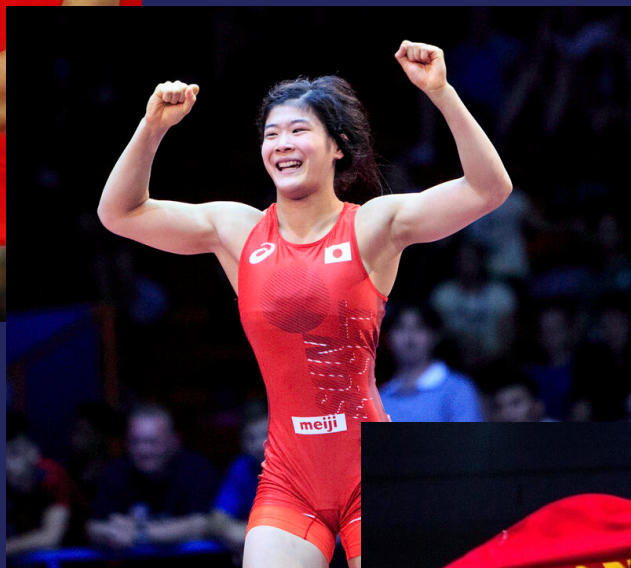
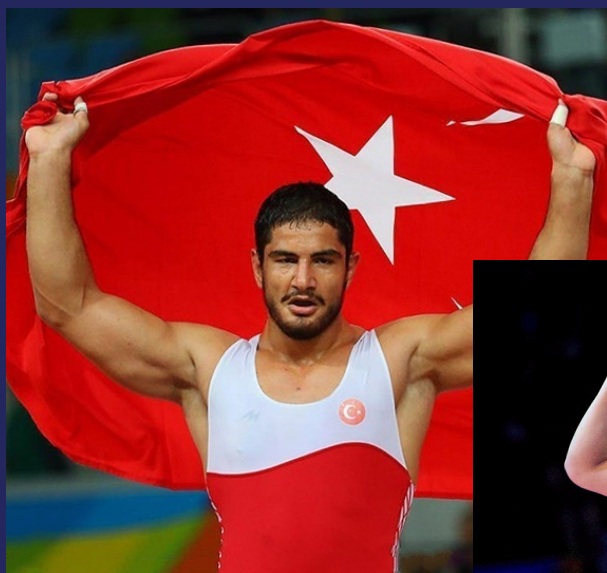


International Journal of Wrestling Science

Volume 12 Number 2, 2022



INTERNATIONAL NETWORK OF WRESTLING RESEARCHERS (INWR)

ADVANCING OUR SPORT THROUGH KNOWLEDGE

FAIRE PROGRESSER NOTRE SPORT PAR LA CONNAISSANCE

ПРОДВИЖЕНИЕ НАШЕГО СПОРТА ЧЕРЕЗ ЗНАНИЕ

PROGRESO PARA NUESTRO DEPORTE MEDIANTE CONOCIMIENTO

International Journal of Wrestling Science

The official journal of the International Network of Wrestling Researchers (INWR)

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Volume 12 Issue 2 2022 International Journal of Wrestling Science is published biannually by Curby Research Group, LLC, 1719 W.60th Street, La Grange, Illinois, 60525. Print ISSN - 2161-5667, Online ISSN - 2161-3524.

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Editor's Comments

This issue contains ***The Annual Compilation of Wrestling Research 2022*** is a compilation of published wrestling-related research published during 2022 and is provided by the International Network of Wrestling Researchers (INWR). The INWR is the largest scientific support group for a sport in the world! Our group has grown to over 500 academics, scientists, doctors and wrestling professionals, from 82 countries who are involved with the sport of wrestling. (www.inwr-wrestling.com) Our Mission Statement is:

The International Network of Wrestling Researchers (INWR) seeks to facilitate the development of wrestling around the world by drawing all wrestling sport science professionals together, in a manner that through our international and intercultural cooperation we are empowered to support the development of wrestling with our research and educational programs.

Sincerely yours in the advancement of Wrestling,



David Curby EdD
Director of the International Network of Wrestling Researchers
davcurb@gmail.com



International Network of Wrestling Researchers (INWR)

Annual Compilation of Wrestling Research for 2022

Abdulrazzaq, Z. T. (2022). "The effect of COVID-19 lockdown on Iraqi wrestlers." Journal of medicine and life **15**(8): 963-966.

The lockdown caused by the COVID-19 pandemic has significantly impacted normal life. At the beginning of March 2020, few cases of infected individuals were recorded, but then the number increased with time, and millions of Iraqi people were forced to stay home, losing many of their daily habits. Banning sports teams from gatherings was a global and local problem facing sports, affecting weight, dietary habits, and other life aspects. This observational retrospective study aimed to determine the changes in athletes' lifestyles like training hours, sleeping hours, weight, and other daily habits. The data were recorded 8 months before the lockdown by their coaches and the medical staff of wrestling teams and after the lockdown by surveys and H directly from the athletes for this study. The results confirmed that Iraqi wrestlers were still committed to not smoking nor drinking alcohol as before the lockdown, but training hours were down to one hour compared to 3 hours daily before the lockdown. All parts of society were affected by the Covid-19 pandemic, and athletes were on top of the social pyramid to manage the problems that resulted from the quarantine and social distancing. Athletes, coaches, medical sports staff, nutritionists, and captains should carry the responsibility to return life to its main road as they should double their efforts to win this battle.

Ang, W. W., et al. (2022). "Ear magnetic discs to prevent cauliflower ear: a case gone wrong." BMJ Case Rep **15**(11).

We present a case of pinna pressure necrosis secondary to the use of ear magnetic discs, used in the management of auricular haematoma. A man in his 20s sustained a left auricular haematoma while wrestling. His coach aspirated the haematoma and advised the use of commercially available compression magnets on either side of the pinna to prevent haematoma reaccumulation. 5 days later, he presented to accident and emergency with left ear pain and swelling. Perichondritis was evident on examination and the compression magnets were removed to reveal significant pressure necrosis of the pinna. The skin underlying the placement of magnets (both anteriorly and posteriorly) was black and necrosed, with erosion of the underlying cartilage. In addition to this, the haematoma had reaccumulated in the surrounding pinna. The haematoma was drained via an incision, and pressure dressing applied with dental rolls. The patient was given a course of oral antibiotics to manage the perichondritis. He was reviewed regularly in the ear, nose and throat emergency clinic to monitor wound healing. 3 months later, he was reviewed in the otology clinic; there was persistent helical rim deformity, and delayed cartilage augmentation was advised. This case highlights the importance of prompt and effective management of auricular haematoma, to prevent long-term deformity. Commercially available pinna magnets for auricular haematoma should be used with caution, and patients should be counselled as such.

Bagheri, R., et al. (2022). "Spirulina supplementation during gradual weight loss in competitive wrestlers." Br J Nutr **127**(2): 248-256.

We aimed to assess the effects of spirulina supplementation during gradual weight loss on serum concentrations of follistatin (FST), myostatin (MST), insulin-like growth factor 1 (IGF-1), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and body composition in competitive wrestlers. Forty competitive wrestlers (age: 22 (SEM 2) years) were randomly assigned to one of two groups: gradual weight loss + spirulina (SP; n 20) or gradual weight loss + placebo (PL; n 20). Subjects in both groups lost weight according to a designed diet over 12 d and were required to reduce baseline body mass (BM) by 4%. Subjects in the SP group received two tablets of spirulina, while subjects in the PL received two tablets of placebo before each meal. Concentrations of mentioned serum markers and body composition were measured before and after the interventions. BM (SP = -3.1 kg and PL = -2.9 kg), body fat percentage (BFP) (SP = -2.1 % and PL = -0.6 %), fat mass (FM) (SP = -2.2 kg and PL = -0.9 kg) and skeletal muscle mass (SP = -1.4 kg and PL = -1.5 kg) significantly decreased in both groups ($P < 0.05$). The changes in BFP and FM were significantly greater in SP compared with the PL group ($P < 0.001$). Additionally, MST (SP = -0.1 ng/ml), AST (SP = -2.1 u/l) and ALT (SP = -2.7 u/l) concentrations significantly diminished in SP group ($P = 0.005$), while FST (PL = -0.1 ng/ml) and IGF-1 (PL = -2.6 ng/ml) concentrations significantly decreased in PL group ($P < 0.05$). Spirulina supplementation during gradual weight loss is beneficial in reducing BFP, FM, MST and liver enzymes while maintaining IGF-1 and FST concentrations in competitive wrestlers.

Baic, M., et al. (2022). "Strength profile in wrestlers - a systematic review." Archives of Budo **18**: 179-192.
Background and Study Aim: Success in wrestling depends on many different factors, but strength could be considered as the most important one. Different strength indicators are closely related to high-level wrestling performance. The aim of this review is to generalize the recommendations of the authors of works dedicated to the analysis of muscle strength in wrestlers, regardless of style (Greco-Roman and freestyle) and knowledge of the most commonly used tests to assess the various manifestations of this motor ability
Material and Methods: The search and the analysis of the studies were done in accordance to PRISMA guidelines. A literature search of 3 databases (Google Scholar, PubMed and Science Direct) was conducted. The identified studies had to meet the following criteria: year of publication (2010-2021), published in English, wrestlers as sample of participants, who do not suffer from acute and chronic injuries.
Results: A total of 24 papers were included to analyses, with a total of 1254 participants, both genders. Greco-Roman style participants were 530, while freestylers were 529. Hand grip strength conducted 18 studies, explosive power of legs 12 studies, basic motor tests 8 studies, 1RM squat and bench 4 studies, isokinetic strength conducted 4 studies and isometric strength only once. The most commonly used test to assess different types of strength in wrestlers are handgrip strength, isometric and isokinetic strength, 1RM bench and squat, explosive strength of legs tests and basic motor tests.
Conclusions: The authors cannot with certainty determine an optimal wrestler profile, but this review can serve as an framework for eventual practical preparation for the demands of competition.

Barreto, L. B. M., et al. (2022). "Judo combat time, scores, and penalties: Review of competition rules changes between 2010 and 2020." Tiempo de combate, puntuaciones y penalizaciones en judo: revisión de los cambios en el reglamento de competición entre 2010 y 2020. **17**(1): 19-37.
This study aimed to describe and analyze the main changes in the official competitive rules of judo between 2010 and 2020, highlighting changes in combat time, scores and penalties. In this retrospective study, a search was performed for official documents which regulated judo rules between 2010 and 2020 on the websites of the International Judo Federation and the Brazilian Judo Confederation, as well as refereeing manuals of the Sergipe Judo Federation (Brazil) and on the Google platform. Over the years, regular combat time has been shortened (2015=5'-4' for women; 2017=5'-4' for men), as well as osaekomi time (2013=25"-20"). This change was intended to facilitate the public's understanding of judo scores, as well as to devalue the use of penalties to achieve the victory (2010=koka's exclusion; 2013=penalty was no longer worth scores; 2017=yuko's exclusion, shido no longer decided the winner in regular time; 2018=shido no longer decided the golden score winner). Attack actions were encouraged (ban on actions to flee combat) and there was an intention to reduce the risk of injuries in competitive judo (prohibition of some types of actions and grips). In other words, there was an attempt by the International Judo Federation to encourage positive judo through the rules from 2010 to 2020. However, these constant rule changes made the competitive training context unstable. Judo coaches and athletes must be aware at the end of each Olympic cycle for new changes which will eventually be introduced and adapt to them quickly to achieve high performance.

