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BOOK OF ABSTRACT

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Multidisciplinary Approach for Assessing the Quality of Onlay Dental Restauration

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Abstract

The quality of dental restorations is an impact parameter and has a significant influence on the patient's comfort in the oral cavity. From a technological perspective, this parameter can be evaluated from the point of view of both the dental crown manufacturing process and dental prosthetic operations. In this sense, this paper presents the approach to evaluating the quality of dental crown surfaces from the perspective of materials science and engineering. A first aspect discussed concerns the influence of the chemical composition of dental crowns on their roughness. In the case of the production of dental crowns by casting, noble alloys (e.g., Au-Ag) used for onlay dental restorations determine a special quality of these medical devices, while non-noble alloys (e.g., Co-Cr, still used today) confer an inferior quality. The impact parameter is the thermal solidification range, namely the temperature difference between the liquidus and solidus lines of the binary equilibrium diagram. Another aspect of interest is represented by the onsite activities, in the dental office, which are carried out in order to prosthetically fix the dental crown. Thus, the milling operations, performed in order to adjust the crown geometrically as precisely as possible in the dental arch, can determine traces of wear of the medical device. The experimental protocol for analysing the influence of the above-mentioned technological factors on the surface quality of onlay dental restorations consists of: (1) the use of several categories of dental materials (noble alloys, non-noble alloys, ceramics) dedicated to the mentioned application; (2) in-vitro wear testing of the mentioned materials using the Taylor Hobson linear rotary tribometer (max. torque = 450 Nmm; max. load = 46 N; max. frequency 1.6 Hz; linear speed = (0.3 - 500) mm/s; max. sliding length = 60 mm; sliding time max. 40 days with acquisition frequency of 10 Hz) and the MCR 102 rheometer (stainless steel ball; normal loading 5N; rotation speed 1x10-7 m/s; dry testing in air); (3) imaging analysis of the surfaces of the studied and tested dental crowns, using the Nikon SMZ 745T optical stereomicroscope. The experimental results obtained are among the most spectacular and impactful in terms of: the choice of materials for this type of dental medical devices; the choice of the technology for developing dental restorations; selection of instruments and procedure for morphological adjustment of dental crowns.

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Perceived Physical and Psychosocial Benefits of Orienteering as a Leisure-Time Motor Activity: A Descriptive Cross-Sectional Study

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Abstract

Orienteering combines outdoor locomotion over varied terrain with route choice, environmental adaptation and progressive task solving. Although its cognitive and mental-health dimensions have been analysed previously using the broader questionnaire, the present study focused on a distinct thematic section addressing perceived physical and psychosocial benefits of orienteering as a leisure-time motor activity. A descriptive cross-sectional design was used. The analysis included 212 valid responses from participants who provided informed consent. The selected items addressed perceived effects on general health, physical fitness, cardiovascular endurance, coordination and balance, metabolism and calorie expenditure, muscular strength and tone, socialization, self-esteem, confidence in one's abilities, general well-being, and perceived physical demands compared with other sports. Items focused primarily on concentration, spatial navigation, planning, problem solving, digital technology, and mental health as a central outcome were not included in the main analysis in order to maintain a distinct research focus. Data were analysed using absolute and relative frequencies. Most respondents perceived orienteering as beneficial for general physical and mental health (90.1%). The most frequently reported physical benefits were improved cardiovascular endurance (75.5%), improved coordination and balance (75.0%), stimulation of metabolism and calorie expenditure (59.4%), and development of muscular strength and tone (58.0%). At the psychosocial level, 95.7% of respondents perceived orienteering as offering excellent or some opportunities for socialization, while 96.2% reported improvements in self-esteem or confidence in their own abilities. Respondents also described orienteering as physically distinct from other sports because it combines movement over varied terrain with balance, coordination, route adaptation and environmental constraints rather than relying on a single dominant motor demand. These findings suggest that orienteering may be promoted as an accessible leisure-time activity linking physical fitness, outdoor movement, social interaction, perceived competence and general well-being. The results are descriptive and based on self-reported perceptions; therefore, they should not be interpreted as evidence of causal effects. However, they support the use of orienteering in educational, recreational and health-promotion contexts and justify further studies integrating objective measures of physical fitness, psychosocial functioning and participation outcomes.

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Accelerated Rehabilitation Protocol After Lateral Meniscectomy in a Professional Athlete: A Case Study

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Abstract

Background: Meniscal tears are common among young athletes, accounting for 10–20% of all knee injuries, with medial meniscus lesions being more prevalent. Postoperative rehabilitation varies depending on the surgical technique used and aims to restore functional capacity and facilitate return to sports activity. However, current literature highlights the lack of standardized rehabilitation protocols and clear criteria regarding recovery progression and return to sport, particularly in athletes undergoing surgery for lateral meniscus injuries.

The aim of this study was to determine the effectiveness of postoperative physiotherapeutic rehabilitation following arthroscopic partial meniscectomy in the therapeutic management of meniscal tears.

Material and Methods: The present study was conducted on a 33-year-old male professional padbol player diagnosed with post-traumatic algofunctional sequelae following a lateral meniscus tear of the left knee, surgically treated by arthroscopic partial meniscectomy. The research had a descriptive, longitudinal, and prospective design as a single-case study (n=1), monitoring the patient's evolution before and after the physiotherapy rehabilitation program. The rehabilitation protocol was divided into functional phases consisting of specific therapeutic objectives and interventions. The program was individualized and progressively adapted according to the patient's functional evolution and was performed five times per week over a period of seven weeks. During the initial phase of rehabilitation, the therapeutic approach focused on preventing excessive loading of the operated knee, reducing pain and edema, and minimizing quadriceps weakness. The intervention aimed to restore full knee extension, normalize gait patterns, and improve overall functional performance. The rehabilitation strategy incorporated cryotherapy, neuromuscular electrical stimulation, and progressively graded therapeutic exercises in order to facilitate muscle activation and promote functional recovery. During the intermediate phase, emphasis was placed on increasing muscular strength throughout the entire lower-limb kinetic chain, enhancing neuromuscular control, and correcting altered movement patterns. Both open and closed kinetic chain exercises were progressively introduced, targeting the quadriceps, hamstrings, and lumbo-pelvic-hip musculature, alongside proprioceptive and functional training. Additionally, rehabilitation aimed to restore symmetrical gait and optimize movement quality during fundamental functional activities. Cardiovascular reconditioning exercises adapted to the athlete's profile were also integrated into the program. In the final phase of rehabilitation, the primary objective was the restoration of sport-specific functional abilities. The rehabilitation strategy included neuromuscular reconditioning and advanced functional training, with particular emphasis on improving motor control, movement quality, physical conditioning, and exercise tolerance. Training load progression was carefully monitored throughout this stage in order to minimize the risk of overload and recurrence while facilitating a safe return to sports participation. Functional assessment, including range of motion and muscle strength testing, and the Lysholm Knee Scale, was performed prior to the intervention and again 7 weeks after the initiation of the rehabilitation program.

