LITHUANIAN SPORTS UNIVERSITY

International Scientific Conference

REHABILITATION AND HEALTH PROMOTION: FUTURE PERSPECTIVES

10th of April, 2025
Kaunas, Lithuania

Book of Abstracts

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Editors Vilma Dudonienė, Edgaras Lapinskas

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Associations Between Social Media Use, Psychological Well-Being, and Quality of Life Among University Students in Lithuania

Rajshree Bhugwant Bhatoo, Miglė Bacevičienė

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Background and aim. Prolonged use of social media and negative psychological states are interrelated. Active use is associated with increased positive social interaction and support while passive use is more related with social comparison, anxiety, stress, and reduced life satisfaction. Research on social media use among university students in Lithuania remains limited with few studies assessing its effect on psychological well-being and quality of life. Hence, the study aims to explore associations between social media use among university students in Lithuania and its impact on psychological well-being and overall quality of life.

Methods. Four hundred university students with mean age of 21.9 ± 2.7 participated in the cross-sectional study via an online survey. Data was analysed through statistical tests in IBM SPSS (version 29.0) after participants filled in the Lithuanian versions of Social Networking Usage Questionnaire (SNUQ), ESM-Social Media Usage Questionnaire (E-SMUQ), short form version of the General Health Questionnaire (GHQ-12), Rosenberg Self-Esteem Scale (RSES), and World Health Organization Quality of Life: Brief Version (WHOQOL-BREF).

Results. Time spent on social media use may be detrimental to self-esteem and overall well-being. In contrast, the way students use social media did not appear to have a direct influence on quality of life. Regression analysis exposed self-esteem as the main predictor of quality of life.

Conclusion. Promoting rational usage of social media and coping strategies which boost self-esteem enhances quality of life among university students.

Keywords. Social media usage, psychological well-being, quality of life, university students, digital behaviour.

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Body Mass Index in Relation to Stress, Depression, and Nutrition in University Students Aged 18–35 Years

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Background and aim. Body mass index (BMI) is a widely used indicator of health that can be influenced by various psychological and dietary factors. Stress and depression are known to affect eating behaviours, potentially leading to alterations in BMI. University students are often exposed to stress and depression, which can impact their nutritional habits and contribute to changes in BMI. Understanding the relationship between BMI, psychological factors, and dietary habits is crucial for promoting overall health. This study aims to examine the relationship between BMI, stress, depression, and nutrition in university students aged 18–35 years.

Methods. A cross-sectional study was conducted among university students (ages 18–35) using an online survey platform to collect data on lifestyle, dietary habits, stress, and depression. The survey included questions related to participants’ daily routines, eating behaviours, stress levels, and depression symptoms. The study aimed to gather data from at least 400 participants, ensuring anonymity in responses. Descriptive statistics, correlation analysis, and regression models were applied to assess associations between BMI, psychological factors, and dietary patterns.

Results. Preliminary findings suggest that higher levels of stress were associated with poorer dietary choices, contributing to variations in BMI. Depression appeared to correlate with both underweight and overweight conditions, highlighting the bidirectional relationship between mental health and nutritional behaviours. Common unhealthy eating habits, such as increased consumption of processed foods and reduced intake of fruits and vegetables, were reported by students experiencing high stress and depression symptoms.

Conclusions. The study reveals a significant relationship between BMI, stress, depression, and nutrition among university students. Addressing mental health challenges through targeted interventions could improve eating behaviours and promote healthier weight management. Future research should further explore these relationships and consider developing strategies to support students’ well-being.

Keywords. Body mass index, stress, depression, nutrition, university students, lifestyle.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Comparative Analyses of Implementation of Connected Sensors on Heart Rate Variability in Middle School Judo Athletes Versus Non-Athletes

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Background and aim. This study aimed to investigate the differences in heart rate variability (HRV) between judo athlete and non-athlete middle school students using wearable heart rate sensors. HRV is a key indicator of autonomic nervous system function and cardiovascular health, with higher variability generally associated with better fitness and stress resilience.

Methods. Sixty-seven middle school students were recruited and divided into two groups: an experimental group (EG) of judo athletes ($n = 39$, height 162.4 ± 7.6 cm, weight 52.7 ± 6.3 kg, age 12.8 ± 1.3 years) and a control group (CG) of non-athletes ($n = 37$, height 159.1 ± 6.9 cm, weight 53.2 ± 7.3 kg, age 13.2 ± 0.8 years). The CG participants did not engage in any competitive sports. HRV metrics, including mean heart rate (mean HR), mean R-R intervals, standard deviation of normal R-R intervals (SDNN), root mean square of successive differences (RMSSD), low-frequency (LF), high-frequency (HF), and LF/HF ratio, were measured using connected sensors. Independent t tests were used to compare HRV parameters between the two groups, with a significance level set at $p < 0.05$.

Results. Results showed that the EG had significantly higher mean R-R intervals ($t = 2.245$, $p < 0.05$) and significantly lower mean HR ($t = –2.149$, $p < 0.05$) compared to the CG. These findings suggest that judo training enhances parasympathetic activity and reduces resting heart rate, indicating improved cardiovascular efficiency. Additionally, time-domain HRV metrics, such as SDNN and RMSSD, were higher in the EG, reflecting greater autonomic adaptability.

Conclusions. Judo training appears to positively influence HRV in middle school students, promoting better cardiovascular health and autonomic regulation. The use of wearable sensors proved effective in monitoring these physiological adaptations, highlighting their potential for real-time health and fitness assessments in young populations.

Keywords. Combat sports, heart rate, sensors, variability, middle school.

