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LITERATURE REVIEW

The Importance of Physical Screening in Enhancing Athlete Performance: A Literature Review of Health and Injury Prevention Aspects

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ABSTRACT

Objectives: This literature review examines the role of physical screening in enhancing athletic performance through health optimization and injury prevention strategies. The study aims to synthesize current evidence on screening methodologies and their impact on athlete safety and performance outcomes.
Methods: A comprehensive literature review was conducted using electronic databases to identify relevant studies on physical screening in athletics. Studies were selected based on predetermined criteria focusing on pre-participation screening, injury prevention, and performance enhancement methodologies.
Results: The analysis revealed that comprehensive physical screening programs incorporating pre-participation medical evaluations, functional movement assessments, and advanced monitoring techniques significantly contribute to injury prevention and performance optimization. Key screening components include cardiovascular assessments, musculoskeletal evaluations, biomechanical analyses, and integrated approaches combining conventional and innovative monitoring methods.
Conclusion: Physical screening serves as a fundamental component in athlete health management and performance enhancement. The integration of traditional screening methods with advanced technologies provides comprehensive athlete assessment capabilities, enabling personalized interventions for optimal performance and injury prevention.

Keywords: physical screening, athlete performance, injury prevention, pre-participation evaluation, sports medicine, health assessment.

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INTRODUCTION

Athletic performance optimization and injury prevention represent critical concerns in modern sports medicine, particularly as professional and amateur sports continue to evolve with heightened intensity, specialization, and year-round training schedules (Drew et al., 2023; Mușat et al., 2024). The increasing demands placed on athletes across elite, collegiate, and recreational competitive levels have led to a surge in overuse injuries, musculoskeletal disorders, and chronic health issues that not only compromise immediate performance but also threaten long-term career sustainability and overall well-being (Brenner et al., 2024). Physical screening has emerged as a cornerstone approach in sports medicine, functioning as a proactive, evidence-informed measure to systematically evaluate athletes' physical condition, biomechanical efficiencies, neuromuscular capacities, and identify potential vulnerabilities—such as muscle imbalances, joint instabilities, or suboptimal movement patterns—before they manifest as performance-limiting injuries or debilitating conditions. Current literature traces the evolution of physical screening from rudimentary beginnings in the early 20th century, which primarily involved basic medical examinations like vital sign checks and cursory physical exams, to today's sophisticated, multi-dimensional assessment protocols that leverage data-driven insights (Bloomfield & Wilt, 2011; Techniques et al., 2023). Traditional approaches have historically focused on pre-participation medical evaluations, basic fitness assessments such as cardiovascular endurance tests and flexibility measurements, and simple anthropometric screenings (Minetto et al., 2024). However, contemporary research underscores a paradigm shift toward integrated methodologies that seamlessly combine conventional biochemical markers (e.g., blood lactate levels, hormone profiles) and physiological monitoring (e.g., VO2 max testing, heart rate variability) with cutting-edge innovative techniques, including genetic analysis for predisposition to soft-tissue injuries, metabolomics for real-time metabolic profiling, wearable sensor technologies for movement analysis, and advanced imaging modalities like MRI, ultrasound, and 3D motion capture systems.

Despite the recognized importance of physical screening in mitigating risks and enhancing outcomes, significant gaps persist in the standardization of protocols and the development of comprehensive, athlete-centered assessment frameworks tailored to diverse sports disciplines, age groups, and performance levels (Ionescu et al., 2021; Weise et al., 2025). For instance, while functional movement screens (e.g., Functional Movement Screen or FMS) have gained popularity, there is limited consensus on normative values across populations, and few studies have longitudinally tracked their predictive validity for injury occurrence. Moreover, research addressing the synergistic integration of multiple screening modalities—such as combining battery tests with biomechanical modeling and biomarker analysis—and

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their collective, dose-response impact on long-term athlete health trajectories, performance sustainability, and return-to-play timelines remains sparse (Kiefer & Martin, 2022; Seshadri et al., 2021). Additionally, there is insufficient empirical evidence regarding the cost-effectiveness, scalability, and practical implementation challenges of advanced screening technologies in resource-variable athletic settings, from high-budget professional teams to underfunded community programs, including barriers like athlete compliance, clinician training, and data interpretation.