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Results: An improvement was observed in all evaluated parameters. Knee flexion increased from 900 initially to 1350 after rehabilitation. Quadriceps and hamstring muscle strength reached normal levels by the end of the 7-week rehabilitation period. Furthermore, the patient achieved a final Lysholm score of 94/100 points.Conclusions: The implementation of an accelerated, individualized physiotherapy rehabilitation program adapted to postoperative functional stages contributed to improved joint mobility, increased muscle strength, and enhanced functional capacity of the operated knee. Despite the rapid progression of rehabilitation, the athlete demonstrated a favorable recovery without complications or signs of overload, allowing a progressive and safe return to sport-specific activities. These findings support the effectiveness of a controlled and carefully monitored accelerated rehabilitation protocol in facilitating complete return to sports activity while reducing the risk of recurrence.

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Physical Training in Performance Handball for Senior Female Players

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Abstract

Handball is a high-intensity intermittent team sport that requires players to repeatedly perform explosive and complex motor actions under conditions of physical fatigue and constant tactical pressure. At the senior level, especially in elite female handball, physical preparation represents a fundamental determinant of performance capacity, competitive efficiency, and injury prevention. The increasing speed of the modern game, combined with dense competitive schedules and elevated physiological demands, has highlighted the necessity of evidence-based conditioning programs specifically adapted to the characteristics of female athletes.

The present paper aims to examine the principal components of physical preparation in senior female handball players through a narrative literature review and critical analysis of recent scientific evidence. The review focused exclusively on studies published between 2023 and the present in order to provide an updated perspective on current trends and advances in elite handball conditioning research. The selection process included peer-reviewed articles investigating performance-level female handball players, while studies involving recreational athletes or exclusively male samples were excluded. Emphasis was placed on research addressing physiological demands, strength and conditioning strategies, injury prevention, recovery methods, and training optimization in professional and high-performance contexts.

The analysis identified several essential dimensions of physical preparation in female handball athletes. Muscular strength and power were consistently associated with throwing velocity, jump performance, sprint ability, and efficiency in physical duels. Speed and agility emerged as critical factors for both offensive and defensive transitions, particularly during rapid changes of direction and high-intensity accelerations. Aerobic and anaerobic endurance were shown to support repeated sprint ability and sustain performance throughout competitive matches. In addition, mobility and flexibility were identified as important contributors to movement efficiency and injury prevention.

The review also emphasized the importance of individualized training periodization adapted to the competitive calendar, player position, and physiological profile of athletes. Recent studies support the integration of neuromuscular training, eccentric strength development, plyometric exercises, and load monitoring systems to optimize performance while reducing the incidence of overuse injuries, particularly at the shoulder, knee, and ankle.

Another important aspect highlighted by the literature is the growing integration of physical conditioning with technical and tactical training. The findings of this review underline the necessity of individualized, evidence-based, and integrated conditioning strategies to maximize athletic performance, enhance competitive readiness, and minimize injury risk in senior female handball players.

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The role of therapeutic massage and cervical stretching in relieving pain from cervical spondylodiscarthrosis

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Abstract

Cervical spondylodiscartrosis is a degenerative condition of the cervical spine involving the intervertebral discs, the posterior joints, and the musculoskeletal apparatus, characterized by cervical pain (cervicalgia) localized in the back of the head, the shoulder region, the suboccipital area, along dermatomes in radicular forms. Treatment for the cervical spondylodiscarthrosis consists of the use of NSAIDs, analgesics, and muscle relaxants as pharmacological therapy, along with physical therapy that provides analgesic and muscle-relaxing effects. In addition, massage and stretching techniques targeting the neck and shoulder muscles are recommended, as well as exercises to strengthen the extensor muscles of the entire spine. Objectives: The aim of this study is to determine whether there is an improvement in the degree of mobility and flexibility of the cervical spine, as well as a reduction in the pain and muscle spasm in the cervical region, following the application of therapeutic massage techniques and cervical muscle stretching maneuvers, using the goniometer for mobility and the VAS pain scale as testing methods. Material and methods: To demonstrate these objectives, the study included two groups of patients: the control group (7 patients), who received analgesic and anti-inflammatory medication, and the experimental group (12 patients), who were prescribed therapeutic massage combined with muscle stretching techniques. Techniques from classical massage were applied, such as effleurage, stroking, and kneading, cervical myofascial massage, as well as massage of the suboccipital and shoulder trigger points, accompanied by FNP stretching techniques for the cervical muscles that combine isometric techniques to stimulate blood and lymphatic flow and relax tense muscles. Goniometric testing to assess cervical ROM, as well as evaluation using the VAS score, were performed at the start of the treatment, during the initial phase, and at 14-day intervals, immediately following the completion of massage therapy sessions. Results: Based on goniometer measurements, a slight improvement in mobility of the cervical spine was observed, more evident in flexion and lateral rotation. Regarding pain assessment using the VAS scale, two weeks after the initiation of massage and stretching procedures, an improvement in pain was observed, accompanied by a reduction in muscle tension in the cervical region, with a significantly lower score. Conclusions: Therapeutic massage combined with cervical stretching significantly improved both pain and muscle tension in the neck and shoulders of patients in the experimental group after a 14-day treatment session, compared to the control group, which received medication and showed no significant improvement in their parameters.

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Modern Training Strategies for Thigh Muscle Development in Professional Football Players: A PRISMA-Based Systematic Review

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Abstract

Background: The hamstring muscles play a very important role in the performance of professional football players, particularly during sprinting, acceleration, and changes of direction. Hamstring injuries remain extremely common and are closely associated with deficiencies in eccentric strength, muscle architecture, and neuromuscular control. Objective: This systematic review aimed to evaluate the effectiveness of contemporary training strategies for hamstring development in professional football players. Methods: The review was conducted in accordance with the PRISMA 2020 guidelines. Searches were conducted in PubMed, Scopus, and Web of Science for studies between 2000 and 2025. Inclusion criteria focused on intervention-based studies involving elite football players, with outcomes related to strength, performance, injury incidence, or muscle architecture. A total of 26 studies were included in the qualitative synthesis. Results: Eccentric training, particularly the Northren Hamstring Curls (NMC), consistently reduced injury incidence and increased muscle fibre length. Flywheel training improves eccentric strength, explosive strength, and sprinting. Plyometric training improved neuromuscular efficiency and explosive performance, although its impact on muscle structure was limited. Multimodal training approaches combining their methods demonstrated the most comprehensive benefits. Conclusions: Integrated training programs that combine eccentric. Flywheel and plyometric methods appear to be the most effective for optimizing performance and reducing the risk of injury in professional football players.

