remains unclear whether these sport-specific adaptations occur from early childhood. Purpose: To investigate differences in visual search speed and hand-eye coordination in pupils aged 10 to 15 years according to the type of sport activity. Methods: A total of 178 pupils were classified as open-skill sports, closed-skill sports, physically active, or non-active participants. The visual search task (VST) and hand-eye coordination tasks were performed under simple (HECS) and distractor conditions (HECD). ANCOVA was conducted with sport type as the primary factor, while age and sex were covariates. Results: Type of sport activity did not significantly influence VST or HECS performance (effect sizes = .003-.02), while performance under distractor conditions approached significance ($p = .06$, effect size = .05). In contrast, age emerged as a consistent predictor across all measures, with the strongest effects in average VST speed (effect size = .14) and HECD performance (effect size = .12). Conclusion: Participation in open-skill sports is not sufficient to improve visuomotor functions compared with other types of activity in 10- to 15-year-old pupils. Maturation remains crucial for perceptual-cognitive and visuomotor development.

O35

Health Literacy for Health Promotion Is Positively Associated with Chronic Illness in Active Older Women

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Purpose: Health literacy, defined as the ability to access, understand, and use health-related information, is a key determinant of health outcomes. While regular physical activity contributes to the prevention and management of chronic illness, the role of health literacy in already active populations remains insufficiently explored. This study aimed to examine the association between health literacy and chronic illness in women engaged in regular physical exercise. Methods: A cross-sectional study included 56 women aged over 60 years who were regular participants in outdoor recreational exercise. Health literacy was assessed using a validated instrument, while chronic illness status (yes/no) was obtained through self-report. Logistic regression analysis was applied to examine the association between health literacy (predictor) and the presence of chronic illness (criterion). Results: A significant positive association was observed between the health literacy subscore "applying information related to health promotion" and the presence of chronic illness (OR = 1.07, 95% CI: 1.01–1.16). This finding indicates that women with chronic illness reported a greater ability to apply health-related information in the context of health promotion compared to those without chronic conditions. No other health literacy domains were significantly associated with chronic illness. Conclusion: These findings suggest that specific dimensions of health literacy, particularly the ability to apply health-related information, may be enhanced among physically active women with chronic illness. Interventions should consider domain-specific approaches to health literacy to further support disease management and promote healthy aging in this population. Keywords: health promotion, chronic disease, motor activity, women.

O36

The Role of Physiotherapy and Nutrition Knowledge in Injury Prevention in Female Handball Players

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This study examines the association between sports injuries among female handball players competing in the First Croatian Handball League and the influence of nutrition knowledge on the occurrence of sports injuries. Purpose: The aim was to determine the impact of nutrition knowledge on the incidence of sports injuries during the training and competition period. Methods: A cross-sectional quantitative survey was conducted with 198 female handball players (aged 17–35 years) from 12 clubs in the First Croatian Handball League. Data were collected using the validated NOKYA nutrition knowledge questionnaire and a physiotherapy questionnaire. All injuries sustained during the season were included. Statistical analyses included the Mann–Whitney U test and chi-square tests. Results: A significantly higher injury rate was observed among athletes ($p = 0.018$ and $p = 0.029$) who were not aware that the main meal should be consumed three to four hours before physical activity or who incorrectly believed that vitamins and minerals are a primary source of energy. The dominant leg (left) was significantly more frequently injured during one competitive season compared with the right leg and showed a higher overall number of injuries. Conclusions: Female handball players, despite being actively engaged in sport, lack sufficient basic nutrition knowledge important for performance, injury prevention, recovery, and long-term health. An integrated approach including preventive exercise programs, sports nutrition, and collaboration with physiotherapists and nutritionists may contribute to the health of female handball players. Individualized approaches according to athletes' specific needs and characteristics are essential. Keywords: female athletes; handball; injuries; education; performance; nutrition.

O37

„Your greatest ability is availability" - an observational study of subjective monitoring during two competitive seasons in professional volleyball players

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Purpose: The purpose of this study was to evaluate the effectiveness of subjective monitoring on subsequent availability in

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training and matches in professional volleyball players. Methods: Twenty nine professional volleyball players participated in this study across two competitive seasons. They were monitored daily by two subjective monitoring tools: 1) a subjective wellness questionnaire to assess players' subjective readiness to train; 2) a novel (covering more extended information regarding training exertion) session rating of perceived exertion (sRPE) scale to assess players' individual and team internal training load. Also, an additional data was tracked during that period: 1) players' availability in trainings and matches; 2) the causes of players unavailabilities. Results: The players' subjective readiness to train did not differ between two competitive seasons ($p = 0.513$), but their training load was significantly higher in season 2 than in season 1 ($p = 0.004$). In both seasons the players' availability to train was very high - 95.6% (93.7% in season 1; 97.4% in season 2). The use of daily subjective monitoring also allowed to limit long-lasting unavailabilities (longer than 28 days) to three with only one severe, season-ending injury. Conclusion: Data collected in this study suggests that the use of daily subjective monitoring may be an effective strategy for high players' availability and to limit the number of injuries throughout the competitive season.

O38

Acute effects of pre-exercise end-expiratory breath-holding on physiological responses in trained athletes

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Purpose: The aim of this study was to examine the acute effect of a pre-exercise breathing protocol based on end-expiratory breath-holding on physiological and ventilatory responses to high-intensity anaerobic exercise in trained athletes. Methods: Eight trained athletes completed a single-group crossover experiment under experimental and control conditions separated by at least 5 days. After a standardized warm- up, participants performed either a 5 min breathing protocol consisting of six cycles of 20 s end-expiratory breath-holding followed by 30 s controlled breathing, or quiet breathing in the control condition. This was followed immediately by a Cunningham-Faulkner treadmill test to exhaustion. End-tidal carbon dioxide, heart rate, oxygen saturation, and capillary blood lactate were measured repeatedly from baseline to 8 min post-exercise. Results: A significant group x time interaction was found only for end-tidal carbon dioxide ($p < 0.001$), indicating a specific effect of the breathing protocol on ventilatory regulation. End- tidal carbon dioxide was lower after the breathing protocol (T2, $p = 0.042$) and immediately after exercise (T3, $p = 0.019$) in the experimental condition. Delta analysis confirmed a strong effect from T1 to T2 ($p = 0.002$; $d = -1.88$). Oxygen saturation was higher at T2 ($p = 0.020$), while heart rate and lactate showed no significant interaction effects. Conclusion: A short pre-exercise end-expiratory breath-holding protocol altered end-tidal carbon dioxide dynamics without significant changes in other physiological variables. These findings suggest an acute modulatory effect by ventilatory regulation on PETCO2 levels.
Keywords: end-expiratory breath-holding, end-tidal carbon dioxide, high-intensity exercise, ventilatory response.

O39

Effect of low-load resistance exercise on cognitive performance in healthy young adults

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High-load resistance exercise has been shown to have beneficial effects on cognitive functions. But older adults, untrained and individuals with health limitations find it difficult to perform high-load resistance exercise. Purpose: The main purpose of this study was to investigate acute effects of low-load resistance exercise (LLRE) on cognitive functions. Methods: Ten healthy, moderately active, randomly selected young adults were included in the study. Each participant performed control (seated rest) and LLRE (40% 1RM) protocol, at least 7 days apart in randomized order. Exercise protocol included bench press, leg press and lat pulldown performed (3 sets to failure, 2-min break). Cognitive performance was assessed with Stroop Color and Word test. Fatigue was assessed using Visual Analogue Scale and Fatigue Severity Scale. Results: ANOVA for repeated measures results showed a statistically significant main effect of time for the Color score ($F1,9=5.51$, $p=0.044$, $\eta^2_p=0.380$) and its T-score ($F1,9=5.19$, $p=0.049$, $\eta^2_p=0.366$) after exercise, not after control. Word and Color-Word score did not improve after any protocol. Fatigue scores did not differ between conditions, nor were correlated with Stroop test performance. Conclusion: The findings suggest that single LLRE may have improved visual recognition and verbal naming, possibly due to increased enhanced temporo-occipital region activation. LLRE therefore have a potential to beneficially effect cognitive functions but further researches for underlying mechanisms and with older population are needed.

Poster Presentations

P1

Relationships Between Strength, Reactive Ability and Deceleration Performance in Elite Female Soccer Players: A Pilot Study

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Deceleration ability is one of the key components of speed performance in soccer. There is a lack of information about neuromuscular determinants in elite female soccer players. Purpose: We aimed to examine the relationships between acceleration-deceleration ability test (ADA)—maximal deceleration velocity (MDV), deceleration distance (DD), and deceleration time (DT)—with linear sprints (10 m, 20 m, 30 m), the 505 agility test, isometric exercises associated with early (EDS) at 160° and late (LDS) at 110° deceleration subphases, hip adductor/abductor strength, hamstring strength, and explosive tests (CMJ, DJ). Methods: Tests performed 12 female 1st league soccer players (age: 21.20 ± 3.48, weight: 63.2 ± 4.44 kg, height: 171.0 ± 5.03 cm) during winter off-season. Pearson's r were calculated. Results: Maximal strength of EDS was significantly correlated with MDV ($r = -0.69$, $p < 0.05$). The 505 was associated with MDV ($r = -0.70$, $p < 0.05$) and DD ($r = 0.71$, $p < 0.01$). RSI correlated negatively with DD ($r = -0.73$, $p < 0.01$), while adductor RFD showed a positive correlation with MDV ($r = 0.64$, $p < 0.05$). Conclusion: These findings suggest that EDS could be one of the significant determinants of the deceleration performance in elite female soccer players.

P2

Analysis of the relative age effect (RAE) in football goalkeepers of different competition levels in Bosnia and Herzegovina

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Purpose: The aim of the study is to examine the relative age effect (RAE) based on the year of birth in football goalkeepers in Bosnia and Herzegovina. The respondents are goalkeepers of different competition levels: First rank - Premier League of BiH (N=24), second rank - First League of FBiH (N=30) and First League of RS (N=36), third rank - Second League of FBiH South (N=31). The research used data from the 2024/25 season. Methods: Data were taken from the official website of the National Football League of BiH, Comet and SofaScore websites. According to the date of birth, the distribution was made by quarters (Q1-Q4): Q1 (January-March), Q2 (April-June), Q3 (July-September) and Q4 (October-December). The frequency of goalkeepers by quarters as well as the differences in the frequency of frequencies between quarters were analyzed using the Chi-square test. The statistical package SPSS 26 was used for data analysis, and the significance level was $p<0.05$. Results: The results of the analysis showed uneven distribution of the month of birth, with a slight dominance of players born in the first and fourth quarters of the year. The number of goalkeepers born in the first and fourth quarters is higher than the number born in the other quarters at the first and second levels of competition, while at the third level this number is uniform across quarters. The conducted Chi-square test did not show a statistically significant difference at all levels of competition: first level ($\chi^2=1.000$, $p=0.801$), second level ($\chi^2=4.667$, $p=0.198$), third level ($\chi^2 =2.677$, $p = 0.444$), as well as at the global level ($\chi^2 =1.810$, $p=0.613$). Conclusion: The results show that the effect of relative age among football goalkeepers in BiH is not sufficiently pronounced to be considered a decisive factor in the selection process. Keywords: Football, relative age effect, goalkeepers.

P3

Prevalence of Overweight and Obesity and Their Association with Socio-Economic and Demographic Factors among Adults in Kosovo

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Purpose: The purpose of this study was to assess the prevalence of overweight and obesity among adults in Kosovo and examine their associations with selected socioeconomic and demographic factors. Methods: The sample included 1,508 adults aged 18-64 years from urban and rural areas in all seven regions of Kosovo. Body weight and height were measured directly, and body mass index (BMI) was calculated according to World Health Organization (WHO) criteria. Socioeconomic and demographic variables included gender, age group, educational level, employment status, income level, marital status, place of residence, altitude, and region. These data were collected using a standardized questionnaire. Data were analyzed using descriptive statistics, and associations between BMI categories and socioeconomic and demographic factors were examined using the Chi-square test. Statistical significance was set at $p \leq 0.05$. Results: Overall, 49.4% of participants were classified as overweight or obese. Statistically significant associations were observed between BMI status and gender, age group, educational level, employment status, place of residence, altitude, marital status, income level and region ($p \leq 0.05$). A higher prevalence of overweight and obesity was observed in males, older age groups, individuals with lower educational attainment, unemployed participants, residents of rural areas and married individuals. Conclusions: Overweight and obesity are highly prevalent among adults in Kosovo and are significantly associated with socio-economic and demographic factors. These findings indicate the need for comprehensive, equity-oriented public health strategies that aim to address the social and environmental determinants of obesity. The results provide valuable evidence to inform policy development and targeted interventions to reduce obesity-related health inequalities in Kosovo. Keywords: Obesity; overweight; body mass index; socio-economic factors; adults; Kosovo.

P4

Differences in anthropometric indicators, physical performance, and academic achievement among third-, fourth-, and fifth-grade students: Preliminary data

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Understanding how physical growth and motor performance relate to academic achievement during early school years is essential for supporting children's overall development. Purpose: The aim of this study was to examine differences in anthropometric parameters, physical performance, and academic achievement among third-, fourth-, and fifth-grade students. Methods: The variables analyzed included body mass, height, waist circumference, BMI, handgrip strength (right, left, and total), beep test performance, and academic results in mathematics, language, and physical education. Results: The results of the ANOVA analysis revealed statistically significant differences between groups for body mass ($p = .011$), height ($p < .001$), handgrip strength ($p < .001$), and beep test performance ($p < .001$). Post-hoc analyses (Bonferroni) showed that fifth-grade students had higher body mass and strength values compared to third-grade students, while height increased progressively across grades. In the beep test, fourth-grade students demonstrated lower performance compared to the other groups. No statistically significant differences were found for waist circumference, BMI, or academic achievement indicators ($p > .05$). Conclusion: These findings suggest that physical development and motor performance change significantly with age/grade level, whereas academic performance remains relatively stable. As preliminary data, these results highlight the need for further studies with larger samples and more advanced analyses to better understand the relationships between physical development and academic achievement in school-aged children.