The imperative for robust, evidence-based screening protocols has become increasingly apparent amid escalating sports participation rates worldwide—exemplified by the International Olympic Committee's reports of rising injury incidences in multi-sport events—and persistently high injury rates that prematurely curtail athlete careers, inflate healthcare costs, and contribute to post-retirement health burdens such as osteoarthritis and mental health disorders. For example, epidemiological data from soccer and basketball cohorts reveal annual injury rates exceeding 20-30% in elite players, underscoring the economic and humanistic toll (Romero-Morales et al., 2023; Torvaldsson et al., 2023). A deeper understanding of the comprehensive benefits of multifaceted physical screening, including its role in personalized training modifications, early intervention, and holistic athlete monitoring, can profoundly guide the development of more effective, scalable prevention strategies and performance optimization programs that prioritize both peak output and durability.

This literature review aims to systematically: examine and synthesize current physical screening methodologies employed in diverse athletic populations, highlighting their strengths, limitations, and applicability; critically analyze the empirical effectiveness of various screening programs in reducing injury incidence, severity, and recurrence while simultaneously enhancing key performance indicators like speed, power, and endurance; evaluate the merits of integrated, multi-modal approaches that fuse traditional assessments with innovative technologies, exploring synergies, validation studies, and implementation frameworks; and distill actionable recommendations for the development of comprehensive, standardized screening protocols that are feasible, cost-efficient, and adaptable to real-world sports medicine practices.

METHODOLOGY

Databases Literature Review

A comprehensive electronic search was conducted using PubMed, Scopus, and SPORTDiscus databases from January 2020 to December 2024. Search terms included combinations of "physical screening," "pre-participation evaluation," "athlete assessment," "injury prevention," "sports medicine screening," and "performance optimization." Additional sources were identified through reference list screening and expert recommendations.

Inclusion and Exclusion Criteria

The inclusion criteria for this review encompassed peer-reviewed articles published in English that specifically addressed physical screening within athletic populations. Eligible studies were required to examine screening components related to injury prevention and performance enhancement, ensuring that the selected evidence directly contributed to understanding proactive athlete management. Systematic reviews and meta-analyses evaluating screening methodologies were also included to provide higher-level synthesized evidence and strengthen the comprehensiveness of the analysis. Conversely, several exclusion criteria were applied to maintain the rigor and relevance of the review. Studies focusing exclusively on a single-sport population without broader applicability were excluded, as were conference abstracts and other non-peer-reviewed publications due to their limited methodological reliability. Research that centered solely on rehabilitation processes rather than preventive screening was also omitted, ensuring that the final body of literature aligned strictly with the preventive and performance-oriented objectives of the review.

Organization of the Study

Research selection followed a systematic approach with initial title and abstract screening followed by full-text review. Data extraction focused on screening methodologies, outcome measures, study populations, and intervention effectiveness. Variables extracted included participant demographics, screening protocols, injury rates, performance metrics, and follow-up duration.

Methods of Analysis

Data synthesis employed narrative review methodology due to heterogeneity in study designs and outcome measures. Findings were categorized by screening approach and analyzed for common themes and evidence quality. Results were organized according to screening components and their respective contributions to injury prevention and performance enhancement.

RESULTS

Study Characteristics

The literature review identified multiple studies demonstrating the effectiveness of comprehensive physical screening programs in athletic populations. Analysis revealed several key components essential for effective screening protocols. Pre-participation screening represents a fundamental first step in injury prevention, with studies demonstrating its effectiveness in identifying athletes at risk for injury or illness (Corrente et al., 2021; Leggit & Wise, 2020; Weise et al., 2025). Comprehensive medical evaluations before sport participation, particularly in high-intensity or high-contact activities, successfully identify pre-existing conditions including musculoskeletal weaknesses, cardiovascular risks, and underlying health issues (Mușat et al., 2024; Pi et al., 2021; Squeo et al., 2025). Detailed medical history collection proves essential for identifying previous injuries or illnesses that may affect current health and performance, while physical examinations

ensure athletes possess appropriate physical capacity for safe sport participation(Farzam & Akhondi, 2019; Ionescu et al., 2021; Leggit & Wise, 2020).