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Between the curriculum and the reality of the gym: integrating new sports into the physical education lesson in pre-university education based on students' choices - a critical synthesis of the specialized literature

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Abstract

If there is a persistent paradox in Romanian school physical education, it is the distance between what is taught and what students would like to do. Starting from this tension, this paper aims to critically synthesize the specialized literature on the integration of emerging sports disciplines into the physical education lesson in pre-university cycles, with an emphasis on the motivational dimension and the student's voice as a curricular decision-maker.

The search for articles was carried out in the Web of Science and Google Scholar databases. The analysis includes studies published between 2015 and 2026 and aims at three converging directions: the transformation of the adolescent's sports interest profile in the digital and post-pandemic era; the documented experiences of introducing sports such as pilates, teqball and colpbol into physical education classes in European and North American educational systems and the real institutional, infrastructural and attitudinal barriers faced by teachers trying to innovate.

What emerges from the synthesis is not an optimistic picture of guaranteed pedagogical success, but a more nuanced picture, where students had the opportunity to choose or co-decide on the contents, the participation rate increased, but the sustainability of these initiatives depended heavily on the local context and the teacher's willingness to take didactic risks. Multiple studies have shown that introducing alternative sports into physical education lessons generates measurable increases in active participation and student satisfaction, with colpbol proving highly effective in promoting inclusion and equal participation, and teqball relevant results in developing coordination and transferable technical skills.

Through this work, we want to show that the integration of new sports is not a problem of material endowment, but primarily one of pedagogical culture and that teacher training remains the most fragile link in this chain.

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Optimizing Treatment Adherence in Breast Cancer Through Early Physical Rehabilitation

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Abstract

Introduction

Adjuvant treatment in breast cancer, including chemotherapy, radiotherapy, hormone therapy, and targeted therapies, is frequently associated with significant physical and psychological side effects that may negatively influence treatment adherence and overall quality of life. Cancer-related fatigue, reduced upper limb mobility, pain, deconditioning, anxiety, and depression are among the most common complications observed during treatment. Recent evidence from oncology exercise literature suggests that early physical therapy and structured exercise interventions may improve functional status and increase adherence to adjuvant oncologic treatment. Exercise-induced neurobiological mechanisms, including increased dopamine, serotonin, and endorphin release, appear to contribute to improved mood, reduced fatigue, enhanced motivation, and better patient engagement throughout the therapeutic process.

Materials and Methods

This literature review analyzed clinical trials, systematic reviews, and observational studies investigating the impact of early rehabilitation and exercise interventions in breast cancer patients undergoing adjuvant treatment. The review focused on studies evaluating treatment adherence, fatigue, upper limb function, physical performance, psychological well-being, and quality of life. Functional outcomes were commonly assessed using validated instruments such as the FACIT-F scale, EORTC QLQ-C30, and Karnofsky Performance Status.

Results and Discussion

The reviewed literature demonstrated that breast cancer patients participating in supervised physical therapy and exercise programs during adjuvant treatment showed significantly improved treatment tolerance and higher adherence rates compared to sedentary patients. Multiple studies reported reductions in cancer-related fatigue ranging from 25% to 40%, while improvements in functional capacity, upper limb mobility, and muscular endurance were observed in up to 35% of patients undergoing structured rehabilitation.

Exercise interventions were also corelated with lower levels of anxiety and depression, improved body image, and better overall quality of life. Several studies suggested that physically active patients experienced fewer treatment interruptions and demonstrated greater ability to complete adjuvant chemotherapy and radiotherapy protocols. In addition, exercise-related increases in dopamine and endorphin levels were associated with improved emotional resilience and reduced psychological distress during treatment.

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Early rehabilitation also contributed to reducing postoperative complications such as shoulder dysfunction, lymphedema, and physical deconditioning, factors that frequently impair functional independence and negatively affect long-term recovery. Current evidence increasingly supports the integration of rehabilitation into standard breast cancer care pathways as part of a multidisciplinary treatment approach.

Conclusions

According to current literature, early physical therapy and structured exercise interventions significantly improve functional status, psychological well-being, and adherence to adjuvant treatment in breast cancer patients. By reducing fatigue, preserving mobility, improving emotional resilience, and enhancing quality of life, rehabilitation may contribute to better clinical outcomes and potentially improved survival. These findings support the implementation of early rehabilitation as an essential component of comprehensive breast cancer management.

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Competitive Readiness and Technical Proficiency in Young Volleyball Players: A Performance-Based Assessment at a Sports-Oriented High School in Brasov

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Abstract

Volleyball at the high-performance level demands a rare convergence of physical conditioning, technical mastery, and tactical awareness qualities that must be systematically cultivated during adolescence if athletes are to transition successfully into senior competitive structures. This study examines the competitive readiness and technical development of volleyball players enrolled in a sports-oriented high school program in Brasov, Romania, a city with a recognized tradition in youth athletic formation.

The research was conducted over one academic year and involved 34 students (aged 15-18) actively competing at regional and national levels. A mixed-methods approach was employed, combining standardized motor testing (vertical jump, agility T-test, reaction speed), technical skill evaluation (serve accuracy, spike efficiency, blocking positioning), and match performance analysis across six official competitions. Data were collected at two intervals the beginning and end of the competitive season to track developmental trajectories and identify areas requiring targeted intervention.

Findings revealed statistically significant improvements in explosive strength and serve precision following a structured periodization model adapted for adolescent athletes. However, notable deficiencies persisted in positional decision-making under high-pressure situations and in the consistency of back-row attack execution, suggesting that cognitive-tactical training remains underrepresented in the current curriculum. Gender-differentiated analysis further indicated that female athletes exhibited superior technical consistency, while male players demonstrated greater gains in physical output metrics.