Bejtlich, R. (2022). "COMMENTARY-I SWEAR IT UPON ZEUS, SOCRATES DID NOT FAVOR WRESTLERS OVER RUNNERS." International Journal of Wrestling Science **12**(1): 19-21.
A quote that is attributed to Socrates states, "I swear it upon Zeus an outstanding runner cannot be the equal of an average wrestler." It can be found at several internet sites that ostensibly list the famous quotes of Socrates. It has been further circulated by people in the wrestling and combat sport community as an outstanding endorsement of wrestling. Did Socrates really say "I swear it upon Zeus, an outstanding runner cannot be the equal of an average wrestler"?

Berg, M. A. and C. Martin (2022). "Tinea Gladiatorum Detection With a Dermatophyte Test Strip." Clin J Sport Med.
OBJECTIVE: Determine sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and concordance of diafactory hs-TP (DTS) to detect tinea gladiatorum using direct potassium hydroxide (KOH) microscopy as the reference standard. DESIGN: Prospective, comparative study. SETTING: Seventeen Minnesota high schools during the winter wrestling season. PATIENTS: Seventy-one consecutive high school wrestlers identified with a suspicious rash during skin inspection. INTERVENTIONS: Samples were obtained from each rash for both DTS and direct KOH microscopy. MAIN OUTCOME MEASURES: Readings were recorded as positive or negative. RESULTS: Direct KOH microscopy identified tinea gladiatorum in 35 of the 71 samples (46%). DTS sensitivity was 80% (95% confidence interval 63%-92%), and specificity was 82% (66%-92%). PPV was 85% (68%-95%), and NPV

was 86% (72 %-91%). The DTS result was 83% concordant (72%-91%) with direct KOH microscopy. CONCLUSIONS: Similar to rapid Covid antigen tests, DTS required brief, basic training to perform and gave onsite results in 5 to 30 minutes. Although DTS is not approved for use in the United States by the FDA, concordance compared with direct KOH microscopy in diagnosing tinea gladiatorum was similar to results reported for DTS-TU in tinea unguium and tinea pedis. Further study comparing DTS to a reference standard using PCR plus direct microscopy is warranted.

Blanco Ortega, A., et al. (2022). "Biomechanics of the Upper Limbs: A Review in the Sports Combat Ambient Highlighting Wearable Sensors." *Sensors* (14248220) **22**(13): 4905-N.PAG.

Over time, inertial sensors have become an essential ally in the biomechanical field for current researchers. Their miniaturization coupled with their ever-improvement make them ideal for certain applications such as wireless monitoring or measurement of biomechanical variables. Therefore, in this article, a compendium of their use is presented to obtain biomechanical variables such as velocity, acceleration, and power, with a focus on combat sports such as included box, karate, and Taekwondo, among others. A thorough search has been made through a couple of databases, including MDPI, Elsevier, IEEE Publisher, and Taylor & Francis, to highlight some. Research data not older than 20 years have been collected, tabulated, and classified for interpretation. Finally, this work provides a broad view of the use of wearable devices and demonstrates the importance of using inertial sensors to obtain and complement biomechanical measurements on the upper extremities of the human body.

Burma, J. S., et al. (2022). "The effect of an exertional field-test on sport concussion assessment tool 5 subcomponents in University rugby and wrestling athletes: A pilot prospective case series." *Phys Ther Sport* **55**: 21-27.

OBJECTIVES: To evaluate how an exertional field-test impacts the Sport Concussion Assessment Tool 5 (SCAT5) subcomponents in uninjured athletes. DESIGN: Prospective case-series. SETTING: Sports medicine setting. PARTICIPANTS: A total of 37 rugby and wrestling athletes (76% female) with a median age of 19 years (range: 18-23). Twenty-one (57%) had a history of concussion. MAIN OUTCOME MEASURES: The SCAT5 was administered prior-to and following a volitionally fatiguing, field-based 30-15 Intermittent Fitness Test. The primary outcome measures included: total symptom scores and severity, standardized assessment of concussion, neurological screening, and balance errors during the modified balance error scoring system. Wilcoxon signed-rank tests examined differences in ordinal data between pre- and post-exertion with Bonferroni corrections ($\alpha = 0.006$). Data were also stratified into time to SCAT5 administration post-exertion and compared via Cliff's Delta (d). RESULTS: The SCAT5 was administered a median of 20-min (interquartile range: 14-26-min) following exertion. No differences were found pre- and post-exertion across all SCAT5 metrics ($p > 0.048$). Within the post-exertion 0-10-min stratification, total symptoms and severity scores appeared to be elevated with a large effect size ($d \geq 0.64$). CONCLUSIONS: While SCAT5 metrics were not statistically altered when quantified a median of 20-min following high-intensity exertion; greater symptom reporting may occur 10-min following exertion.

Campos, Í. S. L., et al. (2022). "Análise do comportamento técnico da luta marajoara." *Analysis of the technical behavior of the marajoara wrestling*. **18**(2): 1-13.

Marajoara Wrestling (MW) is a combat sport that has been not sufficiently investigated. Characterised as a grappling fight, MW demands peculiarities that are still not well known, such as the relationship between physical constitution and the use of competitive techniques. The present study aimed to analyse the technical-tactical performance of the MW in terms of techniques used and combat configuration. This was a cross-sectional observational study from a sample of three male athletes aged between 23 and 33 years. Athletes were filmed in a natural environment during simulated MW combat in order to raise some technical elements of the MW, such as: defensive attitudes, attack technique, takedown and ground fighting. The results allowed the following conclusions: there is no technical tactical standard in MW, but a combination of elements involving technical-tactical collection, practice time and anthropometric indicators; temporal and functional elements are configured from one's place of practice; the halter is the most frequent technique, being widely used when combined with other techniques; the defensive work is very similar among athletes, the same does not happen in relation to the ground fight, where differences were observed in the fight configuration. This study is expected to be useful in proposing training programs aimed at the technical-tactical performance of the MW.

Cankaya, C. (2022). "Examination of the Frequencies of the Wrestling Techniques Applied in Adults Freestyle Wrestling Turkey Championship According to the Competition Rounds." *International Journal of Early Childhood Special Education* **14**(5): 2418-2424.

The aim of this study is to determine whether there are differences between the rounds by determining the techniques that can be applied in the first and second rounds of the Adults Freestyle Wrestling competitions held in the center of Kahramanmaraş. Around 600 wrestlers aged between 17 and 35 in 10 weight classes (57kg, 61kg, 65kg, 70kg, 74kg, 79kg, 86kg, 92, 97kg, 125 kg.) participated in the Adults Freestyle Wrestling Turkey Championship held on 16-19 December 2021 in the center of Kahramanmaraş on 3 mats. Teams to contribute to the data collection process were formed. Due to the pandemic (Diffuse Corona Disease), the competition data were examined and evaluated from the camera recordings recorded by the relevant federation. The third round of matches that extended to the third round was not considered. The data of the last 300 competitions of wrestling competitions were carefully examined and written on the forms prepared by expert teachers in the wrestling department. When the total number of repetitions and percentage figures of the first and second rounds of the applied techniques are examined, the total number of repetitions and the percentage figures of the applied techniques are as follows; Hip headlock; 27-2,45, Single leg tackle; 627-55,14, Waistlock; 21-1.83, Double leg tackle; 482-44,42, Fireman's carry; 68-5,98, Switch; 86-7,64, Gut wrench; 770-70,87, Cipe; 5-0,36, Footlock; 22-1,93, Arm spin; 26-2,21, kravats; 20-1,66, Kle; 26-2.32, Pulling down with front head and arm 30-2.38, Side head throwing; 8-0,57, bravle; 3-0, 24. The wrestling techniques, which take the first three places as the most repetition and percentage values in total, are gut wrench with 450 times, single leg tackle with 420 repetitions and double leg tackle with 280 repetitions, respectively. In total, the least repetitive ones were found to be bravle with 3 repetitions, cipe with 5 repetitions, and sidehead throwing with 8 repetitions. The data in the observation forms were evaluated in the computer SSPS package program environment and tables were created by making percentage calculations. As a result, it was determined that the first three of the most applied wrestling techniques in the first and second rounds of the competitions were gut wrench (70.87%), single leg tackle (55.14%), double leg tackle (44.42%), respectively. They were repeated more in the first rounds. In total, the least repeated techniques were bravle (0.24%), cipe (0.36%), sidehead throwing (0.57%), and the other nine techniques were in the middle ranks with different percentages.

Çebi, M., et al. (2022). "Comparison of Previously Injured Body Regions in Elite Freestyle and Greco-Roman Wrestlers." *Physikalische Medizin Rehabilitationsmedizin Kurortmedizin* **54**(3): 159-167.

The aim of this study was to compare the injured body regions that elite Freestyle and Greco-Roman wrestlers suffered from and to determine the importance of injuries. 41 Freestyle and 51 Greco-Roman wrestlers, who were practicing in Turkish National Wrestling Team camps, participated in this study. 'Chi Square' and student t tests were used in statistical analyses. When examined injury status and body regions distribution between Freestyle and Greco-Roman wrestlers, significant difference was found in head and trunk injuries according to wrestling styles ($p < 0.05$). No difference was found in upper/lower extremities and lesion/scrape and friction burns status of the wrestlers according to wrestling style ($p > 0.05$). There was significant difference in trunk and upper extremity injuries with respect to weight category ($p < 0.05$ and $p < 0.001$). Significant difference was also found in nose injuries according to wrestling styles ($p < 0.05$). When examined wrestling style and upper extremity injuries according to the number of injuries, there was found significant difference between two styles in muscle injuries, finger and wrist injuries ($p < 0.05$). The difference between toe injuries in respect to the wrestling style was statistically significant ($p < 0.05$). Results: Greco-Roman wrestlers experienced more injuries in trunk, head and nose compared to Freestyle wrestlers. Trunk, lower and upper extremity injuries varied depending on weight categories. Neck, back, lumbar and chest injuries were more common in Greco-Roman wrestlers. Freestyle wrestlers were more vulnerable to muscle injuries while Greco-Roman wrestlers were more vulnerable to finger and wrist injuries. It is recommended to improve some abilities excellently such as aerobic power, strength, balance and neuro-motor coordination in wrestling. Techniques should be taught well to the wrestlers, most risky extremities for injury have to be applied extra training and these extremities should be protected from injuries by several tapes, bandages or gears during exercise. Freestyle wrestlers ought to be more careful in diving move. Using ear protector in addition to preventive measures can be recommended during training in order to prevent temporal bone fractures and swellings.

Chhana, R., et al. (2022). "Collegiate Wrestler With a Bicuspid Aortic Valve and Aortic Dilation." *JACC Case Rep* **4**(22): 1548-1552.

Bicuspid aortic valve and aortopathy are generally considered contraindications to isometric exercise. For athletes with mild disease at low risk of adverse events, a shared decision-making approach for continued sports participation is reasonable. We present a case of a collegiate wrestler with bicuspid aortic valve and aortopathy to illustrate shared decision making. (Level of Difficulty: Intermediate.).

Chu, Y., et al. (2022). "Long-Term Effect of Vibration Therapy for Training-Induced Muscle Fatigue in Elite Athletes." International Journal of Environmental Research and Public Health **19**(12).

Purpose: To evaluate the long-term effect of vibration therapy with holistic and local intervention in treating muscle fatigue in elite athletes during their intensive training season. Methods: Study participants included five male athletes from a provincial Greco-Roman wrestling team who were qualified for the finals of China's national games. During the study, conventional therapeutic intervention was applied during the initial three weeks of the study, and an instrument intervention was adopted in the following three weeks. A surface electromyography (sEMG) was used to measure muscle fatigue of latissimus dorsi, both before and after each intervention session. Specifically, the pre-intervention measurement was conducted right after the daily training completion; and the postintervention measurement occurred in the following morning. The data analyses were to compare the differences in the muscle fatigue data between the two modes of interventions, conventional and instrument therapy. Results: The conventional intervention showed no significant difference in the sEMG indexes before and after the intervention; while for the instrument intervention, the pre- and post- intervention sEMG indexes differed significantly ($p < 0.05$). Conclusion: The long-term effects of instrument vibration therapy on muscle fatigue recovery were studied based on observational data from elite athletes. The results indicate that the vibration therapy with holistic and local consideration demonstrated an effective reduction of muscle fatigue and/or fatigue accumulation in elite athletes during their intensive training season.