Contemporary screening protocols incorporate sophisticated movement analysis techniques to evaluate biomechanical efficiency and identify injury risk factors(Jiménez & Verhagen, 2025; Weise et al., 2025). Functional Movement Screens (FMS) effectively assess movement quality in activities such as lunging and squatting, revealing deficiencies or asymmetries that may predispose athletes to injury(Dorrel et al., 2015; Zarei et al., 2022). The Y-Balance Test provides valuable insights into balance and reach distances, offering predictive information regarding lower body injury risk(Lai et al., 2017; Shaffer et al., 2013). Goniometric measurements assess joint flexibility and range of motion, identifying restrictions that could potentially lead to injury (Nelson et al., 2021; Olszewski et al., 2022).

Muscular Strength and Performance Assessment

Systematic strength evaluation through methods such as manual muscle testing reveals power deficits in specific muscle groups, uncovering weaknesses or imbalances that could be problematic(Bittmann et al., 2020). These assessments, when used in combination, provide comprehensive overviews of athletes' physical condition, crucial for developing effective and individualized injury prevention strategies(Rebelo et al., 2023; Xie et al., 2024).

Integrated Advanced Assessment Approaches

Recent research demonstrates the potential of integrated assessment protocols combining conventional monitoring with innovative technologies (Jiménez & Verhagen, 2025; Spanakis et al., 2024). Advanced approaches incorporate telomere analysis for cellular aging assessment, genotype/phenotype profiling for genetic variation identification, and metabolomics for metabolic pathway evaluation (Chen et al., 2024; Spanakis et al., 2024)[3]. Biochemical testing assesses key biomarkers related to energy metabolism, inflammation, and recovery, while echocardiography provides detailed cardiac structure and function monitoring (Culler et al., 2024; Silva et al., 2022). Mental wellness evaluation addresses psychological stress, fatigue, and performance readiness (Soler-López et al., 2024).

DISCUSSION

The evidence consistently demonstrates that comprehensive physical screening programs significantly contribute to injury prevention and performance optimization in athletic populations. The integration of multiple assessment modalities provides more complete athlete evaluation than single-component approaches, enabling targeted interventions that address individual risk factors and performance limitations (Jiménez & Verhagen, 2025; Spanakis et al., 2024).

Current findings align with previous research emphasizing the importance of pre-participation evaluation, while extending understanding through documentation of advanced screening technologies' benefits(Squeo et al., 2025; Weise et al., 2025). The evolution from basic medical clearance to comprehensive health optimization represents a significant advancement in sports medicine practice.

Physical screening enables early identification of potential health risks that may not be immediately apparent, facilitating timely intervention and optimal management of underlying conditions (Bolier et al., 2014). The ability to detect subtle signs or symptoms indicating systemic health problems, ranging from chronic conditions to acute ailments, provides opportunities for preventive treatment and complication avoidance(Smokovski et al., 2024; Surdu et al., 2025).

Current literature limitations include heterogeneity in screening protocols, varied outcome measures, and insufficient long-term follow-up data. Additionally, cost-effectiveness analyses and practical implementation guidelines for resource-limited settings require further investigation.

CONCLUSION

Physical screening serves as a fundamental component in modern athletic health management and performance enhancement. The evidence demonstrates that comprehensive screening programs incorporating pre-participation evaluations, functional movement assessments, and integrated monitoring approaches significantly contribute to injury prevention and performance optimization. The integration of traditional screening methods with advanced technologies including genetic analysis, metabolomics, and sophisticated imaging provides unprecedented opportunities for personalized athlete care. These approaches enable the development of individualized training, nutrition, and recovery protocols that optimize performance while minimizing injury risk. The importance and potential impact of comprehensive physical screening extend beyond immediate injury prevention to encompass long-term athlete health and career longevity. The evidence supports the implementation of standardized, multi-dimensional screening protocols as essential components of athletic programs at all competitive levels.

Future research should focus on developing standardized screening protocols, establishing cost-effectiveness guidelines, and investigating long-term outcomes of comprehensive screening programs. The field would benefit from collaborative efforts to create evidence-based screening standards that can be implemented across diverse athletic settings and populations.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this literature review.