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Comparison of Physical Therapy Interventions in the Management of Lateral Epicondylitis: A Systematic Review

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Background and aim. Lateral epicondylitis (LE) is a common chronic degenerative condition primarily caused by repetitive overuse in sports and occupational activities. Different therapeutic methods have been explored. However, the inconsistencies in the therapeutic outcomes, lack of unified treatment dosage, and absence of agreement on the most effective method and modality pose challenges for the practitioners. The aim was to compare the long-term therapeutic effect of exercise and shockwave therapy on pain and grip strength in patients with LE.

Methods. This systematic review was completed following the recommendations outlined in the PRISMA statement. A literature review search was systematically conducted with the year of publication set within five years (2019–2025). Participants aged 18 to 78 years with diagnosed LE and participants with symptoms ranging from acute onset to chronic cases lasting over three months were included.

Results. Fourteen randomised controlled trial (RCT) studies met the inclusion and exclusion criteria with 674 participants diagnosed with LE. The investigated outcome measures were VAS (Visual Analogue Scale), PRTEE (Patient-Rated Tennis Elbow Evaluation), Q-DASH (Arm, Shoulder, and Hand Disabilities Quick Questionnaire), and grip strength. Both exercise therapy and shockwave therapy led to significant pain reduction and showed improvements in function. Extracorporeal shockwave therapy (ESWT) combined with exercise showed superior outcome on grip strength than when used alone. Out of seven studies, only three studies showed improvement in grip strength. In contrast, exercise group showed significant improvement in grip strength when used alone or combined with another therapy.

Conclusions. Most of the findings are in support of exercise therapy to be superior in improving grip strength and function, while ESWT was significant in pain reduction. Therefore, future RCTs should consider direct comparison specific of eccentric exercise with ESWT with long-term follow-up.

Keywords. Exercise therapy, extracorporeal shockwave therapy, grip strength, randomised controlled trials.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Comparison of Vocal Exercises and Breathing Exercises on Respiratory Function and Core Stability in Women

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Background and aim. In the search for innovative and cost-effective approaches to enhance respiratory function, singing has recently been introduced as a method in pulmonary rehabilitation. This study aimed to analyse the effects of breathing and vocal exercises on core stability and respiratory function in women.

Methods. A quantitative, randomised controlled trial was conducted with 50 females aged 18–65 years (mean age: 45.96 ± 10.05), with no prior singing experience and at least six months of breathing exercise practice. Participants with chronic or acute respiratory diseases were excluded. Participants were recruited via a Google Scholar questionnaire and provided written informed consent. They were randomly assigned to one of two groups: breathing exercises (n = 25) or vocal exercises (n = 25). Interventions were performed independently, using guided visual materials, three times per week for 30 min, over a six-week period. Assessments were conducted pre- and post-intervention during live sessions. Measurements included thoracic excursion at three levels (Th3–4, Th7–8, Th11–12), breath-hold tests, spirometry using a Contec SP80B device (PEF (peak expiratory flow), FVC (forced vital capacity), FEV1 (forced expiratory volume in one second), dynamic neuromuscular stabilisation (DNS) tests, and four core stability tests using Stabiliser Pressure Biofeedback. Data were analysed using IBM SPSS Statistics.

Results. Significant improvements were observed in the breathing exercise group in thoracic excursion (Th3–4, Th7–8, Th11–12), breath-hold performance, PEF, and DNS head-neck-torso flexion tests. The vocal exercise group showed significant improvements in all thoracic excursion levels, breath-hold tests, spirometry parameters, and DNS tests including diaphragm activation, as well as head-neck-torso flexion and extension. A significant between-group difference was found in FVC, FEV1, and left-leg Core Stability Test outcomes, favouring the vocal exercise group.

Conclusions. Both breathing and vocal exercises positively influence respiratory function, muscle strength, and endurance. Vocal exercises additionally improve core stability. Vocal exercises demonstrate superior effectiveness in enhancing several respiratory parameters compared to breathing exercises.

Keywords. Breathing exercises, vocal exercises, core stability, respiratory function, pulmonary rehabilitation.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Digital Health Literacy in Rehabilitation and Physical Activity Promotion: A Framework for Evaluating Online Information Quality

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Background and aim. The internet is a primary source for health and physical activity information, raising concerns about its quality and impact on health decisions. It has been identified that consumers use 25 different criteria and 165 indicators when evaluating the quality of health information, highlighting the complex and subjective nature of online health information assessment. This literature review synthesises research (2018–2025) on evaluating online health information quality, focusing on physical activity content, Lithuanian resources, and social media, aiming to identify current trends and research gaps.

Methods. A systematic literature review was conducted using PubMed, Web of Science, and Google Scholar. Search terms included “health information quality”, “physical activity”, “website evaluation”, “social media”, and “Lithuanian”. Studies evaluating online health information quality, physical activity resources, Lithuanian content, and social media platforms were analysed.

Results. Online health information quality remains suboptimal, with fair to poor ratings using DISCERN and JAMA benchmarks. Physical activity information shows methodological weaknesses in reviews and limitations in AI-generated advice. Research on Lithuanian resources is limited. Social media is a prevalent source but its quality is variable, and traditional evaluation tools may not be suitable.

Conclusions. Significant research gaps exist in evaluating online health information quality, particularly for physical activity, non-English contexts, and social media. Specialised frameworks and further research are needed to address these gaps and ensure access to reliable information.

Keywords. Health information quality, digital health literacy, website evaluation, physical activity information, social media.

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Effect of Breathing Type During Isokinetic Resistance Training on Intraocular Pressure and Systemic Blood Pressure

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Background and aim. The altering effect of physical exercise on intraocular pressure (IOP) has been reported both in healthy people and those with glaucoma, but a comparison of breathing effect on IOP has not been conducted in up-to-date research. The study aimed to evaluate the influence of breathing pattern during isokinetic resistance exercise on IOP, blood pressure (BP), and heart rate (HR).