Coşkuner, Z., et al. (2022). "The impact of existing and modify wrestling shoes on foot posture deformities in 12-13 years old athletes." Pedagogy of Physical Culture and Sports **26**(5): 327-333.

Background and Study Aim

Material and Methods In the early years when sports footwear became compulsory, the importance of shoe design was not considered in terms of athletes' health. Since the early years of wrestling shoe use, these gears have been manufactured according to the rules of competition, and modifications have been very limited. In this regard, this study aims to determine the effect of existing wrestling shoes on foot deformation. The study was carried out with the participation of 108 young male athletes who had the same training on the same ground for three years in the Wrestling Training Center. The athletes were divided into two groups, an experimental and a control group. While the control group wore wrestling shoes produced by widely used brands, the experimental group wore newly designed wrestling shoes. Foot arch values and images of both groups were determined using a podoscope device at the beginning and end of the study. The evaluations were made according to the Staheli arch index. Results: The results of the statistical analysis revealed that differences were found in the footprint measurement values of the control group. It was determined that this difference in the footprints was greater among the freestyle wrestlers. The decrease in the averages between the first and second measurement values of the group using the newly designed wrestling shoes was found to be highly positive and in a linear direction. Also, it was determined that the pain score values of the control group were higher than the scores of the experimental group after training. Conclusions: The results revealed that there were deformations in the feet of the control group wrestlers wearing available wrestling shoes. It was observed that freestyle wrestling athletes had more deformation than Greco-Roman style wrestlers, and leg pains were more prevalent after training and competitions. Based on these results, it was concluded that the design of wrestling shoes produced with today's technology needs to be redesigned.

Cutrufello, P. T., et al. (2022). "INTER-RATER RELIABILITY AND THE PREDICTION OF MINIMUM WRESTLING WEIGHT USING A-MODE ULTRASOUND AMONG EXPERIENCED AND INEXPERIENCED ASSESSORS." International Journal of Wrestling Science **12**(1): 14-18.

The purpose of this study was to examine the inter-rater reliability between four assessors [two experienced (E1 and E2) and two inexperienced (I1 and I2)] using both US and skinfold methods (SF) to determine percent body fat (%BF) and minimum wrestling weight (MWW). Sixteen college-aged adult males (20.8 ± 1.6 yrs) participated in this study. Both US and SF measurements were taken at the chest (CH), abdomen (AB), and thigh (TH). The 3-site Jackson & Pollock method was used to determine body density and %BF. There was no significant difference in %BF determined by any of the 4 assessors when using US (E1=12.8±4.7%; E2=13.8±5.4%; I3=13.2±5.4%; I4=13.4±5.4%; $p=0.120$) or SF (E1=10.3±5.0%; E2=11.2±6.3%; I3=10.5±4.7%; I4=10.2±4.9%; $p=0.094$) methods. The SF correlations between the experienced and inexperienced assessors ranged between 0.843-0.989. The US correlations between the experienced and the inexperienced assessors ranged between 0.643-0.978. The standard error of the estimate (SEE) for SF determined %BF between experienced and inexperienced assessors ranged from 0.76-1.64%,

while the SEE's for US determined %BF ranged from 1.26-1.74%. Compared to E1, the MWW's determined by E2, I1, and I2 using SF identified 4, 6, and 6 wrestlers that would be certified at a different weight class, while US determined MWW's identified 4, 3, and 4 wrestlers that would be certified at a different weight class. The results of this study demonstrate acceptable inter-rater reliability for the assessment of %BF using US when administered by both experienced and inexperienced assessors.

Cynarski, W. J. and K. Warchol (2022). "Wrestling: the impact of their cultivation on achievements in various areas of life." IDO MOVEMENT FOR CULTURE. Journal of Martial Arts Anthropology **22**(5): 22-28. Aim. The problem of the impact of wrestling skills, training, and related experiences on the careers of people who have achieved success in various areas of life was discussed. Method. The qualitative method of expert judgments, also known as the competent judges' method, was used. Seven specific questions were answered by seven experts from five countries. Results. Professionals very positively assess the impact of wrestling on their further careers after completing competition training. They indicate the improvement of general physical fitness, acquired skills, strengthening of willpower and character. Conclusions. For the participants of the study, practicing wrestling was or still is an asset in their further professional careers, helping them to achieve a better status position.

Dankovic, G. (2022). "Effects of sodium bicarbonate supplementation in martial arts." Serbian Journal of Experimental and Clinical Research(in print).

The aim of this systematic review was to evaluate the effects of consuming sodium bicarbonate (NaHCO₃) and to gain insight into the nature of any changes in performance following NaHCO₃ supplementation among combat sport athletes. The analysis of the results provides compelling evidence in favor of acute or chronic NaHCO₃ supplementation as an ergogenic substance which could have an impact on several aspects of performance in judo [23, 31, 32], taekwondo [17, 20], karate [17, 33] [28, 29], wrestling [18, 19], jiu-jitsu [32] and boxing [16]. Acute or chronic NaHCO₃ supplementation is effective in the improvement of several variables of physical performance in combat sports during testing and simulated matches. Enhanced performance resulted in the increased capacity of the glycolytic system. However, the positive effects of its use are most often visible following the onset of fatigue. In addition, the use of NaHCO₃ is associated with an increased concentration of lactate in the blood. This systematic review provides data relevant for sports professionals and athletes alike regarding the use of NaHCO₃ as a supplement, prior or during training and matches.

Dantas, G. H. M., et al. (2022). "Case reports of athletes affected by rhabdomyolysis: A systematic review." International Journal of Sports Science and Coaching **17**(1): 189-196.

Objective: To analyze intensity levels, modalities, types of physical activities, ambient temperature, and hydration levels during stimuli performed in training and competition of studies that reported episodes of rhabdomyolysis in athletes. Method: We conducted a systematic review following the PRISMA guidelines and registered on PROSPERO, as number CRD42020126107. MedLine (via PubMed), Cochrane, LILACS, SciELO, Web of Science, Scopus, CINAHL, SPORTDiscus, ScienceDirect, and PEDro databases were searched for case reports in which professional athletes, who had a technical team as support, were affected by rhabdomyolysis induced by the practice of physical activity. The descriptors and their synonyms "rhabdomyolysis", "exercise", and "athletes", available in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), were used. Results: After the screening process, 10 studies were included and analyzed according to the CAse REport (CARE) guidelines. The sports of the case reports were soccer, football, swimming, wrestling, 24-hour cross-country skiing, and mixed martial arts (MMA). The age range of the athletes varied between 16 to 41 years old. The case reports described a total of 17 athletes (14 male and three female). The main aspects related to the diagnosis of rhabdomyolysis were ambient temperature, creatine kinase (CK) levels, the occurrence of renal impairment, and one or more signs of the classical triad (myalgia, dark urine, and muscle weakness). Conclusion: It was observed difficulty in identifying concrete parameters to prevent and diagnose the rhabdomyolysis of premature form, however, controlling these variables may increase the chances of treatment success and decrease the risk of sequels.

Delaplace, G. and P. Chuluunbat (2022). "When the Picture Comes in How to Win Mongolian Wrestling Tournaments." Inner Asia **24**(1): 103-130.

This article sketches out the conditions in which winning (turuuleh) may be achieved in Mongolian wrestling tournaments. Fieldwork carried out before, during and after the yearly competition of Naadam in the summer of 2019 suggests that these conditions are indeed rather diverse in nature. Getting ready for a contest requires wrestlers to be tending to several aspects of their personhood, as their strength, power (byar) or the success of their techniques (meh) depend not only on their physical preparedness, but also on a delicate balancing of social, technical and cosmological skills. Winning in Mongolian wrestling seldom relies on an individual performance only: following contenders in district, regional and national Naadam tournaments as they prepare for, take part in and reflect on these, we want to show that coming out on top requires a plan, or a 'picture' (zurag), which might or might not prevail, i.e. 'come in' (oroh), over that of other wrestlers. This plan involves enlisting the support of competing wrestlers, and therefore mobilising such resources as kinship, autochthony or money in order to convince them to do so. It is indeed a delicate balance between physical strength, cosmological caution and political strategy that a wrestler must strike for his plan to prevail in a competition, and it is perhaps no wonder if their person and their success should be given such a political importance in Mongolia today.

Diaz, R. E. I. and J. C. N. Gomez (2022). "ORGANIZATION OF THE TACTICAL PREPARATION IN GRECO-ROMAN WRESTLING IN THE JUVENILE CATEGORY - A PROPOSAL." International Journal of Wrestling Science **12**(1): 2-7.

In this investigation a proposal is made for the organization of the tactical preparation in Greco-Roman wrestling for youth. It has three phases; diagnosis, organization and evaluation of the process. We worked with the team of the youth category of the provincial Sports Initiation School [Escuelas de Iniciación Deportivas Escolares, EIDE] of Villa Clara, for its implementation different methods were used, such as document review, interview, observation, systemic approach, modeling and; historical-logical and inductive-deductive methods. The organization of the treatment of tactical preparation in youth wrestlers of the Greco-Roman style, guaranteed the increase in the state of competitive performance of the wrestlers during the different moments of the preparation cycles, causing the increase in sports results. From its application it was found that the level of tactical effectiveness was raised in the fighters of the youth category of the Greco-Roman style achieving 100% effectiveness in medals, since the four athletes who participated in the Youth Olympiad achieved one gold, one silver and two bronze medals.

Dimitrijevic, M., et al. (2022). "Body Fat Evaluation in Male Athletes from Combat Sports by Comparing Anthropometric, Bioimpedance, and Dual-Energy X-Ray Absorptiometry Measurements." BioMed Research International: 1-8.

Multiple anthropometric equations have been developed aiming to provide accurate and affordable assessment of body fat composition in male athletes. This study examined correlations of values obtained from seventeen different anthropometric equations to DXA as well as BIA and DXA values. Male athletes ($n = 101$) from three different combat sports, wrestling ($n = 33$), judo ($n = 35$), and kickboxing ($n = 33$), with an average age of 20.9 ± 4.2 were included. Body fat percentage was estimated using anthropometry, BIA, and DXA. Correlations between anthropometric methods and DXA, as well as BIA and DXA, were determined using Spearman's rank correlation. Sixteen out of seventeen estimates of body fat percentages using existing anthropometric equations showed strong positive correlation with the values derived from DXA measurements ($r = 0.569 - 0.909$). The highest correlation was observed using the equation derived by Yuhasz, $r = 0.909$, followed by the equations from Oliver et al., Evans et al., Faulkner, and Thorland et al. ($r \approx 0.9$). Statistical analysis of body fat percentages from DXA and BIA measurements also showed high positive correlation ($r = 0.710$). Correlation of seventeen anthropometric equations with BIA and DXA methods revealed that equations by Yuhasz, Oliver et al., Evans et al., Faulkner, and Thorland et al. are suitable alternative for assessing body fat percentage among male athletes from combat sports, showing even stronger correlation than BIA method.

Dinçer, N., et al. (2022). "Comparison of visual simple reaction time performances of boxers and wrestlers." Pakistan Journal of Medical and Health Sciences **16**(2): 467-469.