P5

Perturbation based training vs multicomponent exercise in adults aged over 70 years: Effects on strength, balance and walk speed

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Falls represent a major public health concern in older adults and are strongly associated with reduced strength and balance capacity. Purpose: The aim of this study was to compare the effects of an 8 week perturbation based adapted physical activity program with a traditional multicomponent exercise program in adults aged over 70 years. Methods: 61 women were randomly allocated to perturbation training (PT, n: 32) or multicomponent training (MT, n: 29). Both groups trained for 8 weeks, two sessions per week, 45 minutes per session. The PT group performed progressively unpredictable tasks including environmental and mechanical constraints, water inertial load

and visual limitation. The MT group performed light to moderate multicomponent exercises without systematic perturbations. Functional performance was assessed using 30 Second Chair Stand Test, 8 Foot Up and Go Test, Single Leg Stance Test, 3 Metre Backward Walk Test, Tandem Walking Test and Arm Curl Test. Results: PT showed significant improvements across all outcomes ($p<0.001$), whereas MT demonstrated limited or no progress in tasks. Conclusion: An 8 week perturbation based program produced broader and more consistent improvements than traditional multicomponent exercise, supporting the inclusion of non anticipable and ecologically valid tasks in fall prevention programs for older.

P6

Randomized Evaluation of the Effectiveness of the "GRAPPLER QUEST" Training Program in Improving the Special Fitness of Brazilian Jiu-Jitsu Athletes

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Special fitness is a unique ability of an athlete to function effectively within their sport discipline. Despite the growing popularity of innovative training interventions aimed at functional development in combat sports, scientific evidence confirming their effectiveness in the context of Brazilian Jiu-Jitsu (BJJ) is still limited. Purpose: The aim of this study was to evaluate the effectiveness of the experimental Grappler Quest (GQ) training program on the special fitness of BJJ athletes and to examine the relationships between training experience (TE) and the training effect. Methods: A randomized controlled trial was conducted with 44 competitively trained BJJ athletes. Participants were randomly assigned to an experimental group (EXP; n=22) or a control group (CON; n=22). An 8-week parallel training stimulus was applied: the experimental GQ training program in the EXP group (small circuit stations including resistance, plyometric, and gymnastic exercises) and a standard BJJ training cycle in the CON group. The special fitness profile was assessed before and after the intervention by analyzing results from selected specific tests: the Special Brazilian Jiu-Jitsu Fitness Test – Takedown Zone (SBJJFT–TZ) and the Specific Jiu-Jitsu Anaerobic Performance Test (JJAPT). Additionally, relationships for the GQ intervention were examined in terms of TE. Results: Between-group comparisons of isolated training effects showed significant changes in the special fitness profile in favor of the EXP group. The strongest effect was observed for: Round 1 throws (effect size d_c=1.04), total throws (d_c=0.77), and cross-sectional special fitness indices (d_c= 0.68) in SBJJFT–TZ, as well as Round 1 (d_c=0.66), Round 3 (d_c=0.71), and indices in JJAPT (d_c=0.77) (all $p<0.05$). Within-group comparisons showed the same multidimensional improvement trend in the EXP group. This was most pronounced for the number of throws in Round 1 ($\tilde{x}$=0.68 repetitions), total throws performed ($\tilde{x}$=1.00), and indices (mean improvement $\tilde{x}$=−3.96) (all $p<0.001$) in SBJJFT–TZ, as well as the number of butterfly lift techniques in Round 1 ($\tilde{x}$=0.91) and indices ($\tilde{x}$=−0.21) in JJAPT (all $p<0.05$). No such magnitude of training effect was observed in the CON group. In the EXP group (both tests), strong negative relationships were observed between TE and technical progress (r_s from −0.43 to −0.76; $p< 0.05$ or $p<0.001$). In contrast, strong positive relationships were found between TE and recovery heart rate (r_s=0.53, p=0.011 in SBJJFT–TZ; and r_s=0.71, $p<0.001$ in JJAPT), as well as indices (r_s=0.70; r_s=0.71; all $p<0.001$). Conclusion: GQ promoted improvements in the special fitness of BJJ athletes, and its effectiveness was, in most cases, more strongly associated with progress among athletes with shorter training experience. The GQ strategy is recommended as an effective supplement to the BJJ training process. Both JJAPT and SBJJFT–TZ confirmed its usefulness for objective monitoring of changes in the level of special fitness in the examined BJJ athletes. Keywords: combat sports, flagship ground grappling, experimental intervention, special endurance, specific tests.

P7

Isokinetic Strength and Functional Contractility Asymmetries of the Lower Limbs in Youth Elite Football Players

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Football is characterized by unilateral movement patterns in which limb dominance influences mechanical load distribution. Purpose: The study will aim to determine the magnitude and characteristics of strength and functional contractile asymmetries of the lower limbs in elite youth football players. Methods: Players were assessed at the

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start of the competitive period. Bilateral asymmetries of knee flexors and extensors were evaluated using isokinetic dynamometry in concentric mode (60°/s, 180°/s, 300°/s) and eccentric mode (30°/s). Functional contractility of rectus femoris, vastus medialis, biceps femoris, and semitendinosus was assessed by tensiomyography (Tc, Dm, Vc). Statistical analyses used parametric or non-parametric tests (α = 0.05). Results: Significant bilateral differences were found in concentric knee flexor strength at 60°/s (p = 0.017), 180°/s (p = 0.010), and 300°/s (p = 0.002), with small effect sizes (d = 0.155 – 0.230), indicating a dominance effect. No significant differences were observed in concentric extensor or eccentric strength. Undesirable asymmetry (≥ 15%) was more prevalent in hamstrings than quadriceps (9.3 – 48.8%). In contractility, a significant difference was detected only in semitendinosus Dm (p = 0.015). Although Tc and Vc were not significant, undesirable asymmetry (≥ 20%) occurred in 18.6% (rectus femoris, vastus medialis) and 55.8% (biceps femoris). Conclusion: Young elite football players have a high prevalence of undesirable bilateral asymmetries, particularly in concentric hamstring strength.

P8

Challenges in Diagnosis and Management of Soleus Muscle Tears

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Introduction: Injuries to the soleus muscle are often unrecognised, which increases the risk of complete tearing. Consequently, it results in the need for a long break in sports. This is mainly because the soleus muscle is complex, and the clinical signs of injury are difficult to capture, which can mimic Achilles tendinopathy and tennis players' calves. This muscle has a complex connective tissue structure with three intramuscular tendons, which makes it challenging to interpret pathological muscle conditions. Injuries to the soleus muscle can be acute or chronic and are usually considered minor discomfort by both the patient and the sports medicine physician, leading to a relatively quick return to sports activity with a high risk of re-injury. Goal: The purpose of this literature review is to present the diagnostic challenges and reasons for treatment failure associated with soleus muscle injuries and describe the appropriate treatment for these injuries. Methods: Literature review with a case description of soleus muscle injury and a comprehensive proposal for conservative treatment. Results: This case report of a soleus injury highlights the significant diagnostic and treatment challenges. Injuries to the soleus muscle are often unrecognised, increasing the risk of complete ruptures and requiring prolonged recovery periods in athletes. The complexity of the soleus muscle, with its intricate connective tissue and three intramuscular tendons, complicates clinical diagnosis because symptoms can mimic conditions such as Achilles tendinopathy. Both acute and chronic injuries are often underestimated, leading to premature return to sports and a high risk of re-injury. The review highlights the urgent need for standardised diagnostic protocols and treatment strategies, as current practices lack comprehensive guidelines. High-resolution ultrasonography and magnetic resonance imaging are recommended for accurate diagnosis, in addition to physical examination. Treatment of soleus muscle injuries should be a multifaceted approach that includes physiotherapy, advanced physical and injection therapies, and, if conservative treatment fails, surgical intervention. Keywords: calf muscle rupture; post-traumatic physiotherapy; sports medicine.

P9

The Effect of Dynamic Cognitive Training on Reaction Time and Decision-Making in Combat Sports: A Systematic Review

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Dynamic cognitive training is increasingly investigated as an approach to enhance reaction time and decision-making in sports requiring rapid perceptual–motor responses, particularly combat sports.Objective: This systematic review aimed to evaluate the effects of dynamic cognitive training on reaction time and decision-making in combat sports athletes.Methods: The review was conducted in accordance with the PRISMA guidelines and registered in the PROSPERO database (CRD420261304873). A systematic search was performed across Web of Science, Scopus, ScienceDirect, ProQuest, and SportDiscus. A total of 526 records were identified, and after removing 136 duplicates, studies were

screened according to predefined inclusion criteria for the final analysis. The research was funded by Grant Agency for Doctoral Students and Young Researchers of the University of Prešov . Results: The findings indicate that dynamic cognitive training may improve reaction time and decision-making accuracy in combat sports athletes. However, substantial methodological heterogeneity was observed across studies, including differences in training interventions, sport disciplines, participant characteristics, and assessment tools, which limits the strength of conclusions.Conclusion: The available evidence is promising and supports the integration of dynamic cognitive training into combat sports training programs. Nevertheless, further high-quality research with standardized protocols is required to confirm these effects and establish optimal training strategies.

P10

The Impact of Physical Activity Level on the Psychophysical Well-Being of Children Aged 8–12 in Accordance with World Health Organization (WHO) Guidelines

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Purpose: The purpose of this study was to examine the impact of physical activity levels on the psychophysical well-being of children aged 8–12 years, in accordance with World Health Organization physical activity guidelines. Methods: The sample included 1,675 children aged 8–12 years from urban and rural areas. Data were collected using a structured questionnaire aligned with World Health Organization recommendations. Physical activity compliance was defined as engaging in at least 60 minutes of moderate-to-vigorous physical activity on five or more days per week. Descriptive statistics were used to summarize the data, and associations between physical activity compliance and selected behavioral, environmental, and social factors were examined using the chi-square test. Results: Only one quarter of the children met the recommended levels of physical activity. Higher physical activity compliance was significantly associated with lower screen time, more frequent participation in extracurricular sports activities, access to safe play spaces, and stronger family or school support. Children who participated regularly in organized sports and those with supportive environments were more likely to meet physical activity recommendations and report positive psychophysical well-being. Conclusion: The findings suggest that physical activity behavior in children aged 8–12 years is shaped by a combination of behavioral, environmental, and social factors. Promoting structured sports participation, reducing sedentary screen time, and ensuring supportive and safe environments may play a key role in enhancing both physical activity levels and psychophysical well-being in childhood. Keywords: Physical activity; Psychophysical well-being; Children; Sedentary behavior; WHO guidelines.

P11

Artistry and Aesthetics in Rhythmic Gymnastics: A Philosophical and Historical Review (1990-2026)

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Purpose: This review examines how gymnastics, with emphasis on rhythmic gymnastics, has evolved from a primarily technical sport into an artistic practice where movement functions as aesthetic expression. It highlights philosophical foundations, pedagogical approaches, social meanings of the gymnastic body, and differences between audience and judge perception, including the role of subjectivity in artistry evaluation. Methods: A narrative review and thematic synthesis of more than twenty scholarly sources published between 1990 and 2026 was conducted. Literature was organized into four periods (1990-2000, 2000-2010, 2010-2020, 2020-2026) and analyzed across themes: philosophy of movement, performativity and choreography, artistic component, perception of artistry, and judging subjectivity including judge-related psychological factors and emerging technological influences. Results: Findings indicate a clear shift from aesthetics of form to aesthetics of expression. Artistry is increasingly treated as trainable through choreography, musical interpretation, and embodied communication, yet remains partly irreducible to measurement. Discrepancies persist between lay viewing (emotional and holistic appraisal) and judging (rule-based criteria), while judge experience and affective characteristics contribute to variability. Recent work also points to growing use of video analysis and digital tools, raising new questions about objectivity. Conclusion: Contemporary gymnastics increasingly operates at the intersection of sport and art. Artistry is best understood as a relational phenomenon shaped by performer, observer, and evaluation system, rather than a fully objective property of performance.