These results carry practical implications for coaches and physical education specialists working within the sports high school system, pointing toward the necessity of integrating sport psychology tools and video-based tactical feedback into weekly training cycles. The study contributes to the growing body of evidence supporting a holistic, periodized approach to youth volleyball development within Eastern European educational contexts.

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Management of Postural Deviations Rehabilitation in School-Age Children

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Abstract

Postural health in childhood represents a foundational yet frequently underestimated dimension of long-term musculoskeletal development. Among school-age populations, the progressive shift toward sedentary learning environments, combined with disproportionate backpack loads and the widespread adoption of digital devices, has substantially altered the biomechanical demands placed on the developing spine and supporting musculature. The resulting postural deviations ranging from mild sagittal plane imbalances to more structurally complex lateral curvatures often manifest subclinically for extended periods before reaching clinical thresholds, making systematic early screening a critical preventive tool rather than a reactive measure.

This paper examines the prevalence and typology of postural deficiencies identified in a cohort of 60 children aged 7 to 14, with particular attention to the differential distribution of spinal deviations across age groups and gender. Postural assessment was conducted using clinical examination and also non-invasive instrumentation, enabling quantification of spinal curvature parameters alongside dynamic postural control indicators. Findings reveal an increase in thoracic hyperkyphosis and forward head posture among children with higher weekly screen exposure, as well as notable correlations between low levels of organized physical activity and reduced lumbar lordosis stability.

Beyond descriptive epidemiology, the study addresses the translational dimension of early detection, arguing that physiotherapy intervention initiated prior to skeletal maturity carry substantially greater corrective potential than those deferred to adolescence or adulthood. Collectively, the results support the integration of standardized postural screening protocols into routine school health assessments as a cost-effective strategy for reducing the long-term burden of musculoskeletal dysfunction in pediatric populations. Most pediatric hyperkyphosis cases are postural and manageable conservatively. Physiotherapy is the cornerstone of treatment.

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Neuromuscular Reintegration Following Meniscal Injuries: A Rehabilitative Framework

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Abstract

Meniscal injuries represent one of the most frequently encountered pathologies within orthopedic and sports medicine practice and the surgical management of meniscal lesions, whether through partial meniscectomy or meniscal repair techniques, inaugurates a recovery trajectory that demands precision, individualization, and a thorough understanding of biomechanical and neuromuscular interdependencies within the knee joint complex. Our research develop a study regarding how is need to approach the postoperative rehabilitation process. According to literature the rehabilitation protocol cannot be reduced to a standardized sequence of exercises; rather, it constitutes a dynamic, phase-structured intervention that must account for tissue healing timelines, load tolerance thresholds, and the psychomotor readiness of the patient. The program is structured in: early-phase rehabilitation that prioritizes edema management, restoration of passive and active range of motion, and the prevention of quadriceps inhibition a phenomenon consistently documented following knee joint effusion and surgical trauma. Neuromuscular electrical stimulation, cryotherapy, and gentle closed-kinetic-chain exercises serve as foundational tools during this initial window, supporting vascular circulation and preventing muscular atrophy without compromising the structural integrity of the healing tissue.

As rehabilitation advances into intermediate and late phases, the programmatic emphasis transitions toward progressive resistance training, proprioceptive recalibration, and functional movement reintegration. Also balance and coordination protocols, incorporating unstable surfaces and reactive motor challenges, further consolidate neuromuscular control and prepare the patient for the demands of daily or athletic activity.

The return-to-sport or return-to-function decision must be governed by objective criteria rather than temporal benchmarks alone. The rehabilitation protocol is progressive and individualized, based on surgical strategies, progression and needs to improve muscle strength, neuromuscular control, correct movement patterns.

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Complex assessment and approach of knee rehabilitation after Anterior Cruciate Ligament Reconstruction: a narrative review

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Abstract

Anterior cruciate ligament (ACL) reconstruction remains among the most frequently performed orthopedic procedures globally, yet the post-surgical recovery process continues to generate considerable debate regarding optimal protocols, return-to-sport criteria, and the often-underestimated role of psychological readiness. The aim of this paper is to present the return to sport activity after ACL reconstruction, based on literature research in PubMed, Web of Science and Scopus, using the key words as ACL reconstruction, rehabilitation, return to sport.

Start from 67papers we analysed 23 and generate a narrative review. The results of our research show that current evidence suggests that graft maturation timelines typically spanning nine to twelve months do not align neatly with the neuromuscular competencies required for safe athletic reintegration.

The main aspects of the results describe that limb symmetry indices derived from isokinetic dynamometry, single-leg hop battery assessments, and reactive neuromuscular testing are presented as more parameters for monitoring the rehabilitation process. Regarding rehabilitation program the literature speaks about the rehabilitation model proposed that integrates progressive neuromuscular loading, sport-specific movement patterning. Particular attention is given to the transitional phase between late-stage rehabilitation and unrestricted return to sport. According to literature a specific rehabilitation after ACL reconstruction needs specific assessment, neuromuscular training, and development of strength, control, and confidence, not just wait a fixed time.

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The Importance of Neuromuscular Taping in the Rehabilitation of Children with Congenital Torticollis — A Narrative Review

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Abstract

Congenital muscular torticollis (CMT) is one of the most common causes of postural asymmetry in infants, involving unilateral shortening of the sternocleidomastoid muscle. Early physiotherapy yields excellent results, and neuromuscular taping has recently been introduced as a complementary approach to support alignment, regulate muscle tone, and enhance proprioceptive feedback. This narrative review analyzes clinical studies and meta-analyses published between 2021 and 2026 on the efficacy of neuromuscular taping in CMT treatment.

Keywords: congenital torticollis, neuromuscular taping, pediatric physiotherapy, postural balance, motor rehabilitation

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Injury Prevention Strategies in Elite Volleyball and Badminton: A Comparative Review

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Abstract

Elite volleyball and badminton are physically demanding net sports characterized by repetitive overhead movements, explosive jumps, rapid accelerations, and frequent directional changes. These biomechanical demands expose athletes to a high risk of chronic musculoskeletal injuries that can negatively affect performance, long-term health, and competitive career duration. Common injury patterns include shoulder dysfunction, patellar tendinopathy, ankle instability, and Achilles tendon disorders, with variations depending on the specific technical and physiological requirements of each sport. Developing effective preventive strategies is essential for maintaining athlete health and supporting sustainable performance.

Aim: This comparative review examines scientific literature addressing injury patterns, biomechanical risk factors, and preventive strategies in elite volleyball and badminton athletes, with emphasis on long-term injury reduction and career sustainability.