Background: It is known that reaction time, which is of great importance in terms of athlete performance, is one of the most difficult sports performance parameters to develop. Reaction time performance in Athletes may vary according to the sport branch in terms of development. Especially in combat sports such as boxing and wrestling, reaction time is of such great importance that it can directly or indirectly affect the outcome of the competition. Aim: In this study, it was aimed to compare the visual simple reaction time performances of boxing and wrestling athletes. By comparing the simple visual reaction

times of boxers and wrestlers, the effects of both branch trainings on the reaction time were tried to be determined. Methods: This research was carried out with the participation of 30 male athletes between the ages of 14-17. It was held with the participation of a total of 30 male athletes, including 15 boxers and 15 wrestlers, who have been licensed contestants for at least three years and are still actively participating in the competitions. The heights of the participants were measured with a wall-mounted stadiometer (Holtain Ltd. England), their body weights were measured with an electronic scale (Seca, Germany), and their visual simple reaction time performance was measured with a Reaction Time device (Hubbard Scientific 6027). Data were analyzed with the IBM Statistics (SPSS, ver. 22.0, Armonk, NY) program. Results: The mean age of the boxing group (N=15) was 15.46 ± 1.06 , the mean height was 175.53 ± 4.18 , the mean body weight was 61.00 ± 8.03 and the mean reaction time was 23.66 ± 2.99 . The mean age of the wrestling group (N=15) was 15.40 ± 1.12 , the mean height was 170.46 ± 4.29 , the mean body weight was 62.80 ± 8.65 and the mean reaction time was 25.93 ± 2.68 . Conclusion: In this study comparing the visual simple reaction time performances of boxers and wrestlers, it was concluded that boxing training is more effective in shortening reaction time performance compared to wrestling training.

Dutra de Moraes Mourão, N. R., et al. (2022). "Behavior profile of cytokines submitted to combat sports. A systematic review." *Science & Sports* 37(4): 244-254.

Combat sports trigger biological reactions responsible for altering plasma levels of pro and anti-inflammatory cytokines. Thus, although participation in moderate intensity activities can improve the immune function above sedentary levels, excessive and high intensity exercises can damage the immune system, requiring detection of a diagnostic nature in specific sporting scenarios, to enable the planning of adequate periodization. To synthesize and analyze the effects of combat sports on cytokine behavior; and provide quantitative estimates of the alterations in these markers. The Embase, MEDLINE/PubMed, Central, Scielo, and SPORTDiscus databases were searched from the oldest records until May/2020. The search strategy included keywords related to the terms "cytokines" and "combat sport". To be included, studies were required to: (1) evaluate combat sports; (2) evaluate the behavior of cytokines in response to sport; and (3) have an observational design. The search and data extraction processes were carried out by two independent researchers, who followed a standardized form. In total, 11 studies (n = 189 participants, all male) met the inclusion criteria. The combat sports investigated in the studies included: wrestling, judo, karate, kick boxing, MMA, and boxing. With respect to the cytokines, the following were evaluated: IL-1, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-13, IL-17, TNF- α and IFN. The outcomes demonstrated that there was an increase after exercise in TNF- α , IL-1, IL-6, IL-17, and IFN, whereas IL-8 and IL-10 demonstrated inconclusive outcomes, since the behavior of these cytokines was distinct between the studies. For IL-9, IL-2, IL-5, IL-4, and IL-13 the levels were not detectable. The presented outcomes could be useful and relevant to understanding the necessary physiological demands in combat sports and enabled us to conclude that, regardless of the level of conditioning, volume, and modality practiced, there is a circumstance that indicates an acute level of stress in response to combat sports in men.

Fasczewski, K. S., et al. (2022). "“Strong, fearless, tough, enduring”: Collegiate male wrestlers’ perceptions of body image and masculinity." *Performance Enhancement and Health* 10(1).

Background: Successful wrestling performance is largely dictated by weight. Some wrestlers engage in rapid weight loss methods to maximize performance at lower weight classes. Data from other sports suggest these methods can negatively affect body image (BI) and physical health and put athletes at risk for disordered eating behaviors, but the actual impact in wrestling is unknown. The present study examined the relationship between perceptions of masculinity and BI to eating disorder (ED) risk in male collegiate wrestlers. Methods: Survey data were collected from active male NCAA wrestlers (n= 63). Wrestlers completed the Eating Attitudes Test, the Multidimensional Body-Self Relations Questionnaire, the Hoffman Gender Scale, and three open-ended response items. Results: ED risk was positively correlated to appearance self-importance ($r = 0.361$, $p < 0.01$) and body weight vigilance ($r = 0.618$, $p < 0.01$) and negatively correlated to BI satisfaction ($r = -0.328$, $p < 0.05$). Gender self-acceptance was correlated to lower importance placed on BI ($r = 0.402$, $p < 0.01$). Additionally, 35 (53.9%) participants reported at least one maladaptive eating behavior (e.g. bingeing, vomiting, laxative use). Qualitative data indicates similarities in traits associated with successful wrestlers and the traditional ideal male (mental and physical strength, toughness, surpassing limits). Conclusions: The masculine traits exemplified by the sport of wrestling may negatively impact BI and encourage maladaptive eating and/or weight-control behavior and increase ED risk. The information in this study can be used to inform the development of safer weight loss practices and specialized educational programs for ED risk for wrestlers. This study highlights a need for further qualitative analysis of weight-control behaviors in collegiate wrestling.

Francino, L., et al. (2022). "Effect of a Six Week In-Season Training Program on Wrestling-Specific Competitive Performance." *Int J Environ Res Public Health* **19**(15).

The effect of multi-component training on specific performance is under-researched in wrestlers. The aim of this study was to determine the effect of six weeks of multi-component training on The Special Wrestling Fitness Test (SWFT) performances of wrestlers who were preparing for an international championship, and to, additionally, determine their inter-individual adaptive variability. The wrestlers (n = 13; 7 females; all international level) underwent technical-tactical and physical fitness training for the six weeks before the championship, 12 sessions per week (i.e., 36 h per week). Before and after the intervention the athletes were assessed with the SWFT, a wrestling-specific competitive performance test that includes measurements for throws, heart rate response to the SWFT, and the SWFT index. Significant pre-post intervention improvements were noted for throws (pre = 23.5 ± 2.9 ; post = 24.9 ± 3.6 ; $p = 0.022$) and SWFT(index) (pre = 14.9 ± 2.2 ; post = 14.1 ± 2.2 ; $p = 0.013$). In conclusion, six weeks of multi-component training improved wrestling-specific competitive performances in highly-trained wrestlers, although with a meaningful inter-subject variability.

Godina, E. Z., et al. (2022). "Secular Trend of Body Dimensions in Highly Qualified Wrestlers." *Collegium Antropologicum* **46**(1): 9-14.

The purpose of the paper was to study the physique of highly qualified martial art athletes engaged in different types of wrestling, and to perform a retrospective analysis of the morphological characteristics of wrestlers examined since the early 1920s. The materials of the anthropometric survey of 48 athletes engaged in different types of wrestling with qualification from the candidate for master of sports and above were used for this purpose and compared to the "control group" of young men (N = 97) who were not engaged in sports (similar to the group of athletes by age, ethnicity and percentage of individuals with different weight categories). A set of morphological traits was established that contributed to the successful achievements in sports. When comparing the physique of modern athletes with that of the wrestlers surveyed in the early and mid-20th century (the 1920s and 1960s), it has been shown that the secular trend towards increase in height typical for modern population, was expressed in athletes to a much lesser extent. Striking similarities were revealed for absolute and relative dimensions characterizing the skeletal body proportions of the wrestlers, which pointed to the secular stability of this sports morphotype. The obtained results can be used as additional morphological criteria for sports selection, professional orientation and prediction of competitive success.

Gomez, J. C. N. and R. E. I. Diaz (2022). "STRUCTURE FOR PLANNING IN YOUTH OLYMPIC WRESTLING THROUGH THE INTEGRATED MACROCYCLE WITH ACCENTED LOADS-AN ALTERNATIVE." *International Journal of Wrestling Science* **12**(1): 8-13.

The present investigation arises from the need presented by the Olympic Wrestling coaches of the youth category (16-18 years) of the Schools of Sports Initiation Schools (EIDE) to organize the structure of the training of their teams. Its objective was to design a structure for the planning of training in the youth category of Greco-Roman Wrestling through the Integrated Macrocycle model, the design of this scientific result is based on contemporary conceptions of accentuation of the load in the organization of sports training. Methods of the theoretical level, the analysis of documents, the systemic approach, the survey and the criteria of specialists were used. The designed planning structure was submitted to the criteria of specialists, who endorsed its possible application in practice.

Gryaznykh, A., et al. (2022). "Cortisol and testosterone content variability in blood serum of professional wrestlers under different conditions of physical activity." *Journal of Physical Education and Sport* **22**(2): 448-454.

Hormonal mechanisms of metabolic reactions regulation during chronic muscle loads determine the course of recovery processes in athletes' body. Nutrients of various compositions intake (mainly protein foods) affects the hormonal relationship of anabolic and catabolic hormones and can act as a factor in correcting the damaging effect of intense physical activity on the human body, having a modulating effect on metabolism. In this research, the consistency of the anabolic index as a biomarker and its dynamics changes when taking dietary protein were determined. The aim of this research is analysis of postprandial (after protein intake) dynamics of changes in the content of cortisol and testosterone in athletes' blood serum and the anabolic index as biomarkers of functional tension in different background conditions. Materials and methods. During the research 2 series were performed. The scheme of the series is as follows: first series: food + load, the second series: load + food. The hormone content and anabolic index were determined in 12 athletes 15, 45, 75 and 105 minutes after physical activity (60 minutes) in different conditions of protein intake. Research results. In the first series, athletes had a 1.6-fold decrease in

cortisol concentration after 75 minutes and 2.2-fold after 105 minutes, the anabolism index increased 2.2-fold by 105 minutes of the recovery period. In the second series, no significant changes in the concentration of cortisol were registered. There was an increase in the anabolism index by 82.4%, relative to the value of this indicator in the first series. In both series of the research, testosterone concentration in the athletes' blood serum was little affected by the intake of protein food against the background of a significant increase in the anabolism index. Conclusion. It has been established that protein food is able to have a modeling effect on reducing the stress level of athletes' hormonal background.

Gupta, P., et al. (2022). "Spinal injuries in high school men's wrestling." *Pm r* **14**(10): 1303-1305.

Hammer, E., et al. (2022). "Association of in-competition injury risk and the degree of rapid weight cutting prior to competition in division I collegiate wrestlers." *Br J Sports Med.*

OBJECTIVES: Weight cutting is thought to offer a competitive advantage in wrestling. Dehydration has deleterious effects on physical and cognitive function, which may increase the risk of injury. The purpose of the study was to investigate whether the degree of weight cutting was associated with injury risk. **METHODS:** Data were collected prospectively in a cohort of collegiate wrestlers over seven seasons. Changes in weight, body fat and lean mass were measured during the preseason, at midseason and before competition. Cox proportional-hazard ratios were calculated for risk of in-competition injury. **RESULTS:** Among 67 unique division 1 collegiate wrestlers (163 athlete seasons), there were 53 unique injuries affecting 46 athletes. There was no difference in absolute weight change, per cent weight change, per cent body fat change or per cent lean mass change between injured and non-injured wrestlers from the preseason to midseason measurements. From midseason to competition weight, change in body weight was $-7.0\% \pm 3.2\%$ ($-5.3 \text{ kg} \pm 2.6$) in injured athletes compared with $-5.7\% \pm 3.3\%$ ($-4.3 \text{ kg} \pm 2.5$) in non-injured athletes. For every kilogram of body weight lost, wrestlers had a 14% increased hazard of injury (HR 1.14, 95% CI 1.04 to 1.25, $p=0.004$). For every 1% of body weight lost, wrestlers had an 11% increased hazard of injury (HR 1.11, 95% CI 1.03 to 1.19, $p=0.005$). **CONCLUSION:** Rapid weight cutting was associated with a higher risk of in-competition injuries in division 1 collegiate wrestlers. For every per cent in body weight lost, wrestlers had an 11% increased hazard of injury during competition.