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P12
Martial Arts of the Far East and Christian Ontology

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Purpose: The purpose of this paper is to analyze the relationship between the philosophical foundations of Far Eastern martial arts and the Christian ontological understanding of the human person. The study examines how traditional ethical principles embedded in martial arts practice can be interpreted within the framework of contemporary combat sports and Christian moral thought. Today's combat sports represent a simplification of martial arts. The acceptance of the original principles of a specific martial art should be based on the fact that it is not automatically a combat sport, whereas every combat sport represents an articulated martial art. Those originating from the Far East became particularly popular in the late 20th and early 21st centuries, during which they acquired a dominant sports orientation. Method: The study predominantly employs conceptual and theoretical analysis of the philosophical principles underlying Far Eastern martial arts and their transformation into modern combat sports. It relies on a comparative philosophical approach that considers the ethical framework of Eastern traditions—specifically the teacher-student relationship rooted in Confucian social ethics—and interprets it in relation to Christian ethical and ontological perspectives. Results: The study is based on the premise that the points of convergence between the philosophical foundations of Eastern martial arts and the Christian conception of the human being (who practices these skills) are inevitably found in the individuals managing the process—namely, the teacher/coach. One of the vital canons of Far Eastern martial arts philosophy concerns the respect for the teacher-student relationship (relying primarily on the postulates of Confucian social ethics). This relationship of mutual respect operates within traditional relations: supreme teacher (sensei) – senior teacher (senpai) – junior teacher (kohai) – student (seito). In the light of Christian ethics, this is nothing other than the relationship between the one who leads and the one who is led. In this sense, the coach (teacher) emerges as an inseparable and most significant part of combat sports practice—a person who possesses methodological knowledge and transmits it to the athletes. The analysis shows that, although modern combat sports are largely structured according to contemporary sports systems and competitive frameworks, their philosophical roots remain closely linked to the traditional values of martial arts. Thus, the central point of convergence between Far Eastern philosophy and Christian anthropology is the pedagogical relationship between teacher and student. This relationship functions as a moral and educational channel through which discipline, respect, responsibility, and personal development are transmitted to practitioners within the training process. Conclusion: Although most of today's combat sports, which are popular and mass-accepted by youth, are ontologically grounded in the martial arts of the Far East, their common denominator is their adaptation to sporting principles and values. In the broadest sense, this implies the dominance of educational and pedagogical components as the outcomes of the training process (alignment with proclaimed social values and norms). It is essential that moral principles, as the foundation of combat sports—especially those originating from the skills and philosophy of the Far East—be woven into the character building of individuals engaged in combat sports. Traditional martial arts principles, which involved a system of training to prepare the body and mind for real combat, should ideally be interpreted in accordance with the era in which they exist. In this context, it can be concluded that contemporary combat sports, despite their strong orientation toward competition and sports regulation, retain an important ethical and educational dimension inherited from traditional martial arts. The coach or teacher plays a key role in harmonizing these philosophical and ethical elements within modern sports practice. When interpreted in line with today's social values, the traditional principles of martial arts can contribute to the holistic development of the individual, integrating physical training with moral and educational shaping. Keywords: combat sports, philosophy of sport, Christian ontology.

P13
How match demands change with age in youth football goalkeepers?

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This study aimed to examine age-related differences in match-play physical demands imposed on youth football goalkeepers competing in U17 and U19 categories. Match data were collected across one competitive half-season from official elite-level fixtures (U17: 10 matches; U19: 12 matches) using wearable global positioning system technology. A comprehensive set of variables was analysed to capture both locomotor and mechanical components of performance, including running distances at different intensities, frequency of high-intensity accelerations, diving actions, jumping activity, explosive efforts. Differences in physical demands between the U17 and U19 age categories were examined using an independent-samples t-test. Effect sizes were calculated using Cohen's d (d). Results revealed greater overall

running volume during match play in U17 compared to U19 category (d) = 1.23). Conversely, substantially higher mechanical demands, as evidenced by a greater number of total dives (d = 1.67) and high-load diving actions (d = 1.03) were found in U19 compared to U17 category. These outcomes indicated a clear shift in the physical profile of goalkeepers with increasing age, whereby locomotor volume decreases while mechanically demanding, high-impact actions became more prevalent. From an applied perspective, the findings emphasised the need for developmentally appropriate training strategies in youth goalkeeping. Specifically, preparation of U19 goalkeepers should incorporate targeted and progressively overloaded dive-specific drills to enhance mechanical load tolerance and resilience. Collectively, this work reinforced the importance of age-specific monitoring frameworks that recognise the evolving balance between locomotor and mechanical demands across youth goalkeeper development pathways. Keywords: match performance, soccer, goalkeeping-specific, physical demands, maturation.

P14

Analysis of the End of Ball Possession by Field Zones in Football

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Ball possession analysis examines how, where and why a particular team came into possession or lost possession of the ball (Franks & Hughes, 2016). Analysis of ball possession is a valuable tool for sports scientist and coaches to develop strategies and tactics for future matches. However, there is limited research that examines the loss of ball possession in particular field zones. Hence, this study aimed to determine the frequencies of lost ball possession examines this in relation to different field zones. Data was collected throught video analysis of all seven games of the 2014 World Championship played by the German National team and recorded ball possession in one of the four field zones. Descriptive analysis and paired sample t-tests were used to determine the differences between the individual field zones in the representation of the loss of ball possession. Our findings indicate that the highest number of loss of ball possession was in the opponents end of the field zone D 439 (44.21%), and lowest the players own end of the field zone A 68 (6.85%). Paired sample t-tests indicated statistically significant differences in the representation of the loss of ball possession between all four field zones ($p < 0.05$). Findings from this study provide important information for football theorists, sport scientists, coaches, players, and other key stakeholders. Keywords: attack phase, football, coaching, ball possession, field zones.

P15

Comparison of External Load Between In-Season Training Sessions and Home Competitive Matches in Professional Basketball Using Kinexon Tracking

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Abstract: Monitoring external load in basketball can help practitioners determine whether training adequately reflects match demands. This study compared absolute and relative external load variables between in-season training sessions and home competitive matches in professional basketball using the Kinexon local positioning system. A retrospective quantitative observational design was used. Data were collected from 39 training sessions and 14 home matches between 4 October 2025 and 5 February 2026. Absolute variables included Distance, Mechanical Load, Accumulated Acceleration Load, and Decels Load. Relative variables included Distance per minute, Exertions per minute, and Fast Court Transitions per minute. Independent-samples t-tests were used, with Welch's t-test and Mann-Whitney U as confirmatory procedures where appropriate. No significant differences were found in absolute workload variables between training sessions and matches: Distance (36,233 ± 11,145 vs 36,077 ± 9,305 m; $p = .963$), Mechanical Load (14,264 ± 4,076 vs 12,590 ± 3,239 AU; $p = .172$), Accumulated Acceleration Load (4,038 ± 1,177 vs 3,609 ± 919 AU; $p = .223$), and Decels Load (10,781 ± 3,090 vs 9,522 ± 2,453 AU; $p = .175$). In contrast, matches produced significantly greater relative intensity: Distance per minute (63.5 ± 3.84 vs 49.5 ± 7.66 $m \cdot min^{-1}$; $p < .001$), Exertions per minute (1.54 ± 0.209 vs 0.867 ± 0.271; $p < .001$), and Fast Court Transitions per minute (0.842 ± 0.0797 vs 0.289 ± 0.167; $p < .001$). These findings suggest that training sessions replicated total external workload volume but did not reproduce the relative intensity and transition density of match play. Relative external load metrics should be prioritized when evaluating training-match equivalence in professional basketball. Keywords: basketball; external load; Kinexon; training load; match demands.

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P16

Attitudes towards diet as predictors of physical activity in Croatian students: insights using multiple regression

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Given academic obligations and financial status, students often face difficulties in maintaining healthy eating habits and are more susceptible to reduced levels of physical activity. Accordingly, the aim of this study was to examine whether attitudes toward healthy eating habits among students predict physical activity. In line with this objective, a newly constructed questionnaire on attitudes toward healthy eating habits and physical activity was administered to a sample of (N = 549). Using multiple regression analysis, a significant model for predicting physical activity was generated (R^2 = .126; $p < 0.001$), and the item "It is important to me that the food I usually eat keeps me healthy" proved to be the best predictor of physical activity ($b = 0.41$; $p < 0.001$). The results indicate the clear fact that students' physical activity is a multidimensional construct, with attitudes toward nutrition being only one of its predictors. Furthermore, the findings implicitly point to the importance of structuring educational programs for the student population focused on physical activity in order to encourage healthier behavior and improve students' quality of life. The research results may provide guidelines for enhancing the quality of student life by influencing their attitudes, which may affect both physical activity and eating habits. Keywords: healthy eating habits, quality of life.

P17

Effectiveness and Safety of Dry Needling: A Comparison of Hong's Technique and Sustained Needling with an Analysis of Adverse Events

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Objective: The aim of this presentation is to present the results of two studies investigating the effectiveness and safety of dry needling (DN). The first study compares two DN techniques—Hong's technique (GH) and the sustained needling technique (GS). The second study analyzes the frequency and characteristics of adverse events related to DN as reported by Polish physiotherapists. Methods: In a randomized controlled trial involving 30 participants, the effects of GH and GS techniques on muscle tone and stiffness, pressure pain threshold, tissue perfusion, and muscle strength were compared. In a survey study including 102 physiotherapists, the frequency of mild and serious adverse events associated with DN practice was assessed. Results: The GS technique demonstrated greater therapeutic effectiveness by increasing pressure pain threshold, reducing muscle tone and stiffness, and improving function compared to the GH technique, which was associated with more irritative reactions and a higher frequency of adverse events. The survey study confirmed that DN is generally a safe intervention, with the most common adverse events (bleeding and transient pain) being mild in nature. Serious complications, such as pneumothorax or nerve injury, were reported to be very rare. Conclusions: The sustained needling technique (GS) may be a preferred form of DN due to its more favorable effectiveness and safety profile. The integration of findings from both studies indicates that dry needling, when performed correctly and in accordance with safety principles, is an effective and safe tool in the management of myofascial pain.

P18

Active School: Qualitative level of selected factors of health-related fitness in pubescent pupils

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Health reflects the overall functional state of the body; therefore, the level of health-related fitness plays an important role in the lifestyle of school-age children. Purpose: The aim of the study was to determine and analyse the level of physical and functional development, as well as posture quality in pubescent pupils within the Active School, as these factors

form part of health-related fitness and contribute to quality of life in terms of supporting pupils' health. Methods: The sample consisted of N = 579 lower secondary school pupils (ISCED 2) from Central Slovakia. Data collection involved standardized tests and procedures for physical education practice, focusing on the monitored factors (somatometry, functional development and posture). Results: The findings significantly show that in boys, an increase in body weight was recorded between the ages of 12 and 14, whereas in girls this increase occurred one year earlier (between the ages of 11 and 14). A significant increase in BMI in boys was observed between the ages of 12 and 15, while in girls it was recorded in the age of 13. In terms of functional development, girls achieved lower functional fitness than boys. Overall, both sexes exhibited low to very low levels of functional fitness. More than half of the pupils were classified as having Grade III or IV (poor) posture. Conclusion: The findings point to a deteriorating state of (physical) health, as well as to the importance and preventative monitoring of pupils' health within the framework of the Active School programme.

P19

Impact of Training Program on Elite Female Basketball Players in Albania

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The aim of the study is to evaluate the impact of a twice-weekly training program on endurance and strength components in elite female basketball players. Method: A total of 28 elite female basketball players were selected from 2 sports associations in Tirana, Albania and randomly divided into two groups: the experimental group (EXG n = 14; 24.07 ±2.1 years; body height 173.07 ±5.3 cm; body weight 70.99 ±8.5 kg and BMI kg/m2 21.24 ±1.6%) and the control group (COG n = 14; 25.3 ±5.3 years, body height 175 ±4.9 cm; body weight 65.48 ±9.7 kg and BMI kg/m2 21.4 ±2.5%). EXG developed a twice-weekly training program for 16 weeks. Both groups were assessed before and after on the parameters; Body Composition (BC) in the variable (Body Fat-BF%, from the BODPOD® system, landing jump (SJ), counter-movement jump (CMJ) using GFRP "Leonardo" and 505 Agility, 20 m Multi-Stage Run with photo finish. Results: Data analysis showed differences between groups before and after the variables SJ-Pmax, CMJ-JH, Distance Run/m and VO2max ($P < 0.05$). Conclusion: This study highlights the practical applicability of this training model, providing coaches with a time-efficient framework for designing short-term, sport-specific training programs aimed at developing endurance and strength. However, the limited sample size may reduce statistical power, suggesting that future research with larger groups is needed to confirm and generalize these results. Keywords: Body composition, jump, training, basketball elite, agility.

P20

Confidence and Physical Competence Show Opposing Associations with Chronic Illness in Active Older Women

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Purpose: Physical literacy (PL), encompassing motivation, confidence, physical competence, and knowledge to engage in physical activity (PA), is an important determinant of health. While PA is known to support the prevention and management of chronic illness, less is understood about the role of PL in already active populations. This study aimed to examine the association between PL and chronic illness in women engaged in regular physical exercise. Methods: A cross-sectional study included 56 women aged over 60 years who were regular participants in outdoor recreational exercise. PL was assessed using a validated multidimensional instrument, while chronic illness status (yes/no) was obtained through self-report. Logistic regression analysis was applied to examine the association between PL subdomains and total score (predictors) and the presence of chronic illness (criterion). Results: Significant associations were found for the physical competence domain (OR = 1.06, 95% CI: 1.01–1.18) and the confidence domain (OR = 0.94, 95% CI: 0.89–0.98) with the presence of chronic illness. These findings indicate that women with chronic illness reported higher levels of confidence but lower perceived physical competence. Conclusion: These results suggest that different domains of PL may play distinct roles in the experience of chronic illness among physically active older women. Interventions aimed at improving physical competence, alongside maintaining confidence, may enhance health outcomes in this population. Keywords: physical fitness, health status, self-report, logistic models, outdoor recreation.

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P21

Does Physical Literacy Moderate Acute Mood Responses to Recreational Exercise in Older Females?