Methods. In this experimental study 16 (50% women) healthy individuals performed isokinetic calf extension on Biodex apparatus for a minute while breathing normally (NB) and holding their breath for 10 s in the last round (Valsalva maneuver, VM). IOP, BP, and HR were measured before, right after, 5, 10, 15 min after exercise with rebound tonometer (iCare).

Results. There was a statistically significant IOP decrease after 5, 10, 15 min after exercise in both breathing patterns, compared with baseline IOP ($p < 0.05$). There was a statistically significant systolic BP increase right after and 15 min after exercise in NB, and right after and 5 min after exercise in VM. Diastolic BP increased significantly right after, 10, 15 min after exercise in NB and right after in VM ($p < 0.05$). HR increased statistically significantly right after exercise in both breathing patterns ($p < 0.05$). The statistical analysis showed that there are no linear quantitative correlations between BP or HR changes and IOP changes.

Conclusions. A single set of maximal isokinetic resistance training causes an instantaneous IOP decrease in healthy young individuals. Changes in BP and HR values have no linear quantitative correlation with IOP decrease. Future studies should include glaucoma patients aiming to corroborate the generalisability of the findings.

Keywords. Intraocular pressure, exercise, Valsalva maneuver, blood pressure, heart rate.

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Effect of Broccoli Powder on Recovery After Exercise Induced Muscle Damage

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Background and aim. Exercise-induced muscle damage (EIMD) leads to soreness, inflammation, and reduced function, affecting recovery and performance. Nutritional interventions with bioactive compounds may support muscle repair. This study examines the effects of high-glucoraphanin broccoli powder on muscle recovery, delayed onset muscle soreness (DOMS), and hypertrophy following eccentric arm exercise.

Methods. A randomised, double-blind, placebo-controlled crossover trial was conducted with healthy males (18–35 years) who had not engaged in regular gym training for at least six months. Participants performed 60 maximal eccentric biceps contractions on a Biodex dynamometer. They consumed either broccoli powder (10 g daily) or a placebo (spinach powder) for one week before and three days after exercise. Muscle soreness was assessed using a 10-point scale, while creatine kinase (CK) levels were measured from blood samples. Ultrasound imaging was used to evaluate muscle damage and recovery on days zero, two, and four. Range of motion (ROM) was assessed before and after exercise and on days two and four.

Results. Isometric and isokinetic peak torque, as well as elbow joint angles, decreased significantly post-exercise in both groups ($p < 0.001$), with no differences between conditions ($p > 0.05$). Muscle soreness, arm girth, and CK activity increased similarly, with CK showing high variability despite a 50-fold rise ($p < 0.05$).

Conclusion. Broccoli supplementation did not enhance muscle recovery under the tested conditions. Further research should explore optimal dosage, timing, and exercise conditions to assess its potential benefits.

Keywords. Broccoli powder, glucoraphanin, exercise-induced muscle damage, muscle recovery, inflammation, oxidative stress.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Effect of Mental Fatigue on Information Retention

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Background and aim. Mental fatigue is a cognitive state characterised by decreased performance due to prolonged cognitive exertion. It impairs attention, working memory, and information retention by reducing cognitive control and attentional resources. Neurobiological studies link mental fatigue to diminished prefrontal cortex activity, which plays a crucial role in attention regulation and memory processing. Prior research has shown that cognitive fatigue slows information processing, reduces recall accuracy, and negatively affects decision-making. However, the long-term effects of fatigue on different types of learning, such as motor, visual, and auditory information retention, remain unclear. This study aims to investigate the impact of cognitive fatigue on these domains and determine whether fatigue-induced impairments persist over time.

Methods. A randomised controlled trial was conducted with healthy adults (19–35 years old), divided into a control group (no cognitive fatigue) and an experimental group (subjected to a two-hour Go/No-Go Task). Participants completed cognitive assessments, including the Rey Auditory Verbal Learning Test (RAVLT), Code Substitution Learning (CDS), and Code Substitution Delayed (CDD) tests. Motor learning was analysed using the DPA-1 movement analyser. Retests were conducted at 24 hours and seven days to measure memory retention and recovery.

Results. For motor learning retention in a Stable Task, fatigued participants showed improved reaction time after seven days, indicating no long-term negative effects, while the control group exhibited significant improvements in time to maximal speed ($p = 0.026$). In a Variable Motor Task, the fatigued group experienced a significant decrease in average speed after seven days ($p < 0.05$), suggesting an impact on retention. The control group showed significant improvements in speed and accuracy parameters within 24 hours ($p < 0.05$). Visual and auditory memory retention remained unaffected in both groups ($p > 0.05$).

Conclusions. Mental fatigue does not impair stable motor skill retention but negatively affects variable motor learning. Visual and auditory memory remain stable despite fatigue. These findings highlight the need for recovery strategies to optimise learning efficiency.

Keywords. Mental fatigue, information retention, cognitive load, memory encoding, learning efficiency.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Effect of Mirror Therapy on Upper Extremity Function in Stroke Patients: Systematic Review

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Background and aim. Cerebral stroke is defined as an acute focused lesion of the central nervous system due to vascular causes. Motor impairment of the upper limb, i.e. the arm, hand and/or fingers, is often permanent and disabling. Activities of daily living are particularly dependent on hand function, especially such personal tasks as eating, dressing, and self-care. It is for this reason that improving upper extremity function after stroke is a key element of post-stroke rehabilitation to maximise motor recovery.

Methods. Randomised controlled trials comparing upper extremity mirror therapy with other rehabilitation methods were included. Due to the large number of outcome measures used, several rating scales were chosen to facilitate qualitative assessment. The effect size of studies was calculated using Cohen’s D formula.