He, G., et al. (2022). "PHYSIOLOGICAL MONITORING OF INTENSITY TRAINING IN FEMALE WRESTLERS." *Revista Brasileira de Medicina do Esporte* **28**(6): 804-806.

Introduction: Currently, female wrestling has become one of the potential advantages in the Olympic Games, which has also allowed the sport to receive more attention. Physiological monitoring in intense physical training in female wrestlers is still little explored despite its importance in training conduction. **Objective:** Explore special intensity physical training effects on female wrestlers through physiological monitoring. **Methods:** Literature search, expert interview, and an experimental method conducted a situation analysis on 2-month training for 8 female wrestling team athletes, specific contents also included: analysis of female wrestlers' body composition, changes in serum testosterone levels, and variations in cortisol levels. **Results:** During the two-month training period, the various athletes' physiological indicators underwent noticeable changes, remaining at the top of the normal range. Most of the athletes could adapt to the training load and intensity in this phase. Serum testosterone, cortisol, and hemoglobin levels in early athletes increased significantly. However, as training progresses, all indicators decrease, showing that the adaptability of the athlete's body is consolidated. The hemoglobin content increased in most of the athletes, showing that the athlete's own intensity of physical training was high. **Conclusion:** The above physiological indicators can reflect the physical function of the athletes, providing a theoretical basis for coaches to develop evidence-based training plans. Evidence Level II; Therapeutic Studies-Investigating the result.

Horswill, C. A. and A. E. Roedeshimer (2022). "Rethinking the 12% Body-Fat Minimum for Female Wrestlers." *Current Sports Medicine Reports* **21**(1): 8-11.

Reducing body mass to achieve a lower weight category for performance advantages is a long-standing tradition in wrestling (1). The practice can be extreme and methods to do so, unsafe (1,2). To help thwart unhealthy manipulations, body composition assessment was proposed more than 50 years ago by the late Charles Tipton, PhD, for determining an objective, safe weight category for adolescent wrestlers (3,4). By the late 1980s, one U.S. state high-school sport governing body (SGB) had mandated a minimum weight program for adolescent male wrestlers (5,6). In 1998, the National Collegiate Athletic Association adopted a minimum weight program after the deaths of three male wrestlers who succumbed

to hyperthermia while making weight (7,8). Subsequently, the National Federation for High School advised all U.S. states to adopt programs for interscholastic wrestling. As a component of the programs, the minimum weight class could not be less than a weight at which adolescent wrestlers carry 7% body fat (1,9,10) or for collegiate male wrestlers, 5% body fat (1,10). Shortly after implementation of these programs for men, wrestling was introduced as a competitive sport for women. Guidance was needed for their weight-class selection. SGBs leveraged recommendations from sports medicine experts and set the minimum at 12% body fat (1,9,10). The physiological basis for this was that extreme leanness or the pursuit of leanness required a large negative energy balance that would induce nutrient deficiencies, disrupt the reproductive endocrine system, lower reduce estrogen levels, and do harm to bone and other tissues (2,11). Female participation in wrestling has grown in the United States and internationally, but justification for the 12% cutoff remains absent. The minimum is often interpreted as ideal and achievable regardless of whether it is reasonable or safe. In addition, the potential for coercion from coaches or teammates exists when the team attempts to complete the lineup for competition, and the body-composition test indicates that a team member can fill a specific weight class at 12% body fat (2). At that point, 12% body fat may result in an unhealthy minimum weight. This commentary examines available data on female wrestlers to determine the likelihood that 12% body fat occurs among female wrestlers. We believe that 12% body fat is un-likely and rare and that the minimum should be reconsidered for safety among female wrestlers. This does not mean prohibiting a female wrestler from competing at 12% body fat if naturally occurring. Rather, SGBs should consider raising the minimum body fat for the safety of female wrestlers who are considering weight reduction.

Islam, A. (2022). "The effect of athletic mental energy on wrestlers' sports courage and attitudes toward wrestling." Physical Education of Students **26**(5): 247-255.

Background and Study Aim Material and Methods This study aimed to determine whether athletic mental energy played a mediating role between wrestlers' sports courage and attitudes toward wrestling. The study developed an original theoretical model, which was tested using the Sobel test. The sample consisted of 247 wrestlers in the Freestyle and Greco-Roman Wrestling Leagues, U-23, 1. League, 2. League, and Stars Wrestling Leagues of the 2021-2022 Turkish Wrestling Federation. Participants were recruited using random sampling. Data were collected using a sociodemographic characteristics questionnaire, the Guttman Attitude Scale Towards Wrestling (GAS), the Sports Courage Scale-31 (SCS-31), and the Athletic Mental Energy Scale (AMES). Results There was a positive correlation between attitudes toward wrestling and athletic mental energy. There was a positive correlation between athletic mental energy and sports courage. There was a positive correlation between attitudes toward wrestling and sports courage. Moreover, athletic mental energy played a fully mediating role between sports courage and attitudes toward wrestling. Conclusions The results confirmed the theoretical model. Our results also point to the effects of athletic mental energy on sports performance. Athletic mental energy plays a fully mediating role between sports courage and attitudes toward wrestling. Authorities should inform wrestlers about the relationship between athletic mental energy, mental training, and sports courage. Wrestlers should practice developing positive attitudes toward wrestling and build up the courage to show high performance during competitions. Researchers should recruit different samples to investigate the mediating role of athletic mental energy between wrestling attitude and sports courage.

Ismoiljonovich, B. F., et al. (2022). "In Wrestling Speciality, in Developing Technical Actions of Wrestlers Is to Consider Morphological Peculiarities." Journal of Pharmaceutical Negative Results **13**: 4065-4070.

Categories of somatotypes of athletes specializing in various types of wrestling are established by the methods of anthropometry and by Hit-Carter method. Results of anthropometric parameters showed that somatic state of athletes engaged in various types of wrestling are differed. Similarity was found in constitution of wrestlers specializing in weightlifting, freestyle wrestling and national sport kurash, and endomesomorphic somatotype was determined in 67-83% of athletes, that calculating by points is expressed as 3.3:6:2. Ecto-mesomorphic somatotype dominated among judoists and sambo wrestlers and components of body mass were presented as 3,3: 5,4: 2,2 and 2,9: 5,4: 2,3 respectively. Dynamic observation showed that athletes with balanced-mesomorphic somatotype possess wide adaptation ability, providing an effective rearrangement of morphotype under the influence of training modes of different orientation.

Ito, S. H. O., et al. (2022). "Dynamic Control of Upper Limb Stretch Reflex in Wrestlers." Medicine & Science in Sports & Exercise **54**(2): 1-8.

Purpose The objective of this study was to clarify the characteristics of the upper limb stretch reflex in wrestlers. **Methods** Ten wrestlers and 11 control subjects participated in the study. The experiment was

divided into two sessions. In the extension perturbation session, participants either relaxed or flexed the elbow when they felt a perturbation (abrupt elbow extension induced by a dynamometer). This was done 30 times by each subject for both sessions. In the flexion perturbation session, participants also relaxed or extended the elbow when they felt a perturbation (abrupt elbow flexion). During the tasks, the stretch reflex was monitored by recording the surface EMG activities of the right biceps and triceps brachii. The EMG reflex components were divided into three periods based on the time after the perturbation (M1, 20–50 ms; M2, 50–80 ms; and M3, 80–100 ms). The averaged background EMG activity just before the disturbance was subtracted from the EMG activity in each period. The resultant value was integrated to obtain reflex magnitudes of M1 to M3. Results For the triceps brachii, in the relaxation task, the wrestler group showed a significantly smaller value for M2 than did the control group. In the extension task, the wrestler group showed a significantly larger value for M3 than did the control group. There was no difference in M1 between the two groups. For the biceps brachii, there was no significant difference between any reflex components. Conclusions Our results suggest that high-level wrestlers have specific characteristics of the long-latency stretch reflex in the triceps brachii that are modulated in a situation-specific manner.

Jomand, G., et al. (2022). "Women, wrestling, and the Games: Olympic normalization of a practice (1996–2001)." Staps **136**(2): 59-80.

A bastion of masculinities, wrestling offers a significant context for observing and analyzing the inequalities between men and women in sport. Examining the inclusion of women's wrestling as an Olympic discipline in September 2001 helps to understand the hierarchy existing between wrestling styles and, consequently, between genders. Women's wrestling was in fact constructed as a distinct style from the two styles for men, freestyle and Greco-Roman, and was based on the myth of women's fragility. Analyzing the archives of the International Olympic Committee (IOC), the correspondence between the IOC and the International Federation of Associated Wrestling Styles (FILA), as well as the two organizations' meeting and commission reports, together with interviews of FILA stakeholders in the 1990s, shed light on the tensions and gender equality issues running through wrestling's access to the Olympics. The entry of female wrestling into the Olympics shows the difficulties faced by FILA in breaking through the power system based on the hierarchy existing between the wrestling styles, within a context where the IOC held great power of persuasion, even constraint, and influenced the orientation of sporting policies, particularly from the perspective of greater equality.

Karademir, G. and A. C. Atalar (2022). "Pure elbow dislocation in a child wrestler with underlying hyperlaxity: What is the optimal time to return to competition?" Ulus Travma Acil Cerrahi Derg **28**(4): 545-548.

Elbow dislocations are often considered serious injuries that can cause a child athlete to miss the entire season in wrestling. It was reported that the return to sports after the elbow dislocation was between 6 and 12 months in child wrestlers. In some cases, underlying hyperlaxity may have an essential role in the occurrence of pure elbow dislocation without any ligament injury. We report the case of a 10-year-old boy patient who had pure elbow dislocation following falling onto an outstretched hand in a wrestling match. Because the physical examination findings of the patient indicated the presence of hyperlaxity, the patient was treated by closed reduction, short-term immobilization, and early strengthening of the dynamic stabilizers. This case report's findings suggest that detecting the presence of hyperlaxity in this specific patient group is crucial since this patient group has the potential to return to competitions 6 weeks after injury, unlike patients without hyperlaxity.

Kashyap, R., et al. (2022). "Wrestler's Shoulder: 1333." Medicine & Science in Sports & Exercise **54**(9S): 334-334.