REFERENCES

Bittmann, F. N., Dech, S., Aehle, M., & Schaefer, L. V. (2020). Manual Muscle Testing—Force Profiles and Their Reproducibility. *Diagnostics*, *10*(12), 996. https://doi.org/10.3390/diagnostics10120996

Bloomfield, H. E., & Wilt, T. J. (2011). *Evidence Brief: Role of the Annual Comprehensive Physical Examination in the Asymptomatic Adult*. https://europepmc.org/article/MED/22206110

Bolier, L., Ketelaar, S. M., Nieuwenhuijsen, K., Smeets, O., Gärtner, F. R., & Sluiter, J. K. (2014). Workplace mental health promotion online to enhance well-being of nurses and allied health professionals: A cluster-randomized controlled trial. *Internet Interventions*, *1*(4), 196. https://doi.org/10.1016/j.invent.2014.10.002

Brenner, J. S., Watson, A., Brooks, M. A., Carl, R. L., Briskin, S. M., Canty, G., Cuff, S., Edwards, N. M., Kinsella, S. B., Lang, P. J., Master, C. L., Miller, S. M., Peterson, A. R., Silva, F., Stricker, P. R., Walter, K. D., Faigenbaum, A. D., Diamond, A. B., Elder, P. C., & Emanuel, A. (2024). Overuse Injuries, Overtraining, and Burnout in Young Athletes. *PEDIATRICS*, *153*(2). https://doi.org/10.1542/peds.2023-065129

Chen, J., Lin, A., & Luo, P. (2024). Advancing pharmaceutical research: A comprehensive review of cutting-edge tools and technologies [Review of *Advancing pharmaceutical research: A comprehensive review of cutting-edge tools and technologies*]. *Current Pharmaceutical Analysis*, *21*(1), 1. Bentham Science Publishers. https://doi.org/10.1016/j.cpan.2024.11.001

Corrente, C., Silvis, M., MURPHY, J. J., Gallo, R. A., & Onks, C. (2021). Musculoskeletal Practices for the Preparticipation Physical Examination. *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-210629/v1

Culler, K., Sinha, A., Filipp, M., Giro, P., Allen, N. B., Taylor, K. D., Guo, X., Thorp, E., Freed, B. H., Greenland, P., Post, W. S., Bertoni, A. G., Herrington, D. M., Gao, C., Wang, Y., Shah, S. J., & Patel, R. B. (2024). Metabolomic profiling identifies novel metabolites associated with cardiac dysfunction. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-71329-y

Dorrel, B., Long, T., Shaffer, S. W., & Myer, G. D. (2015). Evaluation of the Functional Movement Screen as an Injury Prediction Tool Among Active Adult Populations [Review of *Evaluation of the Functional Movement Screen as an Injury Prediction Tool Among Active Adult Populations*]. *Sports Health A Multidisciplinary Approach*, *7*(6), 532. SAGE Publishing. https://doi.org/10.1177/1941738115607445

Drew, M. K., Toohey, L. A., Smith, M., Baugh, C. M., Carter, H., McPhail, S., Jacobsson, J., Timpka, T., & Newcomer, R. (2023). Health Systems in High-Performance Sport: Key Functions to Protect Health and Optimize Performance in Elite Athletes. *Sports Medicine*, *53*(8), 1479. https://doi.org/10.1007/s40279-023-01855-8

Farzam, K., & Akhondi, H. (2019). Sports Participation Evaluation. *StatPearls*. https://europepmc.org/article/MED/30969510

Ionescu, A., Pitsiladis, Y., Rozenštoka, S., Bigard, X., Löllgen, H., Bachl, N., Debruyne, A., Pigozzi, F., Casasco, M., Jegier, A., Smaranda, A. M., Caramoci, A., & Papadopoulou, T. (2021). Preparticipation medical evaluation for elite athletes: EFSMA recommendations on standardised preparticipation evaluation form in European countries. *BMJ Open Sport & Exercise Medicine*, *7*(4). https://doi.org/10.1136/bmjsem-2021-001178

Jiménez, C., & Verhagen, E. (2025). Reimagining athlete monitoring for true indicative injury prevention. *BMJ Open Sport & Exercise Medicine*, *11*(2). https://doi.org/10.1136/bmjsem-2025-002479

Kiefer, A. W., & Martin, D. T. (2022). Phenomics in sport: Can emerging methodology drive advanced insights? *Frontiers in Network Physiology*, *2*. https://doi.org/10.3389/fnetp.2022.1060858

Lai, W. C., Wang, D., Chen, J. B., Vail, J., Rugg, C. M., & Hame, S. L. (2017). Lower Quarter Y-Balance Test Scores and Lower Extremity Injury in NCAA Division I Athletes. *Orthopaedic Journal of Sports Medicine*, *5*(8). https://doi.org/10.1177/2325967117723666