Results. A total of 29 randomised controlled trials were identified and analysed. The assessment of motor function outcomes showed a small effect size with ARAT (Action Research Arm Test), WMFT-Time (Wolf Motor Function Test Time Scale), and FMA-UE (Fugl-Meyer Assessment-Upper Extremity) evaluations; a moderate effect size with MFT (Manual Function Test) and BBT (Box and Block Test) evaluations; a large effect size with WMFT-FAS (Functional Ability Scale) evaluation. The evaluation of additional indicators revealed a small effect size with BRS (Brunnstrom Recovery Stages), FIM (Functional Independence Measure), MBI (Modified Barthel Index), and MAS (Motor Assessment Scale) evaluations, while MI (Motor Imagery) assessment indicated a large effect size.

Conclusions. Mirror therapy intervention has a variable, mostly small to moderate, effect on upper limb motor function recovery after stroke, depending on the assessment method and study design. Mirror therapy is particularly effective in improving hand dexterity and motor function but its impact on reducing spasticity is limited. Future systematic reviews are recommended to improve methodological quality, increase sample size, and optimise mirror therapy parameters. In addition to that, it is important to periodically update reviews by incorporating the latest studies and additional objective and subjective assessment measures.

Keywords. Mirror therapy, upper limb, stroke patients, acute stroke, chronic stroke.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Effects of Balance and Breathing Exercises on Emotional State, Walking Speed, and Balance in Ischaemic Stroke Patients

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Background and aim. Stroke is the fourth leading cause of death and the third leading cause of disability worldwide. Survivors are often left with a range of sequelae that significantly impair their quality of life. Common challenges include loss of self-confidence, fear of falling, difficulty with everyday movements, and reduced independence. The aim of this study was to compare the effectiveness of combined balance and breathing exercises on emotional state, walking speed, and balance in patients who have experienced ischaemic stroke.

Methods. This study involved 30 participants, who were randomised into two groups. Group A performed both balance and breathing exercises, while group B followed a balance exercise programme only.

Before the intervention, demographic data (gender, age, time since stroke) were collected. Both groups were assessed at baseline and post-intervention using the 10-Meter Walk Test for gait speed, the Beck Depression Inventory for emotional state, and the Berg Balance Scale for balance. The intervention lasted five weeks, with three sessions per week.

Results. Both group A and group B showed statistically significant improvements in balance, emotional state, and gait speed after the intervention ($p < 0.05$). However, no significant difference was found between the groups when comparing results, as the observed power of the test was below 0.8. Despite this, participants in group A demonstrated greater improvement in balance compared to those in group B.

Conclusions. Balance, gait speed, and emotional state improved in both groups following the intervention. The changes in gait speed and emotional state were similar between the two groups, while group A participants experienced a greater improvement in balance than those in group B.

Keywords. Ischaemic stroke, rehabilitation, motor control, breathing exercises, neurorehabilitation.

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Effects of Two Hours of Continuous Mental Work on Cognitive Fatigue and Motor Learning

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Background and aim. Daily activities can lead to mental fatigue, marked by sleepiness, impaired concentration, and reduced efficiency. Prolonged sitting in classes contributes to this cognitive load. The Go/No-Go Task is commonly used to induce mental fatigue and reduce performance. This study aims to explore how two hours of continuous mental effort affects cognitive fatigue and motor learning performance in young adults.

Methods. The study involved 10 healthy participants aged 18–35, divided into two groups: experimental group ($n = 5$) that performed a two-hour Go/No-Go Task to induce cognitive fatigue, and a control group ($n = 5$) that engaged in neutral activities. Testing before and after the intervention measured motor control with a movement analyser DPA-1 and cognitive performance through an Auditory Go/No-go Task and visuospatial tasks using OpenSesame software.

Results. The experimental group showed no significant changes in performance after two hours of cognitive effort ($p > 0.05$). In contrast, the control group improved in average speed ($p = 0.026$) and reaction time variability ($p = 0.035$) after rest. Neither group exhibited significant retention effects one-hour post-learning. Analysis of cognitive performance revealed no significant changes in reaction time or accuracy, indicating that cognitive fatigue did not impair performance ($p > 0.05$).

Conclusions. The study showed that the two-hour Go/No-Go Task did not significantly affect motor learning, while the control group improved in speed and reaction time variability, highlighting the benefits. Both groups had no significant changes in cognitive functions. The small sample size limits generalisability, indicating need for future research with larger, more diverse populations and a focus on individual fatigue susceptibility.

Keywords. Cognitive fatigue, motor learning, reaction time, Go/No-Go Task, Auditory Task.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Effects of Vitamin K2 (MK-7) on Soleus Muscle Remodelling During Ankle Immobilisation and Rehabilitation After Injury in Middle-Aged Patients

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Background and aim. Vitamin K2 (menaquinone-7, MK-7) may influence musculoskeletal health but its effects on human skeletal muscles remain unclear. This study investigated whether MK-7 supplementation could mitigate soleus muscle atrophy and enhance recovery post-ankle injury.

Methods. A double-blind, randomised trial included 20 participants (12 men, 8 women; age 50 ± 11 years) with ankle injuries requiring six weeks of immobilisation followed by six weeks of rehabilitation. They received either 333 μg/day of MK-7 or a placebo. Soleus muscle cross-sectional area (CSA) was assessed via ultrasound, while plasma levels of MK-7, IGF-1 (insulin-like growth factor 1), myostatin, and 25-OH vitamin D3 were measured.