HISTORY: 14 year old male with left shoulder pain after injury during wrestling meet. He was participating in wrestling meet 2 days prior when he was thrown to the mat. He landed on his left elbow and felt immediate pain in his shoulder, was unable to move the shoulder due to pain. He has decreased range of motion and weakness with shoulder movement, pain with moving, lifting, and sleeping. Denies any radiating pain, numbness/tingling or history of prior shoulder injuries. PHYSICAL EXAMINATION: No obvious deformity, no bony tenderness to palpation. Active ROM is forward flexion to 140 degrees with pain, abduction to 120 degrees with pain, external rotation with elbow at side to 20 degrees with pain, internal rotation to L3 with pain. Passive ROM full in all directions. The belly-press test, lift-off tests are abnormal, and the bear hug test

shows weakness. Strength 4/5 of the infraspinatus, 4/5 of supraspinatus with pain. Neer/Hawkins, Obrien's signs negative. Neurovascularly intact in the bilateral upper extremities.
DIFFERENTIAL DIAGNOSIS: Humeral, glenoid or scapular fracture, Rotator cuff tear, AC joint dislocation
FINAL/WORKING DIAGNOSIS: Fracture to base of coracoid process, Avulsion fracture of lesser tuberosity of humerus
Tests and RESULTS: Xray L shoulder: Humeral head high-riding. Widening of the left coracoid on axillary view. Widening of the AC joint. Humeral physes open, normal and symmetric compared to contralateral shoulder. MRI L shoulder: Minimally displaced fracture through base of the coracoid process, medially-displaced, lesser tuberosity physeal fracture. Hemarthrosis of the glenohumeral joint. Edema within subscapularis muscle belly. No rotator cuff full-thickness tears.
TREATMENT AND OUTCOMES: Athlete was referred to an Orthopaedic surgeon and underwent lesser tuberosity avulsion repair, coracoid ORIF, and closed treatment of AC joint instability. Patient immobilized in a sling for 6 weeks post-operatively. Passive ROM was initiated at 2 weeks post-operatively. Active ROM was allowed at 6 weeks progressing to full active elevation. Athlete was allowed to begin weight-lifting as tolerated, running and non-contact practice at 8 weeks. Post-operative course was uncomplicated and the athlete was cleared for full return at 12 weeks post-operatively.

Kaya, A. and S. Arstanbekov (2022). "An Evaluation of Turkish Wrestling History during the Ottoman Empire." International Journal of the History of Sport **39**(5): 557-571.

The aim of this research is to answer questions about the history of wrestling, how it was interpreted by local sports historians and how it was institutionalized during the Ottoman Empire. The Ottomans, who gave great importance to wrestling and wrestlers, had traditional institutions that could surpass the contemporary club phenomenon. A descriptive research and comparison model, which is one of the designs included in the qualitative approach, was used in the study. The research of M. Turkmen, the subject expert, was taken to the centre of the study and the research was limited to the Ottoman period. We conclude that wrestling was the first sport that was formatted and institutionalized by the Ottoman Empire with the knowledge it carried from its predecessor Turkic states; it has been generally understood that it is mostly organized with its institutions called Wrestling Lodges. Specifically, the institutionalization of wrestling in the Ottoman Empire increased the power of this sport. Wrestling in the Ottoman palaces seemed to be part of military training rather than a sports format until the middle of the fifteenth century. Subsequently, wrestling has been equated with worship and transformed into a sports discipline with a mystical education in wrestling lodges.

Korobeynikov, G., et al. (2022). "Comparative analysis of psychophysiological states among Croatian and Ukrainian wrestling." Journal of Physical Education and Sport **22**(8): 1832-1838.

Problem Statement. The task of psychophysiological control is to obtain operational information about the state of the main characteristics and qualities of the athlete, which can be used to correct the training system. Psychophysiological control includes of complex of assessments of personal-typological, sensorimotor, psychological and cognitive characteristics of the athlete. There is a need to develop a system for diagnosing of psychophysiological states and correction of deficits of adaptation process for elite athletes. Purpose: The aim of this study is to compare psychophysiological state among Croatia and Ukrainian wrestlers and add to a more holistic psychophysiological diagnostic in expert athletes. Methods: Participants are the elite Greco-Roman wrestlers and members of the national teams of Ukraine (20 athletes) and Croatia (12 athletes). The psychophysiological states of wrestlers were studied by a holistic methodological approach which includes: estimate of psychological state, balance of nervous process and functional mobility of nervous process. Results: The results indicated higher performance in visual perception and the ability of information processing speed of Ukrainian wrestlers compared to Croatian wrestlers. Differences have been observed as well in optimal impulsiveness, emotional stability and stress resistance that is less optimal Croatian wrestlers. Croatian wrestlers have an increased level of impulsivity and, as a result show low emotional stability. This may indicate possible spontaneous and premature actions of wrestlers. For Ukrainian wrestlers, arousal and fatigue management are future goals for improvement. Conclusions: We conclude that the Ukraine Team should improve preparedness to training given the fatigue and arousal. For Croatian wrestlers, emotional instability and improvement of visual perception need to be considered.

Korobeynikov, G., et al. (2022). "Psychophysiological state and decision making in wrestlers." "1DO MOVEMENT FOR CULTURE. Journal of Martial Arts Anthropology **22**(5): 1-9.

Background. The investigation of psychophysiological functions in athletes is important to adapt the training process. In this paper, we examine speed perception and decision-making during wrestling fights as a crucial component of performance. We argue that a wrestler must anticipate the situation and speeded choices of response selection are required based on fast and frugal decision-making.

Aim. The approach investigates a psychophysiological test battery to test correlates of fast or slow decision making in wrestlers. **Method.** 29 elite Greco-Roman wrestlers were examined. The psychophysiological states of wrestlers were studied by a test battery of vision motor test, non-verbal intelligence, anticipation and heart rate variability. Those competences are correlated to fast or slow decision-making time when choosing between different stimuli. **Results.** The analysis revealed correlation between fast decision-making and visual perception, the increase of impulsiveness and level of emotional strain during fights. In addition, faster decision-making was present in those wrestlers with high anticipation ability and balance between processes of arousal and inhibition. The psychophysiological data suggests that fast decision-making correlates with the autonomic regulation of the heart rate. **Conclusions.** Fast decision-making in wrestlers seems to be related to a number of parameters in a psychophysiological test battery calling for a causal and experimental approach in the future and specific training of those factors allow wrestlers to improve their decision time.

Kuvanov, V. A., et al. (2022). "Manifestation of aggressiveness in the behavior of wrestlers and ways of its regulation." *Teoriya i Praktika Fizicheskoy Kultury* **2022**(4): 66-68.

Objective of the study was to determine the influence of wrestlers' aggressiveness regulation methods on their sports activity. **Methods and structure of the study.** Psychodiagnostics of 50 highly qualified wrestlers was carried out using the methodology for studying hardiness ("Test of hardiness" by D.A. Leontiev and E.I. Rasskazova), personality aggression ("Questionnaire for the level of aggressiveness of Bass-Darky", "Fraigburg questionnaire for the study of aggression factors (FAF)", "Motivation for success and fear of failure" (A.A. Rean). **Results and conclusions.** The data obtained as a result of the study characterize the high level of resilience of wrestlers with a developed component of involvement and risk taking. The tested wrestlers successfully cope with stressful situations, get satisfaction from their activities, are involved in work tasks, are ready to take active actions, even when a positive result and success in achieving the goal are not guaranteed. In stressful situations, subjects tend to go into opposition and use verbal aggression, which is characterized by either passive resistance or active actions. There is a tendency to control the manifestation of aggressive actions, suppression of aggression, a predisposition to transfer aggression to another object that is not involved in the situation.

Lai, Y. K., et al. (2022). "Assessment of Standing Multi-Frequency Bioimpedance Analyzer to Measure Body Composition of the Whole Body and Limbs in Elite Male Wrestlers." *Int J Environ Res Public Health* **19**(23).

We investigated differences in body composition measurements for the whole body and limb segments in elite male wrestlers between results of multi-frequency bioelectrical impedance analyses (MF(BIA)) and dual energy X-ray absorptiometry (DXA). Sixty-six elite male wrestlers from Taiwan were recruited. Wrestlers' body fat percentage (PBF(WB)), whole body fat-free mass (FFM(WB)), whole body lean soft tissue mass (LSTM(WB)), and fat-free mass of arms, legs and trunk (FM(Arms), FFM(Legs), FFM(Trunk)) were measured by MF(BIA) and DXA, and analyzed using Pearson correlation coefficient and Bland-Altman plot. Correlations of FFM(WB), LSTM(WB), and PBF(WB) between devices were 0.958, 0.954, and 0.962, respectively. Limits of agreement (LOA) of Bland-Altman plot were -4.523 to 4.683 kg, -4.332 to 4.635 kg and -3.960 to 3.802%, respectively. Correlations of body composition parameters FFM(Arms), FFM(Legs) and FFM(Trunk) between devices in each limb segment were 0.237, 0.809, and 0.929, respectively; LOAs were -2.877 to 2.504 kg, -7.173 to -0.015 kg and -5.710 to 0.777 kg, respectively. Correlation and consistency between the devices are high for FFM, LSTM and PBF but relatively low for limb segment FFM. MF(BIA) may be an alternative device to DXA for measuring male wrestlers' total body composition but limb segment results should be used cautiously.

Lakicevic, N., et al. (2022). "Patterns of weight cycling in youth Olympic combat sports: a systematic review." *J Eat Disord* **10**(1): 75.

BACKGROUND: Patterns of weight cycling in adult combat sports have been extensively studied, yet data on this matter in youth combat athletes is rather scarce. **METHODS:** PubMed, EBSCOhost and Web of Science were used to retrieve relevant data. Eligible studies had to record the methods used to elicit rapid weight loss (RWL) and/or record the oscillations in bodyweight during the RWL phase. Only studies conducted in the context of an official competition were considered for inclusion in the present review. **RESULTS:** RWL is highly prevalent in children and adolescent combat athletes, ranging from 25 to 94%

depending on the type of combat sport, age and level of competition. These athletes regularly prompt RWL by increasing exercise frequency and intensity, decreasing fluid and food intake, training in impermeable suits and using sauna frequently. Overall, the magnitude of RWL was ranging from ~ 1% to $6.3 \pm 3.7\%$ with significant RWL variations within individual studies and individuals within those studies. CONCLUSION: Acquired data indicated that RWL patterns in young combat athletes are similar to those found in their adult counterparts. Knowing that childhood and adolescence are critical periods for growth and development, RWL needs to be stringently regulated and ideally banned in this population.

Lakicevic, N., et al. (2022). "Disturbing Weight Cutting Behaviors in Young Combat Sports Athletes: A Cause for Concern." *Front Nutr* **9**: 842262.

Problematic weight cutting behaviors in combat sports have been addressed in the scientific literature since the 1930s (1). Indeed, given the available evidence it may be the case that making weight/weight cycling [i.e., rapid weight loss (RWL) prior to weigh-in followed by rapid weight gain prior to competition] has been practiced in combat sports since weight divisions have been introduced. These practices have led to several fatalities (2), which occurred as a consequence of making weight rather than any sports-related injury. Unfortunately, RWL-related deaths still persist into recent times (3). Existing literature has detailed patterns of weight cycling (e.g., methods, magnitudes, frequency, and prevalence) in adult combat sport athletes across various sports, with data revealing RWL is ubiquitous with prevalence reaching 90% in some combat sports(4). However, less is known about the weight making behaviors of child and adolescent combat sport athletes.

Lambert, C., et al. (2022). "Prevalence of sport injuries in Olympic combat sports: a cross-sectional study examining one Olympic period." *Journal of Sports Medicine and Physical Fitness* **62**(11): 1496-1504.

BACKGROUND: Due to full contact impacts in combat sports, the risk of injuries is elevated. The aim of this study is to report severe injuries among athletes in Olympic combat sports. Specific injury types, time loss, and the performance level after injury are examined. METHODS: Survey to investigate injuries in Olympic combat sports during the time period from 2012-2016. Reported injuries were analyzed by anatomical location, injury type, gender, time loss, and performance level. RESULTS: The three injuries resulting in the longest time loss (ACL rupture: judo= 37 weeks; karate = 49 weeks; shoulder dislocation: wrestling = 41 weeks; shoulder rotator cuff injury: wrestling = 32 weeks) also accounted for the largest proportion of athletes with career-ending injuries (ACL rupture: judo = 28%; karate = 67%; shoulder dislocation: wrestling = 40%; shoulder rotator cuff injury: wrestling = 50%). Taekwondo and fencing had the shortest time loss (<12 weeks) among all combat sports. More injuries occurred during training (58%) as compared to competition (42%). Injury prevalence of competitive athletes was significantly higher as compared to recreational athletes. Male athletes suffered significantly more anterior cruciate ligament injuries (72% vs. 56%; $P < 0.05$), unspecific shoulder injuries (89% vs. 47%; $P < 0.01$), and elbow ligament injuries (57% vs. 30%; $P < 0.05$) during training. CONCLUSIONS: The study shows that there are important differences between "punching and kicking" and "throwing" martial arts in terms of specific injury types. In judo and wrestling, the injuries are more likely to affect the joints (knee and shoulder). Therefore, injury prevention these sports should focus on strength training of the muscles surrounding the joints and on defensive reactionary movements to avoid dangerous biomechanical joint angles. In "punching and kicking" sports, injuries of the hands and feet, due to the large impact forces of strikes and kicks, could be reduced by improved protective equipment on hands and feet.