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Purpose: Physical literacy (PL), encompassing motivation, confidence, physical competence, and knowledge related to physical activity, is recognized as an important determinant of lifelong engagement in physical activity. However, limited evidence exists regarding whether higher levels of PL influence the magnitude of acute mood responses before and after recreational physical activity in older females. Therefore, the aim of this study was to evaluate the association between PL and mood state assessed before and after outdoor recreational physical exercise (ORPE). Methods: The sample consisted of 44 females aged 60 years and older. Participants took part in three sessions of ORPE. PL was assessed at baseline, and mood state was measured immediately before (pre) and after (post) each session using the Brunel Mood Scale (BRUMS). Pearson's correlation coefficients were calculated to examine the associations between PL and BRUMS scores. Results: Significant positive correlations were observed between PL and post-exercise BRUMS scores ($r = 0.45–0.67$, $p < 0.01$). In contrast, PL was not significantly associated with pre-exercise BRUMS scores ($r = 0.02–0.11$). Conclusion: Higher levels of PL appear to be associated with more favorable acute mood responses following outdoor recreational physical exercise in older females. These findings suggest that PL may enhance the psychological benefits of exercise in later life and should be considered in the design of recreational physical activity programs for older women.

P22

Acute Effects of Recreational Outdoor Physical Exercising on Mood State in Older Females

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Purpose: Current evidence consistently demonstrates that acute bouts of physical activity (PA) produce immediate improvements in affect, mood state, and psychological well-being; however, studies have rarely examined the specific acute effects of PA in older females. Therefore, this study aimed to evaluate the acute effects of recreational PA performed in a natural outdoor ("green") environment on mood state in older women. Methods: A total of 41 females aged 60 years and older participated in the study. Participants completed three sessions of recreational PA organized in a public park. The sessions were conducted at 9:00 AM, 11:00 AM, and 4:00 PM. Mood state was assessed immediately before and after each session using the Brunel Mood Scale (BRUMS). Repeated-measures analysis of variance (ANOVA) was applied to examine pre–post differences across the three exercise sessions. Results: The ANOVA revealed significant pre–post improvements in mood state across all three sessions, indicating favorable acute effects of recreational PA in older females. The most pronounced improvements were observed following the 11:00 AM session. Conclusion: Recreational PA performed in a public park setting appears to be effective in acutely enhancing mood state among older females. Further research is warranted to investigate long-term effects and to explore factors that may influence the magnitude of these effects, such as weather conditions, climate, and environmental characteristics.

P23

Ski Course as a Comprehensive Educational Intervention

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Purpose: The study examined the effects of a comprehensive educational intervention implemented through a school ski course on group climate dynamics and pupils' perceptions of curative group processes in education. Methods: The sample included 19 primary school pupils (12.6 ± 0.8 years) who attended a five-day ski course as part of the physical and sport education curriculum. Besides learning and improving skiing skills, the program integrated experiential pedagogy principles and digital technologies (Garmin wearable devices and the Garmin mobile application). Group cli-

mate was assessed using the Group Climate Questionnaire – Short Form (GCQ-S), and beneficial group processes were evaluated post-course using the Curative Climate Instrument (CCI). Pre- and post-intervention differences were analysed using the Wilcoxon signed-rank test ($\alpha = 0.05$). The study was conducted within the projects VEGA 1/0689/26, Digital Competence in Physical and Sport Education in the Context of the Innovated National Curriculum and KEGA 007PU-4/2024, Making the teaching of outdoor activities in secondary education more attractive in the spectrum of curriculum teaching and interdisciplinarity. Results: A significant change was found in GCQ-S Engagement ($p = 0.00$; $r = 0.183$). Conflict and Avoidance improved but were not significant. The CCI showed favourable ratings, especially in Cohesion. Conclusions: Despite the small sample, the intervention improved group climate, particularly engagement and cohesion. A ski course enriched with experiential pedagogy and digital technologies fosters positive group processes among pupils.

P24

Longitudinal changes in CPET Performance and Body Composition in Competitive Rowers Across an Annual Training Cycle

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Purpose: The aim of this study was to examine longitudinal changes in body composition and aerobic performance parameters across three distinct phases of the annual training cycle in competitive rowers, and to determine whether seasonal transitions, including an active off-season period, influence physiological adaptations. Methods: Five competitive rowers were assessed at three time points over one competitive year: at the beginning of the season, prior to the competitive period, and following an active recovery period at the end of the season. Body composition variables were obtained using bioelectrical impedance analysis, including muscle mass, skeletal muscle mass, fat mass, percentage body fat, total body water, and related relative indices. Aerobic performance variables were assessed via spiroergometry and included maximal oxygen uptake (VO_2max) and maximal power output reached during the test (Wattmax). Changes across time were analysed using Friedman repeated-measures ANOVA. When significant effects were detected, pairwise comparisons were conducted using the Wilcoxon signed-rank test. Effect size was calculated using Kendall's coefficient of concordance (W). Results: A significant effect of time was observed only for maximal power output (Wattmax) ($p = 0.03$), with a large effect size (Kendall's $W = 0.68$). Post hoc analysis revealed a significant decline between the pre-competitive and post–active recovery measurements ($p = 0.04$), whereas no significant difference was found between the beginning of the season and post–active recovery time points. No significant longitudinal changes were detected for VO_2max or any body composition variables. Conclusion: Across the annual training cycle, maximal power output demonstrated sensitivity to seasonal transitions, particularly following the active recovery phase, while aerobic capacity and body composition remained stable. These findings suggest that neuromuscular and anaerobic performance may be more susceptible to short-term detraining effects than aerobic and morphological characteristics in trained rowers.

P25

Assessment of Explosive Strength in U16 Basketball Players in Tirana, Albania

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Our goal in this study is the assessment of explosive strength in U16 basketball players in Tirana, Albania. Countermovement jump (CMJ) is one of the most often used basketball moves. This component evaluates explosive strength with the reuse of elastic energy. Method: No. 90 young boys' basketball players were randomly selected into the experimental group (EX-No. 47 aged 16.2 ± 0.2) and the Control group (CO-No. 43 aged 16.1 ± 0.1). Both groups underwent anthropometric measurements: Body Height (BH), Body Weight (BW) and the Countermovement jump test (CMJ) with the GRFP instrument "Leonardo", which evaluates jumping from the center of gravity of the body. Tests were conducted before and after the implementation of the training program with the EX-group for 8 weeks with three blocks of exercises. Results: Descriptive statistics resulted in BH (EX -178.5 cm) and BH (CO 177.6 cm), BW (EX 72.7 kg) and BW (CO 74.2 kg) and CMJ improvements were observed in EX-JH 0.05m after training, while the control group had a decrease in JH of 0.01m. Conclusion: These data are of great interest for the basketball training process. Due to the limited investigations conducted in boys' basketball in Tirana, Albania, future studies are still needed, especially regarding

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the longitudinal effects of training prescription according to player positions. Coaches should standardize their work in terms of both explosive strength improvement and short- and long-term training monitoring. Keywords: boys', basketball, jump, training, explosive.

P26

Convergent Validity of Frontal Split on an Elevated Surface Test in Rhythmic Gymnasts

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Purpose: The frontal splits on an elevated surface test have been used in the field for years; however, psychometric properties have been underexamined. The current study aimed to examine the convergent validity of the frontal split on an elevated surface test in rhythmic gymnasts. Methods: Fifty-six rhythmic gymnasts aged 13.63±2.25 years, highly trained at the national level or elite at the international level, were included in the study. Mean gymnastics experience was 7.83±2.39 years, and mean training hours per week were 14.03±6.78. The flexibility of gymnasts was assessed using three tests: a frontal split on an elevated surface, both with a tape measure and a goniometer; a forward bend on a bench; and a frontal split with hand support in standing. Correlations with related constructs and group differences (preferred limb, competition tiers) have been examined. Results: The frontal split on an elevated surface test, measured with a tape measure at maximum foot height, demonstrated good convergent validity ($p<0.001$) in rhythmic gymnasts, whereas the goniometer assessment of the same test was unreliable in the hypersplit positions ($p\geq0.05$). Conclusion: The frontal split on an elevated surface test with a tape measure provides validated, practical, FIG-aligned field screening for talent identification and monitoring; a goniometer is unsuitable for advanced rhythmic gymnastics flexibility. Keywords: flexibility, rhythmic gymnastics, convergent validity.

P27

Analysis of the intensity of physical exertion in wing foiling on waves - a case study

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Wing foiling is one of the newest summer sports that, like windsurfing and kitesurfing for gliding over the water surface or flying, uses the force of the wind. In the past, studies have been conducted on physical exertion in windsurfing and kitesurfing; however, we have not yet found any such research on wing foiling. Purpose: The aim of the paper was to determine the intensity of physical exertion in wing foiling on waves. We analyzed the exertion intensity for wing foiling in the case of a 48-year-old recreational wing foiler. Data were collected from June 25 to July 25, 2024, in the Punta del Médano area on the island of Tenerife across 20 measurements. We collected data with a Suunto Baro 9. Physical exertion intensity was examined in terms of average heart rate (beats/min), energy expenditure (kcal), average and maximum speed (km/h), and measurement distance (km). We determined effort levels with respect to duration (s) and proportions (%). Results: Findings show that wing foiling in very strong winds of 28–34 knots with very high waves (3–5 m) exhibited characteristics of moderate-intensity effort. In strong winds of 24–28 knots with high waves (2–3 m), wing foiling showed characteristics of moderate-intensity physical exertion. In moderately strong winds of 18–24 knots with pronounced waves (1–2 m), wing foiling exhibited characteristics of high-intensity effort. Conclusion: We assess that the intensity of physical exertion in wave wing foiling for an individual in good or excellent physical condition depends strongly on conditions (especially wave height and wind speed) and on their technical skill. The findings can benefit anyone who wishes to prepare deliberately and systematically for wave wing foiling.

P28

Swimming Instruction Through Ability Grouping: A Structural Analysis of Pedagogical Efficacy

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Purpose: Questions of pedagogical efficacy in physical education, especially regarding how students are grouped for instruction, remain central to designing effective curricula for skill-based learning. This study explores the qualitative effects of ability-based grouping in college-level swimming education. Methods: A pre-post experimental design was implemented, involving two student cohorts: an experimental group that received swimming instruction through homogeneous ability grouping (n = 54), and a control group taught through heterogeneous grouping, regardless of initial swimming proficiency (n = 58). Both groups underwent standardized assessments of swimming abilities and technical knowledge at the beginning and end of the course, and the ability grouping was based on swimming abilities. Fisher's r-to-z transformation were used to compare correlation matrices between groups at pre- and post-testing. Results: Initial (pre-test) analyses revealed comparable correlations between swimming ability and technique across both groups. However, post-test findings demonstrated a more homogeneous internal structure within the experimental group, suggesting that ability grouping may foster more aligned development across skill and knowledge domains. Conclusions: These results imply that differentiated instruction based on initial competencies can enhance coherence and potentially improve pedagogical effectiveness in physical education settings. Knowing the importance of swimming skills in everyday life, further studies in younger participants and non-swimmers are warranted.

P29

Start Phase Performance in 50 m and 100 m Freestyle: Distance- and Gender-Related Differences in 11–12-Year-Old Competitive Swimmers

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The start phase substantially contributes to sprint swimming performance. Purpose: This study aimed to investigate distance- and gender-related differences in start phase performance between 50 m and 100 m freestyle in 11–12-year-old competitive swimmers. This research was supported by VEGA 1/0595/26. Methods: A total of 120 swimmers (60 boys, 60 girls) who competed in both race distances were analyzed. Start phase variables included block time (BT), flight distance (FD), underwater distance (UWD), start time (ST), and split times to 10 m, 12.5 m, and 15 m. Normality of paired differences (100–50 m) was assessed using the Shapiro–Wilk test. Paired t-tests or Wilcoxon signed-rank tests were applied for within-group comparisons, and Welch t-tests or Mann–Whitney U tests for gender comparisons. Results: No significant distance-related differences were observed in boys ($p > .05$), indicating stable start characteristics across race distances. In girls, significant differences between 50 m and 100 m were found for BT ($p = .044$), UWD ($p = .013$), and split times to 10–15 m ($p \leq .001$), reflecting greater distance-related adjustments in early race phases. Between genders, significant differences were identified in the 50 m event for FD, ST, split times, and total performance ($p \leq .004$). In the 100 m event, gender-related differences were observed in UWD, SD, ST, split times, and total performance ($p \leq .016$). Conclusion: Distance-related adaptations of start performance were evident only in female swimmers, whereas consistent gender-related differences were present in early race phases across both distances.

P30

Neuromuscular Adaptations in Junior Water Polo Players: Changes in Time to Peak Force and Vertical Performance

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Vertical performance in water polo requires not only high force output but also rapid force generation under aquatic resistance conditions. Purpose: This study investigated whether Time to Peak Force (TTP) may serve as a sensitive neuromuscular indicator of vertical performance in junior water polo players. Methods: Junior athletes (U16 and U18) were assessed pre- and post-8-week training in experimental (n = 14) and control (n = 3) groups. In-water force was measured with an EasyForce dynamometer, vertical displacement with Xbox Kinect, and TTP defined as time to peak force during the vertical eggbeater. Normality was checked with Shapiro–Wilk, and Wilcoxon signed-rank tests were applied. Results: The experimental group demonstrated a significant reduction in TTP following the

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intervention (0.6 ± 0.1 s to 0.4 ± 0.1 s; Z = −2.889, p = 0.004; r = 0.77), indicating a large effect size. No significant changes were observed in the control group (0.5 ± 0.1 s to 0.6 ± 0.1 s; p > 0.05). Improvements in TTP were associated with enhanced vertical displacement measured via motion capture. Conclusion: Time to Peak Force appears to be a sensitive and practically relevant indicator of neuromuscular adaptations following training in junior water polo players. Monitoring TTP may provide added value beyond maximal force assessment when evaluating vertical performance in aquatic sports. Keywords: vertical jump, lower limb, neuromuscular adaptations, water polo players, time to peak force.