Results. The MK-7 group had significantly higher plasma MK-7 levels than the placebo group ($p < 0.01$). Both groups showed similar reductions in CSA post-immobilisation (–11.7% ± 4.4 vs. –12.8% ± 3.5%, $p > 0.05$) but the MK-7 group exhibited a greater recovery trend after rehabilitation (94.4% ± 4.8 vs. 91.7% ± 2.8% of baseline, $p > 0.05$). Higher myostatin levels in the MK-7 group may have counteracted its effects.

Conclusions. While MK-7 did not prevent atrophy, it showed potential in accelerating muscle recovery. Further studies are needed to optimise the dosage and explore synergies with resistance training.

Keywords. Vitamin K2, rehabilitation, injury recovery, nutritional supplements, skeletal muscle.

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Exploring the Role of Post-Game Mobility Exercises on Muscle Recovery and Injury Prevention in Football Players

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Background and aim. Football players experience significant physical demands, leading to muscular fatigue, microtrauma, and increased injury risk. Recovery strategies are essential for sustaining performance and reducing injuries. While passive methods like rest and cryotherapy are common, active recovery techniques, particularly post-game mobility exercises, are gaining attention as well. These exercises incorporate dynamic stretching, joint mobilisation, and controlled articular rotations to enhance recovery. Despite their growing use, their effectiveness in football remains underexplored. This study examines whether post-game mobility exercises aid muscle recovery by assessing their impact on soreness, flexibility, and injury prevention.

Methods. A cross-sectional study was conducted among competitive male football players (18–30 years) who played weekly matches. Participants followed a structured post-game mobility drill protocol. Outcomes were assessed using validated tools: the Visual Analog Scale (VAS) for soreness, range of motion (ROM) for the hip, knee, and hamstring flexibility, and the Rating of Perceived Exertion (RPE) scale.

Results. Mobility exercises significantly improved hamstring flexibility (+15.09°; 21.8%), hip ROM (+12.58°; 13.6%), and knee ROM (+12.49°; 10.6%). Muscle soreness (VAS) decreased by 4.02 points (62.3%), while perceived exertion (RPE) dropped by 3.82 points (49.0%). These findings support the role of mobility exercises in reducing tightness, restoring joint function, alleviating pain, and enhancing recovery.

Conclusions. Incorporating post-game mobility exercises can optimise muscle recovery, improve flexibility, and reduce injury risk in football players. These findings highlight the importance of active recovery strategies in maintaining athletic performance and preventing injuries. Further studies should explore long-term benefits and variations in mobility protocols.

Keywords. Injury prevention, muscle recovery, mobility exercises, sports performance, athletes.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

From the Ground Up: Are Pelvic Floor Dysfunction Symptoms Associated With Proximal, Distal, or Reactive Lower Limb Strength Measures in Elite Women’s Rugby Union Players?

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Background and aim. Pelvic floor dysfunction (PFD) is a disorder frequently experienced by Women’s Rugby Union (WRU) players. To date, stress urinary incontinence (SUI) is the most reported PFD symptom by female players irrespective of their childbirth status; detrimentally affecting athletic performance and long-term well-being. With soaring WRU participation and growth of professional contracts, there is a strong call to formally recognise, acknowledge, and track PFD symptoms within female players’ standard care. The study aims to inform rugby-related PFD management and long-term player welfare strategies.

Methods. This retrospective, single-cohort, observational pilot study calculates incidence of potential PFD symptoms in a convenience sample of 30 WRU players; a minimum of 18 years old, from a UK elite first XV WRU team. The study investigates if players’ PFD symptoms are associated with their pre-season proximal, distal, or reactive lower limb strength (LLS) measures. Mann-Whitney U Test explored the difference between binary PFD and continuous LLS data whilst logistic regression modelled association.

Results. Study results demonstrate 90% of 30 elite WRU players reported incidence of one or more (≥ 1) urinary and 67% reported ≥ 1 anorectal PFD symptom. No significant association between potential PFD symptoms and LLS measures were found.

Conclusions. This novel study is the first to examine an association between PFD symptoms and pre-season LLS measures in elite WRU players. Results may have been influenced by small sample size and several confounding variables. Practical recommendations for future research are made to help advance WRU pre-season screening and inform welfare strategies and direct rugby-related PFD management.

Keywords. Pelvic floor dysfunction, Women’s Rugby Union, lower limb strength.

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Immediate Effect of Kinesiology Taping and Proprioceptive Neuromuscular Facilitation on Static and Dynamic Balance

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Background and aim. Movement is essential for daily activities and sports, relying on postural control, joint stability, and neuromuscular coordination. Balance is crucial for stability, and its impairment is often linked to ankle injuries. While kinesio-taping (KT) and proprioceptive neuromuscular facilitation (PNF) are common rehabilitation methods, their comparative effectiveness in improving balance remains unclear. The aim of the study was to compare the immediate effects of KT and the PNF hold-relax technique on both static and dynamic ankle balance, evaluate their overall impact on ankle function, and determine whether there is a significant difference between these two methods in enhancing postural stability.

Methods. A total of 60 participants were assessed using the Biodex Balance System (BBS) for static balance and Y-Balance Test (YBT) for dynamic balance. They received PNF hold-relax technique followed by KT or vice versa, with a seven-day rest period. Balance was reassessed after each intervention. Data was analysed using repeated measures ANOVA. Research design—quantitative research.

Results. The study found that both KT and PNF techniques significantly improved static and dynamic balance, with KT showing greater effectiveness, particularly in the posteromedial direction ($d = 1.41$). Participants demonstrated stronger performance on balance measures with their dominant leg compared to the non-dominant leg ($\eta^2p = 0.25–0.46$). Additionally, significant correlations were noted between KT and PNF in sway directions (anterior/posterior: $r = 0.52$; medial/lateral: $r = 0.49$, $p < 0.001$). Overall, while both techniques are beneficial, KT may offer enhanced stability improvements in balance training.