Latyshev, M., et al. (2022). "Analysis of the Relative Age Effect in Elite Wrestlers." *Ido Movement for Culture* **22**(3): 28-32.

Background. The relative age effect has been used to refer to the age differences between individuals who have been grouped together in a sports competition. In this sense, the relative age effect is considered a determining factor of sporting success. Problem and Aim. Determine the influence of relative age on the achievement of success by athletes in top-level competitions in modern wrestling. Methods and materials. In the research paper, the data of the athletes ($n = 682$) who took from 1 to 8 places at the 2017, 2018 and 2019 World Championships and the 2016 Olympic Games in Greco-Roman and freestyle wrestling are considered. The athletes were sub-categorized by the athletes' dates of birth; medalists; participation and achieved success in the cadets and juniors competitions. Results. There are more athletes who were born in the first half of the year than in the second: 54.7% versus 45.3%, respectively. The distribution of medal winners by date of birth is as follows: it turned out that 53.3% of medalists were born in the first half of the year while 46.7% – in the second half of the year ($p > 0.05$). Conclusion. The data obtained show that the relative age effect does not affect the achievement of

success in wrestling and is leveled at the adult stage. However, the analysis has shown that the greatest influence of the relative age effect on athletes was revealed at the cadet level.

Levitsky, A. G., et al. (2022). "FEATURES OF PREPARATION AND CARRYING OUT THE THROW THROUGH THE CHEST UNDER COMPETITION CONDITIONS." *Teoriya i Praktika Fizicheskoy Kultury* **2022**(7): 12-13.

Objective of the study was to conduct a biomechanical analysis of the chest throw under competitive conditions. 4 Methods and structure of the study. For biomechanical analysis, a video recording of the performance of the Honored Master of Sports, three-time Olympic champion Alexander Karelin at the 1993 Greco-Roman Wrestling World Championship in Stockholm was used [5]. The part of the video recording that was subjected to the study was divided into cyclograms, and for each cyclogram, the coordinates of the center of gravity of each athlete were determined. Based on the obtained coordinates, the trajectories of the centers of gravity were constructed. A total of 44 cyclograms were analyzed. 5 Results and conclusions. The studied throw belongs to the combinable group of techniques and includes a combination of a lever and a block. The trajectory of the center of mass of each athlete shows that before the reception, the center of mass of the attacked athlete is swinging. In this case, the attacking athlete uses his own mass. In addition, in the process of performing a throw, the center of mass of the attacking athlete shifts away from the trajectory of the opponent's center of mass, that is, the attacking athlete actually gives way to the opponent's fall. The obtained results of the study can be used in the training process of wrestlers.

Liu, M., et al. (2022). "A Study On The Optimal Load Of Wingate Test For Elite Men's Freestyle Wrestlers: 100." *Medicine & Science in Sports & Exercise* **54**(9S): 14-14.

The 30s Wingate Anaerobic Test (WAnT) is a common evaluation method used by elite athletes to evaluate the training effect of anaerobic exercise capacity. However, the commonly used 7.5% body weight is used as the WAnT load in wrestling, judo and other confrontation events. It often fails to faithfully reflect the improvement of training ability, which leads to the phenomenon of "false negative" in the judgment of training effect.

PURPOSE: To explore the optimal load of WAnT test for evaluating the anaerobic exercise capacity of outstanding male freestyle wrestlers.

METHODS: 10 active national male freestyle wrestlers (22.8±1.9 yrs) were tested before and after training with 10%, 7.5%, and 5% of the body mass (BM) representing three kinds of load: large, medium, and small. Peak Power (PP), Mean Power (MP), and Fatigue Index (FI) are used as indicators to evaluate the anaerobic capacity of outstanding male freestyle wrestlers. Twofactor repeated measures analysis of variance was used to compare the differences before and after training and between different loads.

RESULTS: Under a large load of 10% BM, PP (9.85±1.59 vs. 10.99±1.38, p <0.05) and MP (7.27±1.27 vs. 8.36±0.94, p <0.05) after training increased significantly compared with before training, and there was no significant change under medium and small loads of BM7.5% and BM5%. After training, PP and MP (8.36±0.94 vs. 7.83±0.43 vs. 6.25±0.24, p <0.05) under the heavy load of BM10% were significantly different from the medium and small loads of BM7.5%, BM5% and BM5%. There was no significant change in FI before and after training and between different loads.

CONCLUSIONS: The weight load selection of WAnT is an important factor that affects its test accuracy; for national male freestyle wrestlers with excellent strength levels, heavy load is a better load to evaluate their anaerobic capacity and training effect.

López Laval, I., et al. (2022). "Effects of ergo-nutritional strategies on recovery in combat sports disciplines." *Efectos de las estrategias ergo-nutricionales sobre la recuperación en las disciplinas de deportes de combate*. **39**(3): 652-662.

In order to improve the recovery process in combat sports disciplines, ergo-nutritional strategies could be an effective option in training and competition. Some of these ergo-nutritional aids could improve performance but literature references are scarce, with controversial results regarding actual recovery effects. This systematic review aimed to examine which ergo-nutritional methods are most effective for assisting in the recovery process in combat sports, and to determine the appropriate training stimuli. This systematic review was carried out following the Preferred Reporting Items for Systematic Review (PRISMA) guidelines. A computerized search was performed in PubMed, Web of Science, the Cochrane Collaboration Database, Evidence Database, Evidence Based Medicine Search review, National Guidelines, EM-BASE, Scopus and Google Scholar system (from 1995 to April 30, 2021). The PICOS model was used to define inclusion and exclusion criteria. Out of 123 studies initially found, 18 met the

eligibility criteria and were included in the review. Data from 367 athletes from different disciplines were examined. The evidence was grouped in 4 areas: oxidative stress, muscle and energy recovery, muscle repair, and metabolic acidosis. Evidence showed that vitamins, minerals, and some natural ergo-nutritional products are effective as antioxidants. Carbohydrates and protein determine the recovery effect. Sodium bicarbonate has a role as primary acidosis metabolic delayer. Accordingly, ergo-nutritional aids can help in the recovery process. Considering the effects outlined in the literature, more studies are needed to provide firm evidence.

Lota, K. S., et al. (2022). "Rotational head acceleration and traumatic brain injury in combat sports: a systematic review." *Br Med Bull* **141**(1): 33-46.

BACKGROUND: Traumatic brain injury (TBI) in combat sports is relatively common, and rotational acceleration (RA) is a strong biomechanical predictor of TBI. This review summarizes RA values generated from head impacts in combat sport and puts them in the context of present evidence regarding TBI thresholds. **SOURCES OF DATA:** PubMed, EMBASE, Web of Science, Cochrane Library and Scopus were searched from inception to 31st December 2021. Twenty-two studies presenting RA data from head impacts across boxing, taekwondo, judo, wrestling and MMA were included. The AXIS tool was used to assess the quality of studies. **AREAS OF AGREEMENT:** RA was greater following direct head strikes compared to being thrown or taken down. RA from throws and takedowns was mostly below reported injury thresholds. Injury thresholds must not be used in the absence of clinical assessment when TBI is suspected. Athletes displaying signs or symptoms of TBI must be removed from play and medically evaluated immediately. **AREAS OF CONTROVERSY:** Methodological heterogeneity made it difficult to develop sport-specific conclusions. The role of headgear in certain striking sports remains contentious. **GROWING POINTS:** RA can be used to suggest and assess the effect of safety changes in combat sports. Gradual loading of training activities based on RA may be considered when planning sessions. Governing bodies must continue to work to minimize RA generated from head impacts. **AREAS TIMELY FOR DEVELOPING RESEARCH:** Prospective research collecting real-time RA data is required to further understanding of TBI in combat sports.

Marigi, E. M., et al. (2022). "Anterior Cruciate Ligament Reconstruction in 107 Competitive Wrestlers: Outcomes, Reoperations, and Return to Play at 6-Year Follow-up." *Orthop J Sports Med* **10**(5): 23259671221092770.

BACKGROUND: Wrestling is a physically demanding sport, with young athletes prone to anterior cruciate ligament (ACL) injuries. There is a paucity of data evaluating the results of ACL reconstruction (ACLR) in this cohort. **PURPOSE:** To assess return to sport (RTS), patient-reported outcomes, reoperation rates, and graft survival after ACLR in a large cohort of competitive wrestlers at midterm follow-up. **STUDY DESIGN:** Case series; Level of evidence, 4. **METHODS:** We identified all competitive wrestlers (club, high school, collegiate, or professional) with a history of an ACLR at a single institution between 2000 and 2019. Graft failure was defined as a re-tear (as determined via clinical or advanced imaging evaluation) and/or revision ACLR. All patients were contacted for determination of reinjury rates; current sport status; and pain visual analog scale, International Knee Documentation Committee, and Tegner activity scores. **RESULTS:** Included were 107 knees in 103 wrestlers, with a median follow-up time of 5.9 years (interquartile range [IQR], 3.9-10.3 years). The median age was 17 years (IQR, 15-18 years), with 106 (99%) male patients, and the distribution of bone-patellar tendon-bone (BTB) and hamstring tendon (HT) autografts was 64 (60%) and 43 (40%), respectively. At final follow-up, 80% of athletes were able to RTP at a median of 280 days (IQR, 212-381 days). Graft failure occurred in 14 (13%) knees at a median time of 1.8 years (IQR, 0.7-5.3 years) after the index ACLR. BTB autograft demonstrated a lower failure rate compared with HT autograft (8% vs 21%; $P = .044$) and was associated with better survival compared with HT autograft up to 15 years after the index ACLR (90.4% vs 76.3%; $P = .030$). When compared by graft diameter, HT autografts of at least 7.5 mm were not associated with a lower graft failure than BTB constructs of all sizes ($P = .205$). **CONCLUSION:** Return to competitive wrestling was observed in 80% of athletes after ACLR, with 14% of wrestlers experiencing graft failure. BTB autograft was associated with better survival than HT autograft.

Marković, M., et al. (2022). "Sensitivity of Field Tests for Assessment of Wrestlers Specific Fitness." *J Hum Kinet* **83**: 267-276.

The aim of this study was to determine the differences in performance, cardiac, and metabolic variables of combat-specific fitness of wrestlers from varying sports levels. The sample consisted of 61 active and highly trained adult wrestlers of national and international levels from Serbia, from both Greco-Roman and freestyle forms of wrestling, allocated into three groups: national team wrestlers ($N = 15$), first league competitive wrestlers ($N = 20$), and second league competitive wrestlers ($N = 26$). Participants performed

two tests: a Specific Wrestling Fitness Test (SWFT) and a Specific Wrestling Performance Test (SWPT). Between-group differences were determined using multiple analysis of variance (MANOVA). Significant differences were obtained between wrestlers of different sports levels in Tn(Throws) ($F = 77.491$, $p < 0.001$), SJF(Index) ($F = 49.710$, $p < 0.001$), and SWP(Index) ($F = 31.205$, $p < 0.001$) in the SWFT and in Tn(Throws) ($F = 71.051$, $p < 0.001$), SJF(Index) ($F = 45.343$, $p < 0.001$), and SWP(Index) ($F = 26.820$, $p < 0.001$) in the SWPT. Based on the results, it could be concluded that the SWFT and the SWPT provide very good sensitivity in the evaluation of the wrestler's specific fitness.