Leggit, J. C., & Wise, S. (2020). Preparticipation Physical Evaluation: AAFP and Others Update Recommendations. *American Family Physician*, *101*(11), 692. https://www.aafp.org/afp/2020/0601/p692.html

Minetto, M. A., Busso, C., Ferraris, A., Pietrobelli, A., Shepherd, J., McCarthy, C., & Heymsfield, S. B. (2024). Clinical Anthropometrics and Body Composition from 3-Dimensional Optical Imaging. *Journal of Visualized Experiments*, *208*. https://doi.org/10.3791/66698

Mușat, C. L., Mereuță, C., Nechita, A., Tutunaru, D., Voipan, A. E., Voipan, D., Mereuta, E., Gurau, T. V., Gurău, G., & Nechita, L. (2024). Diagnostic Applications of AI in Sports: A Comprehensive Review of Injury Risk Prediction Methods [Review of *Diagnostic Applications of AI in Sports: A Comprehensive Review of Injury Risk Prediction Methods*]. *Diagnostics*, *14*(22), 2516. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/diagnostics14222516

Nelson, S., Wilson, C. S., & Becker, J. (2021). Kinematic and Kinetic Predictors of Y-Balance Test Performance. *International Journal of Sports Physical Therapy*, *16*(2). https://doi.org/10.26603/001c.21492

Olszewski, M., Zając, B., Mika, A., & Golec, J. (2022). Do Hip and Ankle Strength as well as Range of Motion Predict Y-Balance Test - Lower Quarter Performance in Healthy Males? *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-2322146/v1

Pi, R., Garza, M. S. la, Grazioli, G., García, M., Sitges, M., & Drobnic, F. (2021). Pre-participation medical evaluation in competitive athletes: the experience of an international multisport club. *Apunts Sports Medicine*, *57*(213), 100369. https://doi.org/10.1016/j.apunsm.2021.100369

Rebelo, A., Martinho, D. V., Valente-dos-Santos, J., Coelho-e-Silva, M. J., & Teixeira, D. (2023). From data to action: a scoping review of wearable technologies and biomechanical assessments informing injury prevention strategies in sport [Review of *From data to action: a scoping review of wearable technologies and biomechanical assessments informing injury prevention strategies in sport*]. *BMC Sports Science Medicine and Rehabilitation*, *15*(1). BioMed Central. https://doi.org/10.1186/s13102-023-00783-4

Romero-Morales, C., López-López, D., Almazán-Polo, J., Mogedano-Cruz, S., Sosa-Reina, M. D., García-Pérez-de-Sevilla, G., Martín-Pérez, S., & González-de-la-Flor, Á. (2023). Prevalence, diagnosis and management of musculoskeletal disorders in elite athletes: A mini-review [Review of *Prevalence, diagnosis and management of musculoskeletal disorders in elite athletes: A mini-review*]. *Disease-a-Month*, *70*(1), 101629. Elsevier BV. https://doi.org/10.1016/j.disamonth.2023.101629

Seshadri, D. R., Thom, M. L., Harlow, E. R., Gabbett, T. J., Geletka, B. J., Hsu, J. J., Drummond, C. K., Phelan, D., & Voos, J. E. (2021). Wearable Technology and Analytics as a Complementary Toolkit to Optimize Workload and to Reduce Injury Burden [Review of *Wearable Technology and Analytics as a Complementary Toolkit to Optimize Workload and to Reduce Injury Burden*]. *Frontiers in Sports and Active Living*, *2*. Frontiers Media. https://doi.org/10.3389/fspor.2020.630576

Shaffer, S. W., Teyhen, D. S., Lorenson, C. L., Warren, R. L., Koreerat, C. M., Straseske, C. A., & Childs, J. D. (2013). Y-Balance Test: A Reliability Study Involving Multiple Raters. *Military Medicine*, *178*(11), 1264. https://doi.org/10.7205/milmed-d-13-00222

Silva, J. P. D., Pietra, A. E., Baybayon-Grandgeorge, A. N., & Garcia, A. M. (2022). Serum Metabolic Profiling Identifies Key Differences between Patients with Single-Ventricle Heart Disease and Healthy Controls. *International Journal of Translational Medicine*, *2*(1), 78. https://doi.org/10.3390/ijtm2010008