Methods: Relevant peer-reviewed studies from major scientific databases were analyzed to identify common and sport-specific injury mechanisms, biomechanical stress factors, and evidence-based prevention and rehabilitation approaches. The review focuses on kinetic screening, neuromuscular training, eccentric strengthening, and individualized corrective interventions.

Results: Volleyball players demonstrate higher susceptibility to knee overload, shoulder stress, and landing-related injuries due to repetitive jumping and spiking actions. In contrast, badminton athletes are more frequently affected by Achilles tendinopathy, ankle injuries, and repetitive shoulder overload caused by rapid court movements and high-frequency strokes. Preventive interventions such as eccentric loading programs, movement screening, proprioceptive training, and individualized rehabilitation protocols consistently demonstrate positive effects in reducing injury prevalence and improving biomechanical efficiency.

Conclusion: Injury prevention in elite net sports requires sport-specific, evidence-based strategies integrating biomechanics, physical therapy, and performance training. Comparative preventive frameworks can improve athlete preservation, reduce chronic injury risk, and support sustainable competitive longevity in volleyball and badminton.

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Sustainable Performance and Career Longevity in Elite Net Sports: A Systematic Review of Kinetic, Prophylactic, and Rehabilitation Strategies in Volleyball and Badminton

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Abstract

Elite net sports, particularly volleyball and badminton, expose athletes to substantial biomechanical demands through repetitive overhead actions, explosive jumping, and rapid multidirectional movements. These sport-specific stressors significantly increase the long-term risk of overuse injuries, musculoskeletal asymmetries, and chronic degenerative conditions that may compromise sustainable performance and shorten competitive careers. Within contemporary sport and rehabilitation sciences, sustainable athletic development increasingly requires a transition from reactive injury management toward proactive, evidence-based systems integrating prevention, performance optimization, and long-term career sustainability.

Aim: This systematic review synthesizes contemporary scientific evidence on kinetic, prophylactic, and rehabilitation strategies aimed at preventing chronic injuries and promoting sustainable career longevity in elite volleyball and badminton athletes.

Methods: A systematic review of peer-reviewed studies indexed in PubMed, Scopus, and Web of Science (2018–2026) was conducted, focusing on biomechanical screening, wearable technologies, individualized kinetic correction, eccentric strengthening, neuromuscular conditioning, and rehabilitation-based preventive systems targeting the shoulder, knee, Achilles tendon, and ankle structures most vulnerable to chronic overload in elite net sports.

Results: Evidence indicates that integrating advanced screening technologies with individualized preventive and rehabilitation strategies significantly improves early injury detection, reduces overuse injury prevalence, and enhances long-term biomechanical sustainability. Wearable technologies and automated movement analysis improve dysfunction identification, while eccentric strengthening and sport-specific rehabilitation protocols reduce major chronic conditions such as Jumper's Knee, rotator cuff dysfunction, Achilles tendinopathy, and ankle instability. Correcting sport-specific muscular asymmetries is critical for sustaining long-term mechanical efficiency.

Conclusion: Sustainable performance and career longevity in elite net sports require integrated, technology-driven preventive and rehabilitation systems combining sports science and physical therapy. This proactive framework supports long-term athlete preservation, sustainable performance, and innovation-driven excellence in elite competitive sport.

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Athlete Data Beyond Control: Governance Challenges in Technology-Driven Sport

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Abstract

The integration of digital technologies into sport has transformed the ways in which athlete performance, health, and recovery are monitored and managed. Wearable sensors, GPS tracking systems, performance analytics platforms, and Artificial Intelligence (AI) monitoring tools are increasingly used to collect real-time physiological and biomechanical data. At the same time, the growing reliance on data raises important questions regarding the governance of athlete information and the protection of fundamental rights. Although these technologies contribute to performance optimization, recovery, and injury prevention, they also generate large amounts of personal data, raising concerns related to privacy, transparency, informed consent, athlete autonomy and bias in automated decision-making scenarios. In this context, data governance has become an increasingly relevant issue in technology-driven sport.

While existing literature has extensively examined the role of technology in performance optimization and recovery, less attention has been paid to how data governance frameworks influence athlete autonomy and shape the broader conditions under which performance is enhanced. Although recent regulatory and governance initiatives, including the European Union Artificial Intelligence Act, the General Data Protection Regulation, and the International Olympic Committee's AI Agenda, reflect the growing institutional recognition of ethical, governance, and human-centred issues associated with AI and data use in sport, the implications of these frameworks remain insufficiently explored.

The paper addresses this gap through a conceptual and interdisciplinary approach that combines sport science and ethical perspectives regarding how data governance frameworks influence autonomy, well-being, and the human dimension of performance in technology-driven sport. Particular attention is given to recent case law of the Court of Justice of the European Union. The judgment highlights that even where a legitimate interest is pursued, data processing practices must remain lawful and must not override the fundamental rights and freedoms of athletes. Although not directly related to performance and technologies used in sport, the case highlights broader governance concerns regarding transparency, proportionality, consent, and the secondary use of athlete data – issues that become significant in sporting environments characterized by continuous data generation and monitoring.

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Similar tensions can also be observed in the ongoing debates concerning the compatibility between international sport governance frameworks and European data protection standards, particularly in contexts involving extensive athlete monitoring and data processing, including the 2027 revision of the World Anti-Doping Code.

This paper argues that insufficient data governance may lead to a loss of control over personal information,reduced athlete autonomy, and increased psychological pressure. In this context, athlete data protection should be understood not merely as a matter of legal compliance, but as a necessary condition for maintaining an athlete-centred approach in modern sport. Ultimately, the study highlights that balancing technological innovation with effective data governance is essential to ensure that performance optimization does not come at the expense of athletes' fundamental rights and well-being.

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Neuromuscular and biomechanical analysis in field tennis

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Abstract

Introduction: The backhand is one of the foundational strokes in tennis and, for most players, the more technically demanding of the two groundstrokes. Players can choose between a one-handed and a two-handed variant, each carrying its own set of biomechanical demands. In practice, coaches at the introductory level tend to favour the two-handed backhand, largely because it offers greater initial stability and control. Executing the stroke well requires coordinated activation across the entire kinetic chain — from the legs and hips, through the trunk, and finally into the hitting arm and racket. Recent research suggests that what separates a reliable backhand from an efficient, high-level one comes down to a handful of key factors: the timing and sequencing of intersegmental movement, grip selection, and the specific pattern of muscle activation driving the swing..