Conclusions. Both techniques improved bilateral correlation and dynamic balance, with KT being more effective. Future research should explore alternative PNF methods, ankle range of motion (ROM), analysis of electromyography (EMG) signals, and diverse populations to refine balance interventions.

Keywords. Kinesio-taping, PNF hold-relax technique, dynamic balance, bilateral static balance.

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Lifestyle Choices in Relation to Stress and Depression Among University Students

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Background and aim. Mental health issues, particularly anxiety and stress, are increasingly common among university students. This study examines how lifestyle factors such as alcohol consumption, nicotine dependence, physical activity, and social support affect students' mental health. Specifically, it aims to assess the prevalence of stress and depression, the relationship between physical activity and mental health, the impact of alcohol and nicotine use, demographic influences, and the role of coping strategies in shaping these outcomes.

Methods. An online survey was conducted, collecting data from 405 university students (149 males and 256 females) in Lithuania. Participants completed standardised psychological scales measuring anxiety, stress, alcohol use, nicotine dependence, physical activity, and social support.

Results. Key findings show that higher nicotine dependence and alcohol use were strongly linked to increased anxiety and stress, while social support emerged as a major protective factor. Physical activity showed little impact on mental health, possibly due to work-related exertion like cycling in delivery jobs, especially among males, justifying the need for further study. Male students reported higher anxiety than females, and smokers experienced more stress than non-smokers. The results highlight the need for interventions targeting substance use reduction and improved social support to protect students' mental health.

Conclusions. Higher nicotine dependence and alcohol use were linked to increased anxiety and stress, while strong social support emerged as a major protective factor. Physical activity showed no significant effect on mental health, justifying the need for further study. Further research should explore whether leisure or work-related physical activity better supports students' well-being.

Keywords. Mental health, university students, physical activity, alcohol use, nicotine dependence.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

Reliability and Usefulness of Objective Internal Load Measures During a Submaximal Incremental Intermittent Court-Based Test in Basketball

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Background and aim. The use of maximal performance tests to assess players’ fitness levels during the basketball season has been considered impractical due to high injury risk in fatigued state and motivation issues. Therefore, suitable alternatives such as submaximal fitness tests should be considered. The aim of the study was to assess the reliability and usefulness of objective internal load measures using the Submaximal Version of the Yo-Yo Intermittent Recovery Test-1 (Yo-Yo IR1-Sub, lasting 3 min and 42 s) in youth male basketball players.

Methods. After familiarisation, 14 high-level youth basketball players aged between 15 and 16 years completed the Yo-Yo IR1-Sub Test in two consecutive weeks. The exercise heart rate (HRex) and recovery heart rate (HRR) measured at 30, 60, 120, and 180 s were recorded with a HR monitoring system (Polar, Finland). Test-retest reliability was assessed using the intraclass correlation coefficient (ICC) and the typical error of measurement (TE), while the test usefulness was determined by comparing the smallest worthwhile change calculated as 0.2 and 0.5 multiplied by the between-subject standard deviation (SWC0.2 and SWC0.5, respectively) with the TE.

Results. No differences were found in HRex and each HRR value between the two investigated testing sessions ($p > 0.05$). All dependent variables reported ICC values ≥ 0.70, indicating good test-retest reliability. Moreover, low coefficient of variation (CV) values were found for HRex (2.3%), HRR30 (3.5%), and HRR60 (4.0%), while higher values were found for HRR120 (5.7%) and HRR180 (8.1%). The usefulness of the test was found to be “Marginal” for all the studied variables when comparing TE values with SWC0.2, while “Good” capacity to detect changes were shown when comparing TE values with SWC0.5.

Conclusions. The Yo-Yo IR1-Sub demonstrated acceptable reliability (except for HRR120 and HRR180) and can be considered a suitable tool for detecting moderate-to-large changes in HR objective internal load measures in youth basketball.

Keywords. Heart rate recovery, fatigue, fitness.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Effectiveness of Active Breaks on Non-Specific Neck Pain Among Office Workers: A Literature Review

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Background and aim. Non-specific neck pain (NSNP) is a prevalent musculoskeletal condition among office workers, primarily associated with prolonged static postures and sedentary work. Active or exercise breaks during working hours have been suggested as a practical approach to mitigate the effects of prolonged sitting. This literature review aims to synthesise current evidence on the effectiveness of active breaks in reducing NSNP among office-based populations.

Methods. A literature review was conducted using databases including PubMed, Scopus, and ScienceDirect. A total of 11 peer-reviewed studies published between 2014 and 2024 were selected based on eligibility criteria focusing on adult office workers experiencing NSNP and interventions involving active or exercise breaks. Methodological quality was assessed using standardised critical appraisal tools.

Results. Many studies reported positive effects of active breaks on reducing neck pain intensity. Interventions typically included brief sessions of stretching, postural exercises, or mobility drills performed during working hours. Despite some heterogeneity in intervention protocols and outcome measures, the collective findings indicate that active breaks are beneficial for managing NSNP in sedentary occupational settings.

Conclusions. Active breaks represent a feasible and effective strategy for alleviating non-specific neck pain among office workers. The findings support the integration of movement-based interventions into daily work routines to enhance musculoskeletal health. Further research with standardised protocols is needed to confirm long-term efficacy and optimise intervention design.

Keywords. Active breaks, non-specific neck pain, office workers, sedentary behaviour, literature review.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Effectiveness of Blood Flow Restriction Training on Rehabilitation After Knee Surgery: A Systematic Review and Meta-Analysis

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Background and aim. Blood flow restriction (BFR) training has gained recognition as an effective adjunct to rehabilitation after knee surgery, offering muscle strength and function improvements with low mechanical load. This study aimed to systematically evaluate and synthesise the evidence on BFR training effects on rehabilitation results in individuals recovering from knee surgery, using meta-analysis, subgroup analyses, and meta-regression.