P31
Determinants of Competitive Success in Czech National Taekwon-do ITF Athletes

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Purpose: The aim of this study was to identify physiological determinants of competitive success in athletes of the Czech national Taekwon-do ITF team using laboratory testing and multivariate statistical modelling. Methods: Twenty-two elite athletes (12 women, 10 men) completed anthropometric, aerobic, anaerobic, strength and reaction time assessments. Aerobic capacity was evaluated by maximal incremental exercise testing with measurement of maximal oxygen uptake. Anaerobic performance was assessed using a Wingate test and blood lactate concentration. Explosive strength and simple reaction times of upper and lower limbs were measured. Competitive success was defined as final ranking in national competitions. Separate multiple regression analyses were performed for women and men. Results: In women, a multifactorial model explained most of the variance in competitive ranking (R2 = 0.99). Significant predictors included sport specific performance, relative aerobic efficiency, explosive leg power and reaction time. In men, the model explained 76 percent of the variance (R2 = 0.76), with maximal performance output identified as the primary predictor. Conclusion: Competitive success in Czech national Taekwon-do ITF athletes appears to be sex specific. Female performance reflects interaction of aerobic efficiency, explosive power and reaction capacity, whereas male performance is more strongly determined by maximal power output. These findings support targeted training and performance monitoring in elite Taekwon-do ITF athletes.

P32
Planning and Management of the Annual Training Cycle in Top-Level Swimming – Case Study

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Purpose: The aim of the paper is to analyze the model of planning and management of the annual training cycle in top-level swimming through a longitudinal case study of an elite female swimmer specializing in the 200 m butterfly discipline. Special focus is placed on the application of different concepts of periodization (traditional linear and block periodization) and on the distribution of intensity in accordance with the polarized and threshold training models. Methods: The research was conducted during the 2024/25 competitive season and included the complete macrocycle (preparatory, pre-competition, competition and transition period) with a total of eight competitions. The weekly microcycle included 10 swimming training sessions with one recovery day. The average daily mileage was 12.5 km, while the weekly volume in the preparation phase varied between 70 - 75 km. The intensity distribution was analyzed according to the three-zone and five-zone model: 70–80% of the volume was realized in Z1–Z2 (below LT1), 15–25% in Z3–Z4 (lactate threshold zone / MLSS 4.0–4.5 mmol/L), and 5–10% in Z5 (VO_2max and sprint, 8–10 mmol/L), with an increase in the relative share of high intensity in the taper phase. Post-competition lactate values were 16–18 mmol/L. Results: The analysis showed a progressive transformation of the load from a dominant aerobic volume to a specific intensity in the pre-competition period, with a controlled reduction of volume during the taper. The metabolic profile of the swimmer is characterized by a shifted lactate threshold and high tolerance to lactate accumulation, which is in line with the energy demands of the 200 m butterfly discipline. Conclusion: An integrated periodization model, which combines elements of linear and block structure with a predominantly polarized intensity distribution, represents an effective framework for optimizing sports form and competitive performance in top-level swimming. Keywords: swimming, annual periodization, polarized model, lactate threshold, 200 m butterfly.

P33

Barre Fitness Resistance Training: A Strategy for Preserving Functional Health in Perimenopausal Women

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Introduction: Perimenopause is a critical physiological transition characterized by hormonal fluctuations that often lead to unfavorable changes in body composition and a decline in muscular strength, increasing the risk of sarcopenia and osteoporosis. Barre fitness is a hybrid exercise modality that integrates principles of ballet conditioning, Pilates, and low-to-moderate load strength development, specifically focusing on isometric contractions and postural alignment. Objective: The aim of this study was to investigate the impact of an eight-week Barre fitness intervention on handgrip strength, lower-body strength, and body mass index (BMI) in perimenopausal women. Methodology: In a randomized controlled trial, 55 perimenopausal women (aged 38–53 years) were divided into an experimental group (EG, n=33) and a control group (CG, n=20). The EG performed a structured Barre program three times weekly for eight weeks, while the CG maintained their usual daily activities. Primary outcomes included BMI, maximal isometric handgrip strength, and maximal leg press strength. Statistical analysis included descriptive statistics, independent t-tests, paired t-tests, and univariate analysis of variance (ANOVA). Results: Following the intervention, the EG demonstrated a statistically significant increase in dominant handgrip strength (from 26.16 ± 4.65 to 29.66 ± 2.99 kg; $p < .001$) and leg press strength (from 18.30 ± 3.73 to 21.09 ± 5.90 kg; $p = .02$) compared to the CG. ANOVA results confirmed significant group effects for dominant HGS ($F = 6.079$, $p = .001$) and leg press performance ($F = 5.189$, $p = .002$). Although a downward trend in BMI was noted in the EG (from 24.49 to 23.24 kg/m²), the inter-group difference at the final measurement did not reach statistical significance ($p = .142$). Conclusion: An eight-week Barre fitness program serves as a safe and effective non-pharmacological intervention for significantly enhancing functional strength in perimenopausal women. By improving critical health biomarkers such as handgrip strength and lower-body power, this exercise modality addresses the musculoskeletal vulnerabilities associated with the hormonal transition, supporting healthy aging and the maintenance of physical independence. Keywords: Barre fitness, perimenopause, muscular strength, BMI, handgrip, leg press.

P34

Relationship Between Anthropometric Characteristics and Specific Motor Abilities With 40-meter Sprint Performance in 15-year-old Young Football Players from FC "Gjilani"

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The aim of this study was to examine the relationship between anthropometric characteristics and specific motor abilities with 40-meter sprint performance in 15-year-old football players from FC "Gjilani". The sample consisted of 25 male football players. Anthropometric variables included body height, body weight, and body mass index (BMI), while motor and football-specific performance tests included ball juggling, slalom dribbling with obstacles, standing long jump, flexibility, and 40-meter sprint performance. Multiple linear regression analysis was used to determine the contribution of selected predictors to sprint performance. The results indicated that body height had a significant positive contribution to sprint performance ($\beta = -0.035$, $p = 0.006$), while body weight showed a marginal effect ($p = 0.052$) and BMI demonstrated a significant negative influence ($\beta = 0.045$, $p = 0.031$). Among motor abilities, lower-limb muscular power ($\beta = -0.120$, $p < 0.001$) and neuromuscular performance ($\beta = -0.090$, $p = 0.005$) were identified as the strongest predictors of improved sprint performance. Coordination-related ability also showed a significant contribution ($\beta = -0.015$, $p = 0.039$), whereas flexibility was not statistically significant ($p = 0.274$). The regression model explained 72% of the variance in 40-meter sprint performance ($R^2 = 0.72$, $p < 0.001$), indicating a strong combined effect of anthropometric and motor variables on sprint ability. The findings suggest that sprint performance in young football players is primarily determined by lower-limb power, neuromuscular efficiency, and body composition. These results highlight the importance of integrating strength development and motor skill training in youth football programs. Keywords: football, sprint performance, anthropometry, motor abilities, multiple linear regression, youth athletes.

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P35

Association Between Health Literacy and Physical Activity Among Adolescents

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Purpose: Health literacy (HL) is defined as an individual's ability to access, understand, evaluate, and apply health-related information in order to make appropriate health decisions. It is considered an important predictor of health behavior, including the level of physical activity (PA). The aim was to examine the association between HL and PL among adolescents. Methods: The study was conducted on a sample of 585 high school students aged 15 to 20 years (M = 17.32 ± 1.63), including 345 boys and 240 girls. Physical activity was assessed using the PAQ-A questionnaire, while health literacy was evaluated using the HLS-EU-Q questionnaire. The associations between variables were analyzed using Pearson's correlation coefficient. Results: A statistically significant positive association was found between HL and PL in the total adolescent sample ($r = 0.17$; $p < 0.05$). Sex-specific analysis showed similar results, with the association between HL and PL being $r = 0.13$ ($p < 0.05$) among boys and $r = 0.17$ ($p < 0.05$) among girls. Conclusion: HL demonstrates a significant but weak positive association with PA levels among adolescents. These findings suggest that improving HL may contribute to promoting a more active lifestyle and represents an important target for preventive and educational programs aimed at improving youth health. Keywords: Health behavior, youth population, lifestyle habits, physical fitness, public health.

P36

Motor Competence in Preschoolers in Relation to Parental Physical Activity and Socioeconomic Characteristics

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Purpose: This study examined associations between preschool children's motor competence and selected socioeconomic characteristics and lifestyle factors of the responding parent. Methods: The sample included 446 children (mean age 5.5 ± 0.49 years; 259 boys, 187 girls) and 446 parents (81 men, 365 women). Children's motor competence was assessed using the MOBAK test battery. Socioeconomic indicators and parental lifestyle characteristics were collected via questionnaire. Relationships between variables were analyzed using Pearson's correlation analysis. Sex differences and differences between housing-type groups were tested using an independent samples t-test, while differences according to parental education and physical activity were evaluated using the Kruskal–Wallis ANOVA. Results: No significant differences in motor competence were found between boys and girls ($p = 0.54$; $d = 0.02$) or housing-type groups ($p = 0.72$; $d = 0.01$). Motor competence did not differ significantly according to parental education ($p = 0.47$; $\eta^2 = 0.011$) or parental physical activity ($p = 0.30$; $\eta^2 = 0.016$). A small but significant negative correlation was observed between motor competence and children's BMI ($r = -0.09$) and parental BMI ($r = -0.16$). Conclusion: Motor competence was not associated with sex, housing type, parental education, or parental physical activity. The negative association with children's and parents' BMI highlights the importance of early overweight prevention and promoting healthy lifestyle habits from early childhood.

P37

Methodological and Practical Considerations of Qualitative Changes in Physical Fitness and Body Composition in a School-Based Physical Literacy Intervention

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Purpose: This study investigated the impact of a physical literacy–based intervention (PL-intervention) on the dynamic relationships between body composition and fitness measures in preadolescent children. Methods: Participants were 112 children aged 9 to 11 (including 50 girls), who were divided into a control group (C group, n = 61) and an experimental group (E group, n = 51). Variables included anthropometric and body composition parameters, as well as fitness com-

ponents at three time points: baseline (September), post-intervention (December), and follow-up (May). Between the baseline and post-intervention phases, the E-group underwent a structured PL-intervention integrated into their regular physical education (PE) classes, while the C-group continued with standard physical education. The correlation matrices and factor loading matrices were compared across time points using Tucker's coefficient of congruence for each group. Results: Results indicated that the C-group exhibited some qualitative shifts, with early signs of divergence in structural relationships. In contrast, the E-group maintained consistent factor structures and inter-variable correlations across all measurements, suggesting the intervention contributed to preserving stable interactions between body composition and fitness indicators. Conclusion: The PL-intervention supported more harmonized and coherent physical development. Such programs may play a valuable role in helping children establish lasting, organized patterns of physical function.

P38

Effect of Wrestling-Specific Fatigue Protocol on Countermovement Jump Performance in Youth Wrestlers

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Purpose: Combat sports such as wrestling require athletes to maintain high levels of explosive power under fatigue. Standard performance assessments conducted at rest may not accurately reflect competitive demands. This study aimed to evaluate changes in countermovement jump (CMJ) performance following a wrestling-specific fatigue protocol in youth wrestlers. Methods: Twenty-nine competitive male wrestlers (age: 17.6 ± 1.9 years) performed CMJ tests at three time points: before (PRE), after the first fatigue bout (R1), and after the second bout (R2) of the Specific Wrestling Fitness Test (SWFT). The two SWFT rounds were separated by 7 minutes of passive rest. Results: A significant main effect of time was found ($p < .05$). Mean CMJ height decreased from 33.09 ± 5.62 cm (PRE) to 30.29 ± 4.45 cm (R1), indicating a decline in explosive performance after the first fatigue round. A slight recovery was observed in R2 (30.58 ± 6.48 cm), although values remained below baseline. The largest drop occurred between PRE and R1 ($\Delta = -2.80$ cm). Conclusion: Wrestling-specific fatigue significantly impairs lower-body power, as shown by reduced CMJ performance. Post-fatigue CMJ testing provides valuable insight into an athlete's ability to sustain performance and may serve as a practical tool for monitoring fatigue, adaptation, and readiness in combat sports. Keywords: combat sports, exhaustion, vertical jump, performance testing, sport-specific assessment, youth athletes.