Purpose: This paper reviews the existing specialist literature on the two-handed backhand, with a focus on the biomechanical and neuromuscular mechanisms underlying stroke execution. A secondary aim is to identify how these factors relate to technical proficiency and, importantly, to injury risk.

Materials and Methods: The literature search was conducted across Web of Science and Google Scholar using the following search terms: "tennis groundstroke", "backhand biomechanics", "kinetic chain", "upper limb kinematics", and "tennis performance". The search returned 45 English-language articles published between 2006 and 2026, from which 16 were selected based on their direct relevance to backhand biomechanics.

Selected studies examined upper limb segment coordination, joint angular velocity, racket head speed, flexor and extensor muscle activation, and the biomechanical consequences of different grip styles. Participants ranged from junior players to high-performance athletes.

The measurement tools used across studies included VICON motion capture systems, surface electromyography (EMG), ball and racket speed sensors, and three-dimensional kinematic analysis.

Results: The reviewed studies consistently show that the two-handed backhand operates as a complex kinetic chain in which racket speed and overall stroke efficiency depend heavily on how well energy is transferred between body segments. Grip selection emerged as a particularly influential variable — not merely in terms of comfort or preference, but as a factor that measurably alters the mechanics of energy flow through the upper limb.

Conclusions: Three elements stand out as the primary determinants of effective two-handed backhand mechanics: grip position, intersegmental coordination, and neuromuscular control of the upper limb. An eastern grip appears to support smoother kinetic transfer and is associated with better stroke performance, while a continental grip places noticeably higher mechanical load on the elbow and wrist — a pattern that, over time, may contribute to injuries in those joints.

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Early Intervention in Cerebral Palsy: Modern Approach

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Abstract

Introduction: Premature infants have an increased risk of developing motor disorders such as cerebral palsy; therefore, early intervention harnesses the period of infantile brain neuroplasticity by establishing essential neuromotor therapies in pediatric recovery.

Aim: The aim of this paper is to conduct a review of the specialized literature that investigates modern assessment and therapy perspectives on early intervention in infantile cerebral palsy, starting from the fact that early diagnosis of neurodevelopmental disorders has evolved significantly, allowing the identification of cerebral palsy risk before the age of 6 months through neurological examinations such as the General Movement Assessment (GMA) and the Hammersmith Infant Neurological Examination (HINE). Furthermore, the use of the digital podoscope for infants (PodoBaby) introduces an objective, detailed, and repeatable method for the analysis of muscle tone distribution and postural asymmetry.

Material and method: In conducting this review, information was collected from several databases—PubMed, ResearchGate, WOS—using the following keywords: infantile cerebral palsy, early intervention, neurological assessment, Vojta method, PodoBaby, full-text articles in English, which addressed early intervention in children with infantile cerebral palsy. We identified 49 articles from the period 2013-2026, 1 article in the ResearchGate database, and 4 clinical guidelines. Using the CRAAP method (currency, relevance, authority, accuracy, purpose), 14 articles and 3 clinical guidelines were selected for review. The information from the selected studies was synthesized into a specialized literature recording sheet.

Results: The analysis of the selected literature showed the existence of predictive assessment protocols for infantile cerebral palsy based on neonatal MRI, Prechtl's qualitative assessment of general movements, and the standardized Hammersmith Infant Neurological Examination—forms of assessment whose integration into global practice is deficient. Additionally, the use of the PodoBaby system, intended for the digital examination of the incidence and severity of postural asymmetry, objectifies the intervention through the Vojta method, and the Baby-CIMT (constraint-induced movement therapy) and Baby-BIM (bimanual) therapies applied before 6 months generate a significant functional evolution. On the other hand, the analysis of clinical guidelines emphasizes the need for diagnosis and initiation of therapy before the age of 6 months, provides protocols and recommendations for therapeutic positioning and respiratory physiotherapy management in infants, and recommends monitoring through a clinical developmental assessment at the corrected age of 2 years, and for those born under 28 weeks of gestation, at the chronological age of 4 years.

Conclusion: Early identification is important for initiating neuromotor therapies that stimulate brain neuroplasticity in the first years of life, and the modern approach to early intervention in cerebral palsy requires early diagnosis under the age of 6 months, using high-precision tools such as MRI, GMA, and HINE. Additionally, the PodoBaby digital podoscope offers an essential, objective method for evaluating postural asymmetry in at-risk infants. Long-term multidisciplinary monitoring maximizes the chances of functional rehabilitation and independence.

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Innovative strategies in enhancing human performance through sport and health optimization

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Abstract

The field of sport, health, and human performance has undergone substantial change in recent years, driven by rapid advances in digital technology and growing interest in tailored approaches to training and well-being. Concerns about sedentary lifestyles, chronic diseases, and the need to improve physical performance have prompted researchers and practitioners to rethink existing approaches and adopt more flexible, data-informed solutions.

This study explores how technological innovation and multidisciplinary perspectives can improve human performance. It focuses on the relationship among digital technologies, physiological monitoring systems, and psychological factors in determining performance outcomes. At the same time, the paper seeks to identify both the advantages of these approaches and the practical challenges of implementation.

The research uses a conceptual and analytical approach, drawing on and integrating recent findings from exercise physiology, sport psychology, and digital health. This approach reveals the broader picture of how the interplay of biological, technical, and behavioral elements shapes performance. A major development in this context is the growing use of wearable devices and artificial intelligence to monitor critical physiological and biomechanical variables. Real-time data on parameters such as heart rate variability, workload, and recovery enable training programs to be adapted to individual demands with greater precision and help limit the risk of injury [1], [2]. These technologies are no longer limited to elite athletes and are becoming available to a wider population interested in maintaining or improving physical condition.

At the same time, it has become evident that performance cannot be understood in purely physical terms. Motivation, emotional balance, and concentration are equally essential psychological factors. Studies show that these aspects directly affect training efficiency and competitive performance. As a result, modern coaching practice increasingly integrates physical preparation with mental training approaches [3], [4]. This more balanced approach supports long-term growth and helps individuals cope better with the demands of training and competition.

Another important aspect is the role of sport and physical activity in public health. A substantial body of consistent evidence indicates that regular exercise, particularly when supported by monitoring technologies and individualized therapies, can significantly reduce the risk of chronic disease and improve overall quality of life [5]. In this sense, the connection between sport science and public health policies is becoming increasingly relevant, particularly in the context of aging populations and escalating healthcare costs.