Methods. A systematic search was conducted across six databases up to March 15, 2025. Randomised and quasi-randomised controlled trials were included. Standardised mean differences (SMDs) were pooled using random-effects meta-analysis. Subgroup analyses were conducted by age, sex ratio, load, pressure, duration, surgery type, timing, and outcome type. Equivalence testing and meta-regressions were used to explore moderators. Nineteen studies were included.

Results. BFR training showed a significant positive effect on overall outcomes (95% CI: 0.24–0.58, $p < .001$). Subgroup analyses revealed that BFR was most effective in young (95% CI: 0.23–0.62, $p < .001$) and middle-aged adults (95% CI: 0.31–0.87, $p < .001$), during the acute (95% CI: 0.20–0.68, $p < .001$) and subacute phases (95% CI: 0.38–1.06, $p < .001$), with low-load protocols (95% CI: 0.26–0.61, $p < .001$) and either high (95% CI: 0.27–0.67, $p < .001$) or low occlusion pressures (95% CI: 0.19–1.42, $p < .001$), for from moderate (95% CI: 0.18–0.74, $p = .001$) to long (95% CI: 0.24–0.53, $p < .001$) durations. BFR significantly improved strength ($p < .001$) and functional outcomes ($p = .001$). It was effective for patients undergoing ACL (anterior cruciate ligament) reconstruction (95% CI: 0.24–0.72, $p < .001$) or mixed surgery types (95% CI: 0.50–0.94, $p < .001$) but not for total knee arthroplasty (95% CI: –0.47 to 0.06). Meta-regression revealed no moderating effects of age, sex ratio, or sample size.

Conclusions. BFR training is effective in improving strength and function following knee surgery, particularly when applied early in rehabilitation, using low-load protocols with either high or low occlusion pressure for moderate to long durations, and in young to middle-aged adults. Its effectiveness is consistent across sex groups. However, its effects on endurance, fatigue, and bone mass remain inconclusive. Clinical application of BFR should consider patient-specific factors such as surgical type, recovery phase, and outcome targets.

Keywords. Blood flow restriction, knee, meta-analysis, knee surgery, post-operative rehabilitation.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Effects of Exercise and Manual Therapy Versus Exercise Alone on Knee Pain and Joint Function in Postmenopausal Women with Knee Osteoarthritis

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Background and aim. Knee osteoarthritis (KOA) is a leading cause of pain and functional impairment in postmenopausal women, significantly reducing mobility and quality of life. Exercise therapy is widely recognised as a fundamental component of KOA management, helping to reduce pain, improve joint stability, and enhance overall function. However, emerging evidence suggests that manual therapy, including joint mobilisation and myofascial techniques, may provide additional benefits by reducing stiffness and enhancing joint mechanics. Despite these potential advantages, limited research has directly compared the effectiveness of exercise therapy alone versus its combination with manual therapy in postmenopausal women with KOA. This study aims to address this gap by evaluating the impact of both interventions on knee pain and joint function.

Methods. This randomised controlled trial followed a quantitative interventional experimental design. Forty postmenopausal women with KOA were randomly assigned to either an Exercise Therapy Only group (n = 20) or an Exercise + Manual Therapy group (n = 20). The intervention lasted eight weeks, with twice-weekly supervised sessions. Both groups followed a structured physiotherapy programme, with the intervention group receiving additional joint mobilisation and myofascial release techniques. Outcome measures were assessed at baseline (week zero) and post-intervention (week eight), including pain intensity (Visual Analogue Scale, VAS), joint function (WOMAC Function Subscale and goniometer-measured knee flexion range of motion), and physical performance (Timed Up and Go test). Statistical analysis was conducted using SPSS (Version 26) with ANOVA for repeated measures, paired t tests, and ANCOVA to adjust for confounding variables.

Results. Results showed that both interventions significantly reduced pain and improved mobility. Exercise combined with manual therapy led to greater improvements in pain reduction, range of motion, and functional mobility compared to exercise alone. However, no significant between-group difference was found in joint function as measured by the WOMAC Index.

Conclusion. Adding manual therapy to physiotherapy exercises can make treatment more effective for postmenopausal women with knee osteoarthritis.

Keywords. Knee osteoarthritis, postmenopausal women, exercise therapy, manual therapy, joint function.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Impact of a Virtual Reality Rehabilitation Programme on Physiological and Psychological Indicators

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Background and aim. The COVID-19 pandemic has significantly affected overall physical activity levels, contributing to reduced physical and psychological well-being. Previous studies show that just a few weeks of inactivity can lead to muscle atrophy and diminished mood. This study aimed to evaluate the effects of a five-day virtual reality (VR) rehabilitation programme on changes in physiological and psychological indicators.

Methods. Nine university students (six males, three females; age 23 ± 2 years) participated in a five-day VR rehabilitation intervention targeting the upper body. The programme included exercises via the VastRehab VR system. Psychological outcomes were measured using the Automated Neuropsychological Assessment Metrics (ANAM), FaceReader 7 software, and physiological indicators were monitored using the Polar H10 heart rate sensor. Participants completed cognitive tasks and emotional response assessments before and after each session.

Results. The five-day intervention led to statistically significant improvements ($p < 0.05$) in several parameters: heart rate during activity decreased, indicating improved physiological response; cognitive reaction times improved and attention increased; additionally, participants showed a significant rise in positive emotional responses and motivation throughout the sessions.

Conclusions. Short-term VR rehabilitation has a statistically significant positive impact on both physiological and psychological indicators. These findings suggest VR is a promising tool in physical and mental recovery contexts, especially in populations affected by reduced physical activity. Future research should explore long-term effects and larger population samples.