P39

The Influence of Explosive Strength, Isokinetic Potential, and Stability on the Performance Success of the Uchi-mata Throw Technique in Students

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The aim of this study was to determine the influence of explosive strength, isokinetic muscle potential, and stability on the success of performing the Uchi-mata throwing technique in students (n = 57) from the Faculty of Sport and Physical Education, University of Sarajevo, who were systematically introduced to judo for the first time through the teaching process. The predictor variables included indicators of explosive strength (countermovement jump—CMJ, squat jump—SJ, and countermovement jump with arm swing—CMJFA), isokinetic peak torque of relevant muscle groups at 30°/s and 60°/s, and stability indices (overall stability index—BOSI, anteroposterior stability index—BAPSI, and mediolateral stability index—BMLSI). The criterion variable was defined as the first principal component extracted from the ratings of three expert evaluators. Hierarchical regression analysis showed that explosive strength alone was not a statistically significant predictor ($R^2 = .093$, $p = .155$), whereas the full model (explosive strength + isokinetic potential + stability) explained 62.4% of the variance in performance success ($R = .79$, $R^2 = .624$, $p = .007$). Significant partial predictors were peak torque of plantar flexion in the dominant ankle ($\beta = -1.044$, $p < .001$), elbow extension of the dominant arm ($\beta = -0.668$, $p = .007$), and the overall stability index (BOSI). These findings indicate that technical proficiency in Uchi-mata among novice students is not determined by general explosive strength, but rather by the functional integration of specific maximal force and postural stability within a properly acquired biomechanical movement pattern. The results have practical implications for planning and programming judo instruction in the initial stages of learning, with an emphasis on developing specific isokinetic strength and stability. Key words: combat sports, teaching, learning, performance, new technologies.

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P40

The Role of Selected Cognitive Functions in Shooting Performance of Applicants for Security Forces: A pilot Study

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Shooting performance is a critical skill for applicants to security forces and may be influenced by cognitive functions such as reaction speed and response accuracy. Purpose: This pilot study aimed to explore the relationship between selected cognitive functions and shooting performance using a cross-over experimental design. Methods: Seven applicants for security forces (5 males, 2 females; median age: 22 ± 2 years) completed two testing sessions one week apart. Shooting performance was assessed using an IPSC-based task, while cognitive performance was evaluated through measures of reaction time and error rate. The order of shooting and cognitive assessments was reversed between sessions to control for potential order effects. Statistical analysis included the Wilcoxon signed-rank test for paired comparisons between sessions and Spearman's rank correlation coefficient to explore associations between cognitive and shooting performance variables. The research was funded by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V05-00006.Results: Comparative analyses between sessions did not indicate substantial order-related differences in shooting or cognitive performance variables. Exploratory correlation analyses based on averaged values across sessions suggested limited associations between reaction time, error rate, and shooting performance measures, including the penalized performance index. Conclusions: Overall, the findings indicate that simple measures of reaction speed and error rate alone may provide limited explanatory value for shooting performance in this sample.

P41

The influence of effective playing time on match running performance in the UEFA Champions League

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This study aimed to analyse the influence of effective playing time on match running performance (MRP) in professional soccer while controlling for contextual factors. The MRP was measured from all teams (n = 32) in all UEFA Champions League matches (n = 125) during the 2022/23 season. Data were obtained using an optical tracking system. Effective playing time, considered as the duration of play after subtracting the time taken up by stoppages, substitutions, injuries, and goals, was captured for each match. The MRP variables included total distance (TD) and running at low- (LIR), moderate (MIR), and high-intensities (HIR). The players' MRPs (n = 1371) were categorized according to effective playing time categories: < 50 min, 50–55 min, 56–60 min, 61–65 min, > 65 min. A linear mixed model was fitted in which playing position, match outcome, match location, and opponent quality were used as covariates. To account for the repeated measures, players' and teams' identities were modelled as random effects. The main effects comparisons were summarised using the least significant difference (LSD). Effect sizes were evaluated using Cohen's d (d). Results revealed (i) greater TD (mean difference (MD) = 964m, d = 0.64) and LIR (MD = 761m, d = 0.68), and (ii) no differences for MIR (MD = 147; d = 0.20) and HIR (MD = 48; d = 0.08) in matches with long (> 65 min) compared to short (< 50 min) effective playing times. These findings indicated that extended effective playing time primarily increases overall running volume, largely driven by low-intensity activity, while higher-intensity running outputs remained relatively stable. This study highlights the importance of effective playing time for accurate interpretation of match running performance, thereby supporting informed load management and training design. Keywords: ball-in-play, football, physical demands, load monitoring.

P42

Transition Games in Professional Soccer: Analysis of External Load Across Different Playing Formats

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Purpose: This study aimed to compare the external load demands of two different transition game in professional soccer players. Methods: Twenty-five professional soccer players participated in this study. Players performed two playing formats: 3vs2 and 2vs1-3vs2, both conducted on a 50 x 40 m pitch. The protocol consisted of 2x9 min, separated by 1 min 30 s of passive recovery. Each bout was organized in repeated 20-s repetitions. Players were monitored using 18.18-Hz global positioning system devices (GPEXE System, Exelio Srl, Udine, Italy). The following external load variables were assessed: total distance, peak velocity, % peak velocity, high-speed running distance (19.8-25.2 km/h), sprint running distance (>25.2 km/h), number of sprints and bursts. Results: 3vs2 elicited significantly greater values than 2vs1-3vs2 for total distance, number of bursts, and high-speed running distance (all $p < 0.001$). Conversely, 2vs1-3vs2 produced significantly higher peak velocity, sprint running distance, % peak velocity, and number of sprints compared with 3vs2 (all $p < 0.001$). Conclusion: These findings support the inclusion of transition games, as both playing formats impose substantial physical demands in professional soccer players. 3vs2 appears to induce a higher mechanical load and greater submaximal running volume, whereas 2vs1-3vs2 determined higher peak speeds and sprint-related demands.

P43

Body Composition Variation Across Age and Playing Position in Elite Academy Football

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Monitoring anthropometric traits and body composition in elite youth footballers is essential for optimizing performance, identifying talent, and developing personalized training strategies. This study aimed to investigate differences in body composition among elite male soccer players across various age groups and playing positions within the PFC Levski Sofia academy. A total of 87 male youth players (U14–U17 and Second Team) were assessed using the InBody 270 bioelectrical impedance analyzer (BIA). Measurements included height, body mass, body mass index (BMI), body fat percentage (BF%), and skeletal muscle mass (SMM%). Players were grouped into two age clusters: Group 1 (U14+U15) and Group 2 (U16+U17+Second Team). All assessments were conducted under standardized conditions by certified staff, following fasting and rest protocols. Younger players (Group 1) showed significant inter-positional differences in height, weight, and BMI ($p < 0.05$), indicating early-stage physical differentiation. Group 2 athletes presented higher overall values in height, weight, and BMI, consistent with maturation and training exposure. No significant positional differences were observed in BF% or SMM% in either group, although graphical analyses indicated expected trends—higher BF% in goalkeepers and strikers, and lower values in wide players. These findings reinforce the importance of bio-banding, position-specific training, and longitudinal tracking in youth football development, highlighting the emergence of physical specialization during early adolescence and the role of age-related homogeneity at later stages. Keywords: anthropometry, bioimpedance, youth soccer, playing position, body composition, elite football development.

P44

How Lower Limb Average Power Calculation Models Affect Performance Interpretation in a 15-Second Repeated Jump Test in Youth Competitive Football Players

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Accurate evaluation of lower-limb power is essential for monitoring physical performance in football. Jump-based tests are widely used for this purpose, yet several computational models exist to estimate average power, raising the question of whether they provide comparable representations of an athlete's neuromuscular performance. Purpose: This study compared average power values derived from the Bosco, Miron Georgescu (MG), and Modified Miron Georgescu-15 (MGM-15) models in trained youth competitive football players. Methods:

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Twenty-eight male youth football players performed a 15-second repeated bilateral vertical jump test with arm swing, recorded using OptoJump Next. Average power (W/kg) was calculated from the raw jump data using flight time, contact time, and jump height according to the three models, allowing direct within-subject comparison. Results: Significant differences were observed between calculation approaches. The Bosco and MG models produced consistently higher average power values, whereas the MGM-15 model yielded lower outputs. Conclusions: Average power outcomes in the 15-second repeated jump test are model-dependent. Without awareness of these differences, performance evaluation and related training decisions may be misinterpreted by athletes and coaches, highlighting the importance of selecting and interpreting calculation models carefully in applied sport settings.

P45

Effects of military training on some characteristics and abilities of soldiers

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Changes in morphological characteristics and motor abilities are often the goal of one-time and/or continuous military training programs. Purpose: The aim of this study was to determine possible differences in the morphological characteristics and motor abilities of volunteer soldiers of the Army of Montenegro who underwent specific military training. Methods: On a sample of 20 soldiers who underwent special military training lasting 14 weeks, the following variables were monitored: body height, body weight, neck circumference, chest circumference, upper arm circumference, abdominal circumference, and thigh circumference. Motor abilities were assessed using the following motor tests: pull-ups on a bar; sit-ups in 2 minutes; push-ups in 2 minutes; 270 m shuttle run; and a 3200 m run. Measurements, testing, and training were conducted at the Training Center of the Army of Montenegro. Descriptive and comparative statistical procedures were used to process the obtained data. Results: The results from the initial and final measurements showed that there were no statistically significant differences in the soldiers' morphological characteristics before and after the training. On the other hand, statistically significant differences were found in motor ability tests, specifically in: sit-ups in 2 minutes, the 3200 m run, and the 270 m shuttle run. Conclusion: Although this study included a small sample, it may help military training planners in reviewing existing programs and planning future ones.

P46

Effects of Elastic Resistance Training on Neuromuscular Coordination, Reaction Time, and Stroke Accuracy in Competitive Badminton Players

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Purpose: Badminton demands high neuromuscular coordination, quick motor responses, and technical precision. This study investigated the effectiveness of elastic resistance training on improving neuromuscular coordination, reaction time, agility, and the accuracy of forehand smash and diagonal forehand strokes in competitive players. Methods: A pre–post experimental design with one group was used, involving five competitive badminton players aged 17–19 from the Armenian Club Training Center. Participants completed an eight-week program of sport-specific resistance band exercises aimed at enhancing neuromuscular activation and movement control. Training occurred four times weekly. Reaction time, agility, coordination, and stroke accuracy for straight and diagonal forehand smashes were assessed before and after the intervention. Paired Samples t-tests identified differences, and Cohen's d measured effect sizes. Results: Significant improvements were found in all variables after training. Reaction time, agility, and coordination showed marked enhancement. Accuracy of straight forehand smash and diagonal forehand strokes also increased significantly. Large effect sizes demonstrated the strong practical impact of elastic resistance training on neuromuscular function and stroke execution. Conclusion: Elastic resistance training is an effective and practical strategy to enhance neuromuscular abilities and stroke accuracy in badminton players. Incorporating resistance band exercises into sport-specific conditioning may boost technical performance and competitive efficiency in racket sports.

P47

Plyometric Training in Football- changes in power and biomechanical Properties of the Muscles: Randomized Controlled Trial

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This study investigated the effects of a 10-week plyometric training program on sprint performance, reactive power, and biomechanical muscle properties in soccer players. Twenty soccer players were randomly assigned to an experimental group (n = 10) or a control group (n = 10). Both groups maintained their regular weekly training, with the experimental group performing additional plyometric sessions twice weekly. Pre- and post-intervention assessments included 5 m and 30 m sprint times, Reactive Strength Index (RSI), and biomechanical properties (tension, stiffness, elasticity) of the rectus femoris (RF) and vastus lateralis (VL). The experimental group demonstrated significant improvements in 5 m ($p < 0.01$; ES = 1.44) and 30 m ($p < 0.01$; ES = 1.11) sprint times and RSI ($p < 0.05$; ES = 0.87). No significant changes were observed in muscle tension, stiffness, or elasticity at the group level. However, correlations indicated that higher baseline elasticity in the VL was linked to greater 5 m sprint improvements, while changes in RF elasticity were negatively associated with 5 m sprint gains. These findings suggest that plyometric training effectively enhances short-distance sprint performance and reactive power in soccer players. Although group-level biomechanical properties did not change significantly, individual variability in muscle elasticity may modulate training outcomes, supporting the integration of plyometric exercises into soccer training regimens. Keywords: functional performance; physical activity; myotonometry; drop jump; sprint; stiffness.

P48

Stature and Its Estimation Utilizing Length of Foot Measurements of Both Gender Adolescents from Kosovo

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Introduction: The purpose of this research was to examine the stature of adolescents of both genders from Kosovo, as well as the relationship between foot length and standing height. Methods: The subjects who participated in this study included 993 boys and 894 girls, the average age was 18.23 ± 0.44 years (range 18-20 years) for girls and 18.24 ± 0.46 years (range 18- 20 years) for boys. Measurements of standing height and foot length were taken according to the ISAK protocol (Marfell-Jones, Olds, Steele, & Carter, 2006). Results: The results for the average height and foot length were analyzed using descriptive statistics. The relationships between these measurements were examined using simple correlation with a ninety-five percent confidence interval. Discussion: A comparison of means of standing height and foot length between genders was performed using a t-test. Then, linear regression analysis was carried out to estimate body height based on foot length measurements. Conclusions: The results obtained in this study show that standing height can be estimated from foot length, which reliably predicts standing height for both genders. Key words: Standing Height, Foot Length, Boys and Girls.

P49

Examining the Association Between Reactions to Sporting Outcomes and Career Satisfaction Across Athletes With Differential Media Visibility

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Prior research indicates that the modes of presenting sporting achievements differ in relation to athletes' professional

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status and the broader social context of their engagement. Purpose: The present study aimed to investigate whether statistically significant differences exist among athletes with varying levels of media coverage with respect to their reactions to sporting outcomes and their satisfaction with their sporting careers. Methods: A multivariate analysis of variance (MANOVA) was conducted. The dependent variables included negative reactions to sporting outcomes, positive reactions to sporting outcomes, uncontrollable reactions to sporting outcomes, and satisfaction with sporting careers, while the independent variable was athletes' media coverage, operationalized across multiple categories. Results: The MANOVA results revealed a statistically significant multivariate effect of athletes' media coverage on the set of dependent variables. This finding indicates that athletes with differing levels of media coverage differ significantly in the overall pattern of reactions to sporting outcomes and in satisfaction with their sporting careers, encompassing both positive and negative reactions. Conclusion: Differences in reactions to sporting outcomes were found to be consistent between groups with higher levels of media coverage and the group with the lowest level of media presence, whereas groups with comparable levels of media exposure did not differ significantly from one another. The study demonstrates that the presentation of sporting results on Instagram is contingent upon athletes' sporting status and their social roles.