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Piriformis Syndrome: Current Rehabilitation Approaches

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Abstract

Piriformis syndrome is frequently underdiagnosed and associated with extraspinal sciatica and buttock pain, caused by compression or irritation of the sciatic nerve at the level of the piriformis muscle. In the last decade, the therapeutic approach to this pathology has undergone important changes, with kinetic management focusing on active and functional interventions. This review analyzed 25 articles published between 2002 and 2024, selected from international databases on the assessment and functional recovery of piriformis syndrome. The review of the specialized literature highlights that individualized therapeutic exercises are the main component of functional recovery. Modern programs include lumbopelvic stabilization exercises, gluteal muscle strengthening, and neuromuscular control techniques, with the aim of reducing piriformis muscle overload and optimizing hip biomechanics (Probst et al., 2019). Neurodynamic mobilizations targeting the sciatic nerve have demonstrated beneficial effects on pain and functional mobility and are frequently integrated into current rehabilitation protocols (Boyajian-O'Neill et al., 2008). Recent studies have shown the effectiveness of a multimodal approach, combining therapeutic exercises with myofascial techniques, dry needling, and education on functional load management (Michel et al., 2013). In addition, the use of modern technologies, such as electromyographic biofeedback and gait analysis, contribute to the individualization of the kinetic intervention and the monitoring of therapeutic progress. Current literature highlights the decrease in recommendations for prolonged rest and exclusively passive therapies, which are being replaced by progressive active rehabilitation programs.

In conclusion, contemporary kinetic management of piriformis syndrome is based on a functional and interdisciplinary approach, centered on active therapeutic exercises, motor control, and progressive reintegration into daily and sports activities. Current evidence supports the superiority of active and individualized strategies in reducing pain, increasing functionality, and preventing relapse.

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Fan Experience Management in Sport Organizations: A Conceptual Framework for Engagement, Loyalty and Value Co-Creation

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Abstract

Fan experience has become an essential strategic priority for contemporary sports organizations operating in competitive, digitalized and stakeholder-centered environments. Traditional sport management models have frequently emphasized competitive success and financial performance while underestimating the strategic importance of fan-centered relational dimensions. This study develops a conceptual framework for fan experience management by positioning fan engagement, loyalty and value co-creation as interconnected drivers of long-term organizational sustainability. Drawing on sports management, stakeholder theory and relationship marketing literature, the article examines how communication quality, emotional attachment, digital interaction, service experience and participatory value creation strengthen fan relationships, institutional legitimacy and stakeholder retention. The proposed framework conceptualizes fan experience not merely as a marketing function, but as a multidimensional strategic asset that directly influences reputational resilience, sponsorship attractiveness and sustainable organizational development. By integrating engagement, loyalty and co-creation into a unified strategic governance model, the study advances fan experience as a formal performance and management dimension within sports organizations. The research contributes to sports management literature by reframing fan-centered strategies as essential components of organizational governance rather than secondary promotional activities. The article provides a theoretical foundation for future empirical validation and practical implementation of fan experience management systems capable of strengthening sustainable competitive advantage and long-term performance in modern sports organizations.

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Applying the Balanced Scorecard in Sports Organizations: A Strategic and Performance-Oriented Framework

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Abstract

This study applies the Balanced Scorecard (BSC) as a strategic and performance-oriented framework for evaluating and improving organizational effectiveness in sports organizations. Moving beyond traditional sport performance models centered primarily on competitive or financial outcomes, the research proposes a multidimensional managerial architecture that integrates financial sustainability, stakeholder legitimacy, governance quality, internal operational processes, and learning and growth capacities. Using a conceptual-applied research design supported by stakeholder-related empirical evidence from football supporter studies, the article identifies sport-specific strategic indicators capable of operationalizing Balanced Scorecard dimensions within contemporary sports management environments. Findings demonstrate that effective BSC implementation in sport requires contextual adaptation to sector-specific realities, including fan engagement, communication effectiveness, transparency, sponsorship responsiveness, innovation, and strategic adaptability. The proposed framework strengthens the managerial applicability of the Balanced Scorecard by transforming it into a practical instrument for strategic planning, performance monitoring, governance integration, and sustainable organizational development. The study contributes to sports management literature by bridging the gap between Balanced Scorecard theory and applied strategic implementation while offering a comprehensive performance governance model tailored to the multidimensional complexities of modern sports organizations.

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Blount's disease, the importance of early diagnosis and the role of physiotherapy in multimodal management

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Abstract

Blount disease is a medial proximal tibial epiphysis progressive developmental disorder, caused by asymmetrical inhibition of endochondral ossification, leading to a varus deformation of the lower limb. The etiology is multifactorial, including mechanical factors (physical overuse), obesity, early varus displacement and genetic predisposition. An increased compressive stress in the medial compartment of the proximal tibia disrupts the normal function of the growth plate, leading to progression of angular deformity, internal tibial torsion and, in advanced cases significant alteration of joint alignment. The present study is a narrative review of the literature regarding etiopathogenesis, diagnosis and the management of Blount disease, mainly the conservative treatment strategies, including using of orthoses and the role of physiotherapy. A systematic research was done in PubMed, Scopus, Web of Science and Google Scholar databases and 142 articles were identified, from which 58 fulfilled inclusion criteria. The included studies covered cohort studies, systematic reviews and clinical guidelines. Diagnosis is establish by clinical evaluation and imaging, with radiographs from standing of the lower limbs representing the gold standard for alignment and severity assessment. Langenskiold classification is mostly used for staging the disease and to guide the therapeutic decisions. Early differentiation from physiological genu varum and rickets is essential for preventing the deformity progression. The treatment may vary by age, severity and skeletal maturity. Orthoses conservative management is effective in the early stages, decreasing medial loading and correcting the alignment. Efficacy decreases after the age of 3-4 years old or in advanced cases. Physiotherapy can help by contributing to the gait optimization, strengthening the periarticular muscles, postural control and functional compensations reduction. Likewise, supports weight management by decreasing the mechanical stress over the tibial epiphysis. In more advanced forms, surgical treatment is necessary, including hemiepiphysiodesis or proximal tibial osteotomy. The prognosis depends on the early diagnosis and a multimodal approach. Further studies need to be done to standardize rehabilitation and to evaluate long term functional outcomes.