Keywords. Virtual reality, rehabilitation, physiological indicators, psychological indicators, cognitive performance.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Relationship Between Adolescent Idiopathic Scoliosis, Trunk Muscle Function, and Gait Parameters

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Background and aim. Adolescent idiopathic scoliosis (AIS) is the most common spinal deformity in the paediatric population, accounting for 70–80% of all cases. AIS can impair overall motor control, leading to reduced trunk muscle endurance and compromised postural stability. Altered postural control may also affect the body’s centre of mass, influencing gait stability and related parameters. Despite these connections, there is a lack of targeted studies investigating the relationships among scoliosis severity, trunk muscle function, postural control, and gait. This study aimed to evaluate the correlations between AIS, trunk muscle endurance, and gait characteristics.

Methods. This cross-sectional study included 21 adolescents diagnosed with idiopathic scoliosis. Assessments comprised anthropometric measurements, the McGill trunk muscle endurance tests, the Modified Star Excursion Balance Test for dynamic postural control, and gait analysis using the Zebris FDM force platform system.

Results. Correlation analysis revealed statistically significant moderate to strong associations ($p < 0.05$) between Cobb angle magnitude and dynamic postural control, as well as stance parameters, including plantar pressure distribution. Comparisons between scoliotic and non-scoliotic sides showed significant asymmetries ($p < 0.05$) in step length, stance characteristics, and dynamic postural control. Additional analyses indicated significant relationships ($p < 0.05$) between trunk muscle endurance and both postural control and gait metrics, as well as between gait parameters, dynamic postural control, and plantar pressure variables. Significant interrelationships were also found among spatiotemporal and gait phase parameters.

Conclusions. Greater spinal curvature in adolescents with AIS is associated with impaired postural control, asymmetrical gait patterns, and altered weight distribution. These findings underscore the interdependence of postural control, gait mechanics, plantar pressure, and trunk muscle endurance, highlighting the importance of integrated clinical assessments and interventions targeting these functional domains.

Keywords. Adolescents, idiopathic scoliosis, trunk muscle endurance, trunk stability, gait, gait parameters.

Funding and disclosures. No funding was received. The authors declare no conflicts of interest.

The Relationship Between Adolescents’ Physical Activity and Health Behaviour

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Background and aim. Adolescence is a critical period for establishing lifelong health habits, with physical activity playing a pivotal role in preventing chronic diseases and promoting overall well-being. However, many adolescents engage in insufficient physical activity, which is often linked to risky lifestyle behaviours. The purpose of this study was to evaluate the associations of physical activity with diet, screen time, and risky behaviour among adolescents.

Methods. This cross-sectional study included 356 Biržai district pupils (50.3% girls) aged 10–16 years, with a mean age of 1.78 years, studying in grades five, seven, and nine. Physical activity and unhealthy lifestyle (tobacco, e-cigarette smoking, alcohol consumption, and others) were assessed using a questionnaire compiled by the Lithuanian Institute of Hygiene, which is used to study the lifestyle of Lithuanian schoolchildren throughout the country.

Results. Only 37.1% of students are physically active. Boys (42.9%) are significantly more physically active than girls (31.3%) ($p = 0.23$). No differences were found when comparing by grade. Pupils with adequate physical activity are significantly more likely to consume fruit ($p = 0.21$) but the frequency of consumption of vegetables, sweets, and soft drinks is not significantly different from other pupils. Physically active pupils spend significantly more time using screens at the weekend ($p < 0.01$). However, they are more satisfied with their family ($p = 0.023$) and have a better health attitude ($p = 0.001$). The frequency of alcohol consumption ($p = 0.39$), e-cigarette ($p = 0.627$) and tobacco products ($p = 0.95$) smoking does not differ between physically active and inactive pupils.

Conclusions. Just over a third of pupils in grades five, seven, and nine are physically active. They eat more fruit and spend more time using screens at the weekend but their rate of harmful habits does not significantly differ from that of physically inactive pupils.

Keywords. Adolescents, physical activity, health behaviour.

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Weight-Related Pressure and Eating Disorders in Aesthetic, Other Weight-Sensitive, and Less Weight-Sensitive Sports

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Background and aim. Disordered eating (DE) and eating disorders (ED) are highly prevalent mental health challenges among athletes and can severely impact both well-being and performance. Identifying the contributing factors behind DE is essential to improve preventative strategies.

Methods. This study included 1 003 athletes aged 15–44 years (average age 18.9 ± 5.8), with females comprising 51.3% of the sample. Participants completed measures assessing disordered eating behaviour, concerns about body weight, and perceived socio-cultural and coach-related appearance pressures.

Results. Female athletes in aesthetic weight-sensitive sports exhibited significantly higher rates of DE, body weight preoccupation, and perceived pressure from coaches compared to peers in less weight-sensitive disciplines. Compared to male athletes, females were considerably more likely to report recent dietary restriction (96%), binge eating (47%), and excessive physical activity aimed at weight reduction (51%). Involvement in less weight-sensitive sports was associated with a 49% reduction in dietary restriction and a 43% reduction in excessive exercise behaviours compared to those in aesthetic weight-sensitive sports. Similarly, athletes engaged in other types of weight-sensitive sports were 44% less likely to report excessive exercising. These patterns were particularly associated with female gender and participation in weight-sensitive sports.

Conclusions. There is a pressing need to implement prevention programmes addressing disordered eating, especially targeting female athletes in aesthetic sports. Equally, coaches of such athletes must receive targeted education to support healthy body image and eating behaviours.

Keywords. Athletes, competitive sports, eating disorders, body image, body weight control.

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