Smokovski, I., Steinle, N., Behnke, A., Bhaskar, S., Grech, G., Richter, K., Niklewski, G., Birkenbihl, C., Parini, P., Andrews, R. J., Bauchner, H., & Golubnitschaja, O. (2024). Digital biomarkers: 3PM approach revolutionizing chronic disease management — EPMA 2024 position. *The EPMA Journal*, *15*(2), 149. https://doi.org/10.1007/s13167-024-00364-6

Soler-López, A., Moreno-Villanueva, A., Gómez-Carmona, C. D., & Pino-Ortega, J. (2024). The Role of Biomarkers in Monitoring Chronic Fatigue Among Male Professional Team Athletes: A Systematic Review [Review of *The Role of Biomarkers in Monitoring Chronic Fatigue Among Male Professional Team Athletes: A Systematic Review*]. *Sensors*, *24*(21), 6862. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/s24216862

Spanakis, M., Fragkiadaki, P., Renieri, E., Vakonaki, E., Fragkiadoulaki, I., Alegakis, A., Kiriakakis, M., Panagiotou, N., Ntoumou, E., Gratsias, I., Zoubaneas, E., Morozova, G. D., Ovchinnikova, M. A., Tsitsimpikou, C., Tsarouhas, K., Drakoulis, N., Skalny, A. V., & Tsatsakis, A. (2024). Advancing athletic assessment by integrating conventional methods with cutting-edge biomedical technologies for comprehensive performance, wellness, and longevity insights. *Frontiers in Sports and Active Living*, *5*. https://doi.org/10.3389/fspor.2023.1327792

Squeo, M. R., Ferrera, A., Gioia, G. D., Mango, F., Maestrini, V., Monosilio, S., Lemme, E., Crotta, S., Spinelli, A., Serdoz, A., Fiore, R., Zampaglione, D., Daniello, C. D., Volpe, M., Bernardi, M., Pelliccia, A., & Gabrielli, L. (2025). Pre-participation Cardiovascular Evaluation for Paris 2024 Olympic Games in Elite Athletes: The Italian Experience. *High Blood Pressure & Cardiovascular Prevention*, *32*(3), 299. https://doi.org/10.1007/s40292-025-00709-w

Surdu, A., Foia, L., Luchian, I., Trifan, D., Tatarciuc, M., Scutariu, M. M., Ciupilan, C., & Budală, D. G. (2025). Saliva as a Diagnostic Tool for Systemic Diseases—A Narrative Review [Review of *Saliva as a Diagnostic Tool for Systemic Diseases—A Narrative Review*]. *Medicina*, *61*(2), 243. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/medicina61020243

Techniques, C. on I. N. or I. D. or E., Services, B. on H. C., Division, H. and M., & Medicine, N. A. of S., Engineering, and. (2023). Advances in the Diagnosis and Evaluation of Disabling Physical Health Conditions. In *National Academies Press eBooks*. https://doi.org/10.17226/2694 1

Torvaldsson, K., Lindblom, H., Sonesson, S., Senorski, E. H., Stigson, H., Tamm, L., Sandberg, J., & Hägglund, M. (2023). Swedish Olympic athletes report one injury insurance claim every second year: a 22-year insurance registry-based cohort study. *Knee Surgery Sports Traumatology Arthroscopy*, *31*(10), 4607. https://doi.org/10.1007/s00167-023-07511-y

Weise, A., Könsgen, N., Joisten, C., Schlumberger, F., Hirschmüller, A., Breuing, J., & Gooßen, K. (2025). Pre-Participation Evaluation of Recreational and Competitive Athletes – A Systematic Review of Guidelines and Consensus Statements [Review of *Pre-Participation Evaluation of Recreational and Competitive Athletes – A Systematic Review of Guidelines and Consensus Statements*]. *Sports Medicine - Open*, *11*(1), 33. Springer Nature. https://doi.org/10.1186/s40798-025-00837-6

Xie, M., Zhang, R., & Gong, Y. (2024). Risk Assessment of FMS and YBT on Sports Injuries in Collegiate Athletes. *International Journal of Sports Medicine*, *46*(3), 189. https://doi.org/10.1055/a-2466-9920

Zarei, M., Soltanirad, S., Kazemi, A., Hoogenboom, B. J., & Hosseinzadeh, M. (2022). Composite functional movement screen score predicts injuries in youth volleyball players: a prospective cohort study. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-24508-8