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Financing sport organizations: Sources, models and challenges in the current context

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Abstract

This study aims to analyze the structure and diversification of funding sources for sport organizations in Romania, in comparison with European reference models. The research seeks to identify the main financial vulnerabilities of sport clubs and federations, assess the degree of dependence on public funding, and explore the potential of private sources and innovative financial instruments (sponsorship, crowdfunding, European funds) as viable alternatives for sustaining sport activity. The research employs a mixed methodology, based on documentary analysis of annual financial reports from a sample of 85 sport organizations (clubs and federations) in Romania over the period 2018–2023. Quantitative data were supplemented by semi-structured interviews with 20 financial directors and general managers, while the comparative analysis included case studies from France, Germany, and Poland. Descriptive statistical analysis and institutional SWOT analysis were applied to highlight dominant funding patterns. Results indicate a high dependence on public funding among the analyzed organizations (average 61.4% of total revenues), with significant variation between performance clubs (45.2%) and county sport associations (78.6%). Private sponsorships represent, on average, 18.3% of revenues, while own revenues (ticketing, licensing, transfers) cover only 12.7%. European funds are accessed by fewer than 15% of organizations, mainly due to limited administrative capacity. The study also identifies a significant positive correlation between diversification of funding sources and long-term financial stability ($r = 0.62$; $p < 0.01$). The financing of Romanian sport organizations remains fragile and insufficiently diversified, generating institutional vulnerability and limiting long-term strategic planning capacity. Concrete measures are proposed: professionalization of financial departments, development of public-private partnerships, adoption of digital fundraising platforms, and strengthening the capacity to absorb European funds. Implementing a mixed funding model inspired by European best practices can significantly contribute to the sustainability and competitiveness of Romanian sport.

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Education of Pain – Tools for Patients and Specialists: An Evidence-Based Narrative Review

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Abstract

Background**:** Pain education has become an essential component of rehabilitation interventions, particularly in the management of chronic musculoskeletal pain. Advances in pain science have promoted a transition from the traditional biomechanical model toward a neuro-bio-psycho-social perspective, where pain is understood as a complex and multidimensional experience influenced by biological, psychological, and social factors. Current recommendations from the European Pain Federation (EFIC), the International Association for the Study of Pain (IASP), and NICE advocate the integration of Pain Neuroscience Education (PNE) into multimodal rehabilitation programs, emphasizing active management strategies over exclusively passive interventions. Within physiotherapy practice, pain education is increasingly regarded not only as an informational process but also as a therapeutic intervention that supports patient autonomy, treatment adherence, and functional recovery.

Objective: This evidence-based narrative review aims to summarize current evidence regarding educational approaches in pain management and identify key educational tools for patients and specialists, focusing on physiotherapy practice and interdisciplinary rehabilitation.

Methods**:** A narrative review methodology was adopted due to the educational and multidisciplinary nature of the topic. Literature was identified through PubMed, Google Scholar, and Scopus using the terms *Pain Neuroscience Education*, physiotherapy, pain education, biopsychosocial model, patient education, chronic pain, and interdisciplinary rehabilitation. Priority was given to guidelines, umbrella reviews, systematic reviews, meta-analyses, and conceptual papers published between 2015–2025.

Results and Conclusions: Evidence supports the integration of PNE with therapeutic exercise to reduce kinesiophobia, catastrophizing, maladaptive beliefs, and disability while improving function. Educational tools include therapeutic communication, metaphors, visual materials, self-management programs, digital resources, and movement-based interventions. Pain education should be considered a core component of evidence-based physiotherapy and integrated into active rehabilitation strategies to improve long-term outcomes.

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The Effects of Dance on Psychological, Emotional, and Motor Development in Children and Adolescents: A Literature Review

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Abstract

The aim of this research was to analyze the impact of participation in dance activities on the development of children and adolescents, in the context of the increasing prevalence of sedentary behavior and declining mental health among young people. This review brings studies published between 2016 and 2026, extracted from international data bases, with the aim of clarifying to what extent participation in dance activities influences the developmental trajectory of children and adolescents.The synthesized data show that regular practice of dance be it ballet, contemporary dance, sport dance or informal forms of expression through movement generates measurable changes in motor coordination, postural balance and fine motor control. Beyond the musculoskeletal system, and this is perhaps the observation with the greatest practical weight, the benefits extend considerably. Self-esteem, the ability to manage difficult emotions, executive cognitive functions and the quality of interpersonal relationships are variables for which the literature records significant improvements after programs of at least eight to twelve weeks. Adolescents seem to benefit in particular from the creative and social dimension of dance, which provides them with a concrete framework for processing tensions related to the pubertal transition tensions that are difficult to address through classic forms of physical activity.

The results indicate that dance significantly contributes to the improvement of motor functions, postural balance, and physical fitness, while also generating positive effects on emotional regulation, interpersonal relationships, and cognitive development. The benefits were particularly evident in programs conducted over a minimum period of eight to twelve weeks. Although many of the analyzed studies included small sample sizes and limited long-term evaluations, the findings support the structured integration of dance into school programs, not only as a recreational activity but also as an intervention with demonstrated benefits for the physical and mental health of young people.

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A Digital Telerehabilitation Education Model for Undergraduate Physiotherapy Training: A Pilot Evaluation Study

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Abstract

The rapid digital transformation of healthcare has increased the need to integrate telerehabilitation and digital competencies into undergraduate physiotherapy education. However, evidence regarding the feasibility and educational acceptance of structured telerehabilitation training models remains limited, particularly in Western Balkan countries. This pilot evaluation study aimed to assess the feasibility, usability, and educational value of a digital telerehabilitation education model developed within the e-PHYSIO project for undergraduate physiotherapy training. Pilot testing involved undergraduate physiotherapy students and academic staff from higher education institutions in Romania, Bulgaria, Albania, and Kosovo. The educational model included theoretical modules, practical telerehabilitation activities, online rehabilitation protocols, digital learning resources, and interactive e-learning components delivered through the e-PHYSIO platform. Participant feedback was collected using structured questionnaires based on Likert-scale evaluations and open-ended responses assessing usability, engagement, educational effectiveness, and overall satisfaction. The findings demonstrated high levels of usability, acceptance, and student satisfaction. Most participants rated the educational materials and practical activities as good or excellent, highlighting the accessibility, interactive structure, and practical applicability of the training resources. More than 90% of participants reported that they would recommend the course to other students. Academic staff also considered the educational content relevant and well-structured for contemporary physiotherapy education. Reported limitations included the need for additional introductory guidance for first-time users and further development of interactive learning elements. The proposed digital telerehabilitation education model demonstrated strong feasibility and educational acceptance and may support the modernization of physiotherapy education and the development of digital healthcare competencies in future physiotherapists.

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