P50

Age-Group Differences in Concentric Isokinetic Knee Flexor and Extensor Strength in Competitive Soccer Players

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Lower-limb muscle strength is a crucial determinant of football performance and is commonly assessed using isokinetic dynamometry. Purpose: The aim of this study was to examine age-related differences in concentric knee extensor and flexor strength in players competing in the highest Slovak leagues. Methods: A non-randomized cross-sectional design was employed, including players from U15, U17, U19, and senior categories. Concentric muscle strength was assessed using isokinetic dynamometry at angular velocities of 60, 180, and 300°/s. Peak torque was calculated as the mean of dominant and non-dominant limbs and expressed in both absolute and body mass–normalized values. Results: Peak torque of both quadriceps and hamstrings increased progressively with age across all angular velocities. The largest improvements were observed between U15 and U17. Between U17 and U19, a non-significant increase was detected in both absolute and relative values, except for maximal strength at 60°/s. Normalization to body mass reduced inter-group differences; however, age-related effects remained significant. Peak torque decreased with increasing angular velocity across all groups. No significant differences were found in ipsilateral or bilateral strength asymmetries. Conclusion: The findings confirm an age-related increase in lower-limb strength and a consistent decline in torque with higher contraction velocities. Although normalization attenuates inter-group differences, age remains a significant determinant of isokinetic strength, while ipsilateral and bilateral asymmetries appear stable across age categories.

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Should there be any errors, authors should report them to the Office e-mail address **office@mjssm.me.** If there are not any errors authors should also write a short e-mail stating that they agree with the received version.

1.7. Code of Conduct Ethics Committee of Publications

MJSSM is hosting the Code of Conduct Ethics Committee of Publications of the **COPE** (the Committee on Publication Ethics), which provides a forum for publishers and Editors of scientific journals to discuss issues relating to the integrity of the work submitted to or published in their journals.

2. MANUSCRIPT STRUCTURE

2.1. Title Page

The first page of the manuscripts should be the title page, containing: title, type of publication, running head, authors, affiliations, corresponding author, and manuscript information. *See* example:

Transfer of Learning on a Spatial Memory Task between the Blind and Sighted People Spatial Memory among Blind and Sighted

Original Scientific Paper

Transfer of learning on a spatial memory task

Selcuk Akpinar[1], Stevo Popović[1,2], Sadettin Kirazci[1]

[1]Middle East Technical University, Physical Education and Sports Department, Ankara, Turkey
[2]University of Montenegro, Faculty for Sport and Physical Education, Niksic, Montenegro

Corresponding author:
S. Popovic
University of Montenegro
Faculty for Sport and Physical Education
Narodne omladine bb, 84000 Niksic, Montenegro
E-mail: stevop@ac.me

Word count: 2,980

Abstract word count: 236

Number of Tables: 3

Number of Figures: 3

2.1.1. Title

Title should be short and informative and the recommended length is no more than 20 words. The title should be in Title Case, written in uppercase and lowercase letters (initial uppercase for all words except articles, conjunctions, short prepositions no longer than four letters etc.) so that first letters of the words in the title are capitalized. Exceptions are words like: "and", "or", "between" etc. The word following a colon (:) or a hyphen (-) in the title is always capitalized.

2.1.2. Type of publication

Authors should suggest the type of their submission.

2.1.3. Running head

Short running title should not exceed 50 characters including spaces.

2.1.4. Authors

The form of an author's name is first name, middle initial(s), and last name. In one line list all authors with full names separated by a comma (and space). Avoid any abbreviations of academic or professional titles. If authors belong to different institutions, following a family name of the author there should be a number in superscript designating affiliation.

2.1.5. Affiliations

Affiliation consists of the name of an institution, department, city, country/territory(in this order) to which the author(s) belong and to which the presented / submitted work should be attributed. List all affiliations (each in a separate line) in the order corresponding to the list of

authors. Affiliations must be written in English, so carefully check the official English translation of the names of institutions and departments.

Only if there is more than one affiliation, should a number be given to each affiliation in order of appearance. This number should be written in superscript at the beginning of the line, separated from corresponding affiliation with a space. This number should also be put after corresponding name of the author, in superscript with no space in between.

If an author belongs to more than one institution, all corresponding superscript digits, separated with a comma with no space in between, should be present behind the family name of this author.

In case all authors belong to the same institution affiliation numbering is not needed.

Whenever possible expand your authors' affiliations with departments, or some other, specific and lower levels of organization.

2.1.6. Corresponding author

Corresponding author's name with full postal address in English and e-mail address should appear, after the affiliations. It is preferred that submitted address is institutional and not private. Corresponding author's name should include only initials of the first and middle names separated by a full stop (and a space) and the last name. Postal address should be written in the following line in sentence case. Parts of the address should be separated by a comma instead of a line break. E-mail (if possible) should be placed in the line following the postal address. Author should clearly state whether or not the e- mail should be published.

2.1.7. Manuscript information

All authors are required to provide word count (excluding title page, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References), the Abstract word count, the number of Tables, and the number of Figures.

2.2. Abstract

The second page of the manuscripts should be the abstract and key words. It should be placed on second page of the manuscripts after the standard title written in upper and lower case letters, bold.

Since abstract is independent part of your paper, all abbreviations used in the abstract should also be explained in it. If an abbreviation is used, the term should always be first written in full with the abbreviation in parentheses immediately after it. Abstract should not have any special headings (e.g., Aim, Results…).

Authors should provide up to six key words that capture the main topics of the article. Terms from the Medical Subject Headings (MeSH) list of Index Medicus are recommended to be used.

Key words should be placed on the second page of the manuscript right below the abstract, written in italic. Separate each key word by a comma (and a space). Do not put a full stop after the last key word. *See example:*

Abstract

Results of the analysis of…
Key words: spatial memory, blind, transfer of learning, feedback

2.3. Main Chapters

Starting from the third page of the manuscripts, it should be the main chapters. Depending on the type of publication main manuscript chapters may vary. The general outline is: Introduction, Methods, Results, Discussion, Acknowledgements (optional), Conflict of Interest (optional), and Title and Abstract in Montenegrin (only for the authors from former Yugoslavia, excluding Macedonians and Slovenes). However, this scheme may not be suitable for reviews or publications from some areas and authors should then adjust their chapters accordingly but use the general outline as much as possible.

2.3.1. Headings

Main chapter headings: written in bold and in Title Case. *See* example:

- ✓ **Methods**

Sub-headings: written in italic and in normal sentence case. Do not put a full stop or any other sign at the end of the title. Do not create more than one level of sub-heading. *See* example:

- ✓ *Table position of the research football team*

2.3.2 Ethics

When reporting experiments on human subjects, there must be a declaration of Ethics compliance. Inclusion of a statement such as follow in Methods section will be understood by the Editor as authors' affirmation of compliance: "This study was approved in advance by [name of committee and/or its institutional sponsor]. Each participant voluntarily provided written informed consent before participating." Authors that fail to submit an Ethics statement will be asked to resubmit the manuscripts, which may delay publication.

2.3.3 Statistics reporting

MJSSM encourages authors to report precise p-values. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Use normal text (i.e., non-capitalized, non-italic) for statistical term "p".

2.3.4. 'Acknowledgements' and 'Conflict of Interest' (optional)

All contributors who do not meet the criteria for authorship should be listed in the 'Acknowledgements' section. If applicable, in 'Conflict of Interest' section, authors must clearly disclose any grants, financial or material supports, or any sort of technical assistances from an institution, organization, group or an individual that might be perceived as leading to a conflict of interest.

2.4. References

References should be placed on a new page after the standard title written in upper and lower case letters, bold.

All information needed for each type of must be present as specified in guidelines. Authors are solely responsible for accuracy of each reference. Use authoritative source for information such as Web of Science, Medline, or PubMed to check the validity of citations.

2.4.1. References style

MJSSM adheres to the American Psychological Association 7th Edition reference style. Check the Publication Manual of the American Psychological Association (2019), Seventh Edition that is the official source for APA Style, to ensure the manuscripts conform to this reference style. Authors using EndNote® to organize the references must convert the citations and bibliography to plain text before submission.

2.4.2. Examples for Reference citations

One work by one author

- ✓ In one study (Reilly, 1997), soccer players…
- ✓ In the study by Reilly (1997), soccer players…
- ✓ In 1997, Reilly's study of soccer players…

Works by two authors

- ✓ Duffield and Marino (2007) studied…
- ✓ In one study (Duffield & Marino, 2007), soccer players…
- ✓ In 2007, Duffield and Marino's study of soccer players…

Works by three or more authors: cite only the name of the first author followed by et al. and the year

- ✓ Bangsbo et al. (2008) stated that…
- ✓ In one study (Bangsbo et al., 2008), soccer players…

Works by organization as an author: cite the source, just as you would an individual person

- ✓ According to the American Psychological Association (2000)…
- ✓ In the APA Manual (American Psychological Association, 2003), it is explained…

Two or more works in the same parenthetical citation: citation of two or more works in the same parentheses should be listed in the order they appear in the reference list (i.e., alphabetically); separated by a semi-colon

- ✓ Several studies (Bangsbo et al., 2008; Duffield & Marino, 2007; Reilly, 1997) suggest that…

2.4.3. Examples for Reference list

Works by one author
Borg, G. (1998). *Borg's perceived exertion and pain scales*: Human Kinetics.

Works by two authors
Duffield, R., & Marino, F. E. (2007). *Effects of pre-cooling procedures on intermittent-sprint exercise performance in warm conditions. European Journal of Applied Physiology, 100*(6), 727–735. https://doi.org/10.1007/s00421-007-0468-x

Works by three to twenty authors
Nepocatych, S., Balilionis, G., & O'Neal, E. K. (2017). Analysis of dietary intake and body composition of female athletes over a competitive season. *Montenegrin Journal of Sports Science and Medicine, 6*(2), 57–65. https://doi.org/10.26773/mjssm.2017.09.008

Works by more than twenty authors
Krustrup, P., Mohr, M., Amstrup, T., Rysgaard, T., Johansen, J., Steensberg, A.,… Bangsbo, J. (2003). The yo-yo intermittent recovery test: physiological response, reliability, and validity. *Medicine & Science in Sports & Exercise, 35*(4), 697–705. https://doi.org/10.1249/01.mss.0000058441.94520.32

Works by group of authors
NCD-RisC. (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet*, 390(10113), 2627-2642. https://doi.org/10.1016/s0140-6736(17)32129-3

Works by unknown authors
Merriam-Webster's collegiate dictionary (11th ed.). (2003). Merriam-Webster.

Journal article (print)
Scruton, R. (1996). The eclipse of listening. *The New Criterion, 15*(3), 5–13.

Journal article (electronic)
Aarnivala, H., Pokka, T., Soininen, R., Mottonen, M., Harila-Saari, A., & Niinimaki, R. (2020). Trends in age- and sex-adjusted body mass index and the prevalence of malnutrition in children with cancer over 42 months after diagnosis: a single-center cohort study. *European Journal of Pediatrics,* 179(1), 91-98. https://doi.org/10.1007/s00431-019-03482-w

Thesis and dissertation
Pyun, D. Y. (2006). *The proposed model of attitude toward advertising through sport*. [Unpublished Doctoral Dissertation]. The Florida State University.

Book
Borg, G. (1998). *Borg's perceived exertion and pain scales*: Human Kinetics.

Chapter of a book
Armstrong, D. (2019). Malory and character. In M. G. Leitch & C. J. Rushton (Eds.), *A new companion to Malory* (pp. 144-163). D. S. Brewer.

Reference to a Facebook profile
Little River Canyon National Preserve (n.d.). *Home* [Facebook page]. Facebook. Retrieved January 12, 2020 from https://www.facebook.com/lirinps/

2.5. Tables

All tables should be included in the main manuscript file, each on a separate page right after the Reference section.

Tables should be presented as standard MS Word tables.

Number (Arabic) tables consecutively in the order of their first citation in the text.

Tables and table headings should be completely intelligible without reference to the text. Give each column a short or abbreviated

heading. Authors should place explanatory matter in footnotes, not in the heading. All abbreviations appearing in a table and not considered standard must be explained in a footnote of that table. Avoid any shading or coloring in your tables and be sure that each table is cited in the text.

If you use data from another published or unpublished source, it is the authors' responsibility to obtain permission and acknowledge them fully.

2.5.1. Table heading

Table heading should be written above the table, in Title Case, and without a full stop at the end of the heading. Do not use suffix letters (e.g., Table 1a, 1b, 1c); instead, combine the related tables. *See* example:

- ✓ **Table 1.** Repeated Sprint Time Following Ingestion of Carbohydrate-Electrolyte Beverage

2.5.2. Table sub-heading

All text appearing in tables should be written beginning only with first letter of the first word in all capitals, i.e., all words for variable names, column headings etc. in tables should start with the first letter in all capitals. Avoid any formatting (e.g., bold, italic, underline) in tables.

2.5.3. Table footnotes

Table footnotes should be written below the table.

General notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here. General notes are designated by the word Note (italicized) followed by a period.

- ✓ *Note.* CI: confidence interval; Con: control group; CE: carbohydrate-electrolyte group.

Specific notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. [a, b, c]), and order the superscripts from left to right, top to bottom. Each table's first footnote must be the superscript [a].

- ✓ [a]One participant was diagnosed with heat illness and n = 19.[b]n =20.

Probability notes provide the reader with the results of the texts for statistical significance. Probability notes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || etc.

- ✓ *P<0.05,†p<0.01.

2.5.4. Table citation

In the text, tables should be cited as full words. *See* example:

- ✓ Table 1 (first letter in all capitals and no full stop)
- ✓ ...as shown in Tables 1 and 3. (citing more tables at once)
- ✓ ...result has shown (Tables 1-3) that... (citing more tables at once)
- ✓ ....in our results (Tables 1, 2 and 5)... (citing more tables at once)

2.6. Figures

On the last separate page of the main manuscript file, authors should place the legends of all the figures submitted separately.

All graphic materials should be of sufficient quality for print with a minimum resolution of 600 dpi. MJSSM prefers TIFF, EPS and PNG formats.

If a figure has been published previously, acknowledge the original source and submit a written permission from the copyright holder to reproduce the material. Permission is required irrespective of authorship or publisher except for documents in the public domain. If photographs of people are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph whenever possible permission for publication should be obtained.
Figures and figure legends should be completely intelligible without reference to the text.

The price of printing in color is 50 EUR per page as printed in an issue of MJSSM.

2.6.1. Figure legends

Figures should not contain footnotes. All information, including explanations of abbreviations must be present in figure legends. Figure legends should be written bellow the figure, in sentence case. *See* example:

- ✓ **Figure 1.** Changes in accuracy of instep football kick measured before and after fatigued. SR – resting state, SF – state of fatigue, *p>0.01, †p>0.05.

2.6.2. Figure citation

All graphic materials should be referred to as Figures in the text. Figures are cited in the text as full words. *See* example:

- ✓ Figure 1
- × figure 1
- × Figure 1.
- ✓ ….exhibit greater variance than the year before (Figure 2). Therefore…
- ✓ ….as shown in Figures 1 and 3. (citing more figures at once)
- ✓ ….result has shown (Figures 1-3) that... (citing more figures at once)
- ✓ ….in our results (Figures 1, 2 and 5)... (citing more figures at once)

2.6.3. Sub-figures

If there is a figure divided in several sub-figures, each sub-figure should be marked with a small letter, starting with a, b, c etc. The letter should be marked for each subfigure in a logical and consistent way. *See* example:

- ✓ Figure 1a
- ✓ …in Figures 1a and b we can…
- ✓ …data represent (Figures 1a-d)…

2.7. Scientific Terminology

All units of measures should conform to the International System of Units (SI).

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples.

Decimal places in English language are separated with a full stop and not with a comma. Thousands are separated with a comma.

Percentage	Degrees	All other units of measure	Ratios	Decimal numbers
✓ 10%	✓ 10º	✓ 10 kg	✓ 12:2	✓ 0.056
× 10 %	× 10 º	× 10kg	× 12 : 2	× .056

Signs should be placed immediately preceding the relevant number.		
✓ 45±3.4	✓ p<0.01	✓ males >30 years of age
× 45 ± 3.4	× p < 0.01	× males > 30 years of age

2.8. Latin Names

Latin names of species, families etc. should be written in italics (even in titles). If you mention Latin names in your abstract they should be written in non-italic since the rest of the text in abstract is in italic. The first time the name of a species appears in the text both genus and species must be present; later on in the text it is possible to use genus abbreviations. *See* example:

- ✓ First time appearing: *musculus biceps brachii*
- ✓ Abbreviated: *m. biceps brachii*

ISSN 1451-7485 eISSN 2337-0351
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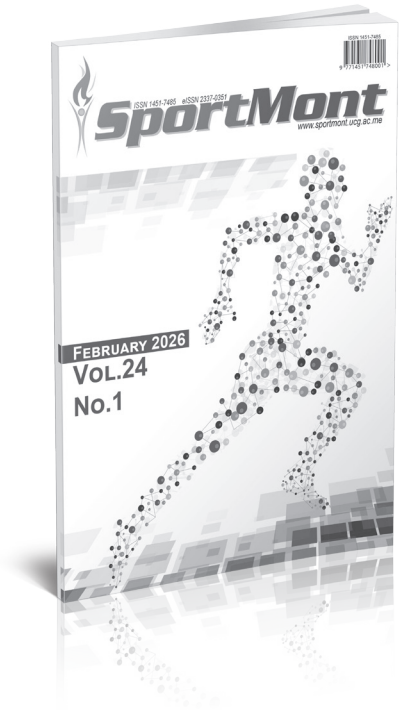

ISSN 1451-7485

Sport Mont Journal (SMJ) is a print (ISSN 1451-7485) and electronic scientific journal (eISSN 2337-0351) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:

- Open-access and freely accessible online;
- Fast publication time;
- Peer review by expert, practicing researchers;
- Post-publication tools to indicate quality and impact;
- Community-based dialogue on articles;
- Worldwide media coverage.

SMJ is published three times a year, in February, June and October of each year. SMJ publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Sports Science and Medicine, as well as it can function as an open discussion forum on significant issues of current interest.

SMJ covers all aspects of sports science and medicine; all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side.

Prospective authors should submit manuscripts for consideration in Microsoft Word-compatible format. For more complete descriptions and submission instructions, please access the Guidelines for Authors pages at the SMJ website: http://www.sportmont.ucg.ac.me/?sekcija=page&p=51. Contributors are urged to read SMJ's guidelines for the authors carefully before submitting manuscripts. Manuscripts submissions should be sent in electronic format to sportmont@ucg.ac.me or contact following Editors:

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Publication date: Summer issue – June 2026
Autumn issue – October 2026
Winter issue – February 2027

MONTENEGRIN SPORTS ACADEMY

Founded in 2003 in Podgorica (Montenegro), the Montenegrin Sports Academy (MSA) is a sports scientific society dedicated to the collection, generation and dissemination of scientific knowledge at the Montenegrin level and beyond.

The Montenegrin Sports Academy (MSA) is the leading association of sports scientists at the Montenegrin level, which maintains extensive co-operation with the corresponding associations from abroad. The purpose of the MSA is the promotion of science and research, with special attention to sports science across Montenegro and beyond. Its topics include motivation, attitudes, values and responses, adaptation, performance and health aspects of people engaged in physical activity and the relation of physical activity and lifestyle to health, prevention and aging. These topics are investigated on an interdisciplinary basis and they bring together scientists from all areas of sports science, such as adapted physical activity, biochemistry, biomechanics, chronic disease and exercise, coaching and performance, doping, education, engineering and technology, environmental physiology, ethics, exercise and health, exercise, lifestyle and fitness, gender in sports, growth and development, human performance and aging, management and sports law, molecular biology and genetics, motor control and learning, muscle mechanics and neuromuscular control, muscle metabolism and hemodynamics, nutrition and exercise, overtraining, physiology, physiotherapy, rehabilitation, sports history, sports medicine, sports pedagogy, sports philosophy, sports psychology, sports sociology, training and testing.

The MSA is a non-profit organization. It supports Montenegrin institutions, such as the Ministry of Education and Sports, the Ministry of Science and the Montenegrin Olympic Committee, by offering scientific advice and assistance for carrying out coordinated national and European research projects defined by these bodies. In addition, the MSA serves as the most important Montenegrin and regional network of sports scientists from all relevant subdisciplines.

The main scientific event organized by the Montenegrin Sports Academy (MSA) is the annual conference held in the first week of April.

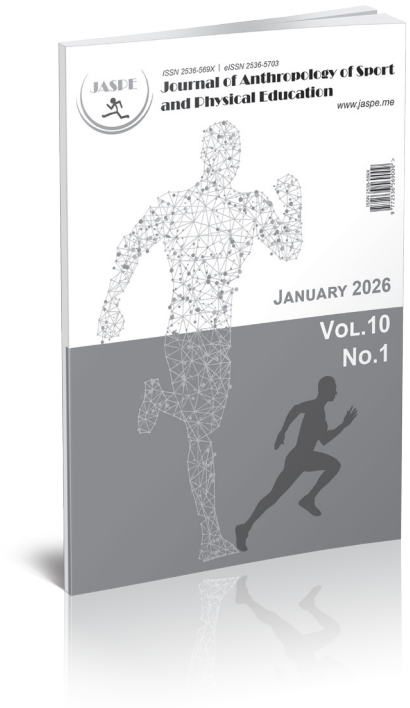
Annual conferences have been organized since the inauguration of the MSA in 2003. Today the MSA conference ranks among the leading sports scientific congresses in the Western Balkans. The conference comprises a range of invited lecturers, oral and poster presentations from multi- and mono-disciplinary areas, as well as various types of workshops. The MSA conference is attended by national, regional and international sports scientists with academic careers. The MSA conference now welcomes up to 200 participants from all over the world.

It is our great pleasure to announce the upcoming 24th Annual Scientific Conference of Montenegrin Sports Academy “Sport, Physical Activity and Health: Contemporary Perspectives” to be held in Budva, Montenegro, from 16 to 19 April, 2026. It is planned to be once again organized by the Montenegrin Sports Academy, in cooperation with the Faculty of Sport and Physical Education, University of Montenegro and other international partner institutions (specified in the partner section).

The conference is focused on very current topics from all areas of sports science and sports medicine including physiology and sports medicine, social sciences and humanities, biomechanics and neuromuscular (see Abstract Submission page for more information).

We do believe that the topics offered to our conference participants will serve as a useful forum for the presentation of the latest research, as well as both for the theoretical and applied insight into the field of sports science and sports medicine disciplines.

Journal of Anthropology of Sport and Physical Education



ISSN 2536-569X

Journal of Anthropology of Sport and Physical Education (JASPE) is a print (ISSN 2536-569X) and electronic scientific journal (eISSN 2536-5703) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:

- Open-access and freely accessible online;
- Fast publication time;
- Peer review by expert, practicing researchers;
- Post-publication tools to indicate quality and impact;
- Community-based dialogue on articles;
- Worldwide media coverage.

JASPE is published four times a year, in January, April, July and October of each year. JASPE publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Anthropology of Sport and Physical Education, as well as it can function as an open discussion forum on significant issues of current interest.

JASPE covers all aspects of anthropology of sport and physical education from five major fields of anthropology: cultural, global, biological, linguistic and medical.

Prospective authors should submit manuscripts for consideration in Microsoft Word-compatible format. For more complete descriptions and submission instructions, please access the Guidelines for Authors pages at the JASPE website: http://www.jaspe.ac.me/?sekcija=page&p=51. Contributors are urged to read JASPE's guidelines for the authors carefully before submitting manuscripts. Manuscripts submissions should be sent in electronic format to jaspe@ucg.ac.me or contact JASPE's Editor:

Fidanka VASILEVA, *Editor-in Chief – vasileva.jaspe@gmail.com*

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Autumn issue – October 2026
Winter issue – January 2027

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Sports Science and Medicine Journals

from Montenegrin Sports Academy

We have expanded the quality of our journals considerably over the past years and can now claim to be the market leader in terms of breadth of coverage.

As we continue to increase the quality of our publications across the field, we hope that you will continue to regard MSA journals as authoritative and stimulating sources for your research. We would be delighted to receive your comments and suggestions, mostly due to the reason your proposals are always welcome.

Look Inside!

Sport Mont Journal

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Volume 24, 2026, 3 issues per year; Print ISSN: 1451-7485, Online ISSN: 2337-0351

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Montenegrin Journal of Sports Science and Medicine

Editors-in-Chief: **Dusko Bjelica**, Montenegro; **Damir Sekulic**, Croatia
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Volume 15, 2026, 2 issues per year; Print ISSN: 1800-8755, Online ISSN: 1800-8763

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MONTENEGRIN OLYMPIC COMMITTEE

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Sports Science, Medicine & Health:

Innovations, Achievements, Synergy and Challenges – A Bridge to the Future of Excellence in Sports

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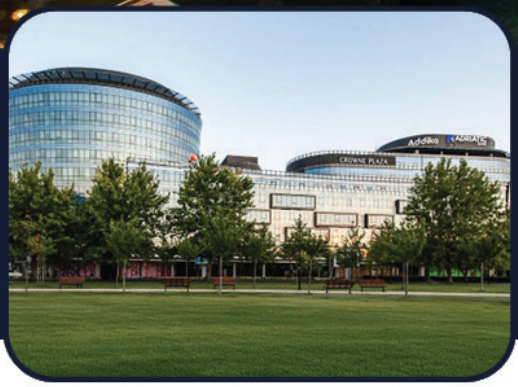

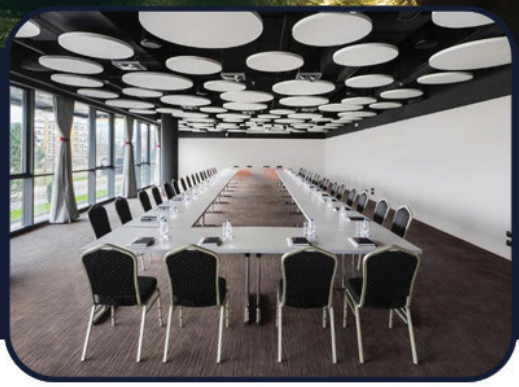

24th–26th September 2026

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