Mauricio, C. A., et al. (2022). "Rapid Weight Loss of Up to Five Percent of the Body Mass in Less Than 7 Days Does Not Affect Physical Performance in Official Olympic Combat Athletes With Weight Classes: A Systematic Review With Meta-Analysis." *Front Physiol* **13**: 830229.

Given the relevance of the effects that weight loss can generate on the physical performance in athletes, this study performed a systematic review with meta-analysis of the published literature on rapid weight loss (RWL) and examined its impact on the physical performance in Official Olympic combat sports athletes. The "Preferred Reporting Items for Systematic Reviews and Meta-Analysis" (PRISMA) guidelines were followed to ensure an ethical and complete reporting of the findings. PubMed, SPORT Discus, and EBSCO were the electronic databases explored for article retrieval and selection. The following string was applied: "RWL" OR "weight loss" OR "weight reduction" AND "judo" OR "wrestling" or "taekwondo" or "boxing" AND "performance." Based on the quality analysis, conducted according to the "Tool for the assessment of study quality and reporting in exercise training studies" (TESTEX), ten articles achieved a score >6 points. The meta-analysis showed a significant difference in pre- vs. post-weight loss ($p = 0.003$) and no effects in pre- vs. post-power and strength performance analysis ($p > 0.05$ for both results). Based on our systematic review and meta-analysis of the literature, RWL up to $\leq 5\%$ of the body mass in less than 7 days does not influence performance outcomes in Official Olympic combat athletes with weight classes, considering the strength and power measures.

Mazuera-Quiceno, C. A., et al. (2022). "Most effective mean for lactate clearance in Olympic wrestling." *Retos*(43): 1073-1078.

This research project determined the most effective training mean for lactate clearance using the subaerobic functional area in Olympic wrestling athletes of the freestyle modality. Eight Olympic wrestlers participated (age: 20.1 ± 2.74 years), using a four-phase crossover study design, in which the athlete performed active recovery alternating each of the training means (Elliptical machine, treadmill, crank ergometer and stationary bicycle); lactate samples were taken 5 minutes after each bout and 15 minutes after finishing the active recovery. The elliptical machine presented the highest average efficiency, with 56.6%, followed by the treadmill with a 54.1% efficiency average; the repeated measures ANOVA F test evidenced differences among the means ($p = .001$). Likewise, differences were found when performing the post hoc comparisons of minimal significant difference, between the elliptical machine with respect to the crank ergometer ($p = .001$) and the stationary bicycle ($p = .007$), but they were not registered between the elliptical machine and the treadmill ($p = .737$). Of the means analyzed in this study, the highest efficiency in the process of blood lactate clearance during active recovery was evidenced by the elliptical machine and treadmill.

McLellan, M., et al. (2022). "Youth Sports Specialization and Its Effect on Professional, Elite, and Olympic Athlete Performance, Career Longevity, and Injury Rates: A Systematic Review." *Orthopaedic Journal of Sports Medicine* **10**(11).

Background: Limited data are available on the long-term consequences of early sports specialization in high-level athletes. Purpose: To evaluate the existing literature on the effects of sports specialization among professional, Olympic, and other elite athletes. Study Design: Systematic review; Level of evidence, 3. Methods: We performed a systematic review of studies from 1990 to 2021 on youth sports specialization in professional, elite, and/or Olympic athletes following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. An elite athlete was defined as one who performed at the highest level of his or her sport, beyond college level. Data were summarized according to 6 objectives: (1) definitions of specialization, age at specialization, and participation in other sports; (2) motivation for specialization; (3) athlete perspectives on specialization; (4) performance data; (5) specialization and injury risk; and (6) career longevity. Results: From 8756 articles, 29 studies were included, of which 17 (58.6%) were survey-based studies. Of the 8 articles that commented on injury risk, all demonstrated reduction in injury risk in athletes who delayed specialization. Performance benefits were apparent with later specialization in 7 of 9 articles; the remaining 2 showed benefit with earlier specialization in marathon runners and soccer players. There were less definitive results on career

longevity, with 5 of 9 articles finding no association between career longevity and sports specialization. Conclusion: Although current data on sports specialization in elite, professional, and Olympic athletes are mostly retrospective and survey-based evidence, most sports demonstrate better performance after youth multisport engagement, and youth sports specialization was linked with increased injury risk in athletes at the highest levels of competition.

Miranda, W. A. S., et al. (2022). "Can Sodium Bicarbonate Supplementation Improve Combat Sports Performance? A Systematic Review and Meta-analysis." *Current Nutrition Reports* **11**(2): 273-282.

Purpose of Review: To verify the effects of sodium bicarbonate (NaHCO₃) supplementation on biochemical and physical measurements of combat sports athletes. Recent Findings: A systematic review of articles indexed in three databases (PubMed, CAPES journal, and Google Scholar) was carried out until October 2020, using descriptors related to NaHCO₃ supplementation in combat sports. First, 38 articles were identified. Next, eight articles were selected through the inclusion and exclusion criteria. The methodological quality of the articles was assessed using the Physiotherapy Evidence Database (PEDro) scale (8 and 9 points). Blood lactate, rating of perceived exertion, Special Judo Fitness Test, Dummy throw, and mean and peak powers for Wingate were evaluated. Random effects meta-analysis was used, the effect size was adjusted by corrected Hedges' g, and the heterogeneity is explored by I². The results were obtained through weighted average and 95% CI, and the significance limit was set as p < 0.05. Summary: NaHCO₃ supplementation had a significant effect on increasing blood lactate (p = 0.006) of the athletes studied. However, the performance measures (rating of perceived exertion, power, and specific performance) did not show a significant difference (p < 0.05). In conclusion, NaHCO₃ supplementation causes a significant increase in blood lactate, indicating an ergogenic effect on buffer, which can delay the onset of fatigue and contribute to the performance of combat sports athletes. New experimental studies need to be published that assess the effect of acute and chronic NaHCO₃ supplementation in specific combat sports tests and in women.

Mohile, N. V., et al. (2022). "Spondylolysis and Isthmic Spondylolisthesis: A Guide to Diagnosis and Management." *J Am Board Fam Med* **35**(6): 1204-1216.

INTRODUCTION: Spondylolysis and isthmic spondylolisthesis are commonly implicated as organic causes of low back pain in this population. Many patients involved in sports that require repetitive hyperextension of the lumbar spine like diving, weightlifting, gymnastics and wrestling develop spondylolysis and isthmic spondylolisthesis. While patients are typically asymptomatic in mild forms, the hallmark of symptoms in more advanced disease include low back pain, radiculopathy, postural changes and rarely, neurologic deficits. METHODS: We conducted a narrative review of the literature on the clinical presentation, diagnosis, prognosis and management of spondylolysis and isthmic spondylolisthesis. RESULTS: A comprehensive physical exam and subsequent imaging including radiographs, CT and MRI play a role in the diagnosis of this disease process. While the majority of patients improve with conservative management, others require operative management due to persistent symptoms. CONCLUSION: Due to the risk of disease progression, referral to a spine surgeon is recommended for any patient suspected of having these conditions. This review provides information and guidelines for practitioners to promote an actionable awareness of spondylolysis and isthmic spondylolisthesis.

Molnár, S., et al. (2022). "Moderate and Severe Injuries at Five International Olympic-Style Wrestling Tournaments during 2016-2019." *Journal of Sports Science & Medicine* **21**(1): 74-83.

As a contact sport, wrestling may result in injuries. Based on the severity, they are classified as mild, moderate, severe and critical. All injuries occurring at international competitions are documented in a cloud-based surveillance system. The purpose of this study was to analyze the incidence and characteristics of moderate and severe (including critical) wrestling injuries that occurred during five international Olympic-style wrestling competitions in 2016-2019. Three Wrestling World Championships and two European Wrestling tournaments were organized by the Hungarian Wrestling Federation in 2016-2019. A total of 2483 wrestlers in three Olympic wrestling styles have competed in 3007 matches. Data from all injuries were recorded and analyzed to define rates, locations, types and severity, and to compare with previous reports. A total of 53 wrestlers sustained 55 injuries, which is equivalent to an overall injury incidence rate of 9.1‰ (9.1/1000 athletic exposures). Greco-Roman and Women Wrestling had the same injury incidence rate, while Freestyle had a lower one (9.5‰ versus 8.5‰). The injury proportion by regions and anatomic locations were on head and face 29.1%, spine and trunk 16.4 % and the upper-and-lower extremity injuries equally 27.3%. The most common types of injuries included ligament lesions, joint injuries, skin lacerations, and contusions. Five wrestlers (0.8‰) sustained

strangulation or concussion. Wrestling injury rates during United World Wrestling competitions are not high, but when happen they can be serious. Despite relatively low incidence rate of injuries, there is a need for continuous education for medical teams, referees and coaches to avoid wrestling injuries.

Montilla, J. A. P., et al. (2022). "Differences in the Force-Velocity profile between Judoist and freestyle wrestlers." Physical Activity Review **10**(1): 141-149.

Background: The aim of this study was to gain new knowledge about the force-velocity (F-V) profile in Judoist and freestyle wrestlers, investigating if there were any differences between sports and which physical demands have which fighting modalities. Participants: 24 athletes (male) took part in this study. Twelve Judoist (age: 20.3 ± 3.9 years, weight: 76.4 ± 10.4 kg; height: 179.4 ± 5.3 cm; BMI: 32.2 ± 1.9 kg/m²) and twelve freestyle wrestlers (age: 19.6 ± 4.5 years, weight: 65.3 ± 13.6 kg; height: 177.5 ± 5.7 cm; BMI: 23.8 ± 1.8 kg/m²) participated. Methods: To evaluate the F-V profile, the participants performed a squat jump (SJ) without load, as well as with different load conditions (0, 25, 50, 75, and 100% of athlete's body mass). To assess the height of the jump, the OptoGait system was used. Consequently, the theoretical maximal force (F₀); the theoretical maximal velocity (V₀); maximal mechanical power output (P_{max}); slope of the linear F-V relationship (S_{fv}); optimal F-V profile (S_{fvopt}); and the differences between S_{fv} and S_{fvopt} (FVimb%) were obtained. Results: A higher F₀ and lower V₀ were found in Judo athletes compared to wrestlers. Significant differences were found in S_{fv} and FVimb ($p < 0.001$). Conclusion: The F-V profile is an accurate, reliable, and economical method that facilitates the evaluation of the current state of the athlete individually. Practical applications: The F-V profile method allows coaches and athletes to adjust their training objectives to achieve a higher level in their sport.

Moris, J. M., et al. (2022). "Collegiate male athletes exhibit conditions of the Male Athlete Triad." Applied Physiology, Nutrition & Metabolism **47**(3): 328-336.

The primary purpose of this study was to determine prevalence of the Male Athlete Triad (MAT) conditions: low energy availability (EA), low bone mineral density (BMD), and low testosterone in male collegiate athletes from different sports. Participants included 44 collegiate male athletes (age, 20.4 ± 0.2 years; body mass index, 25.3 ± 1.3 kg/m²) from 7 sports (cross country, soccer, basketball, wrestling, track, golf, and baseball). Resting metabolic rate, 3-day food intake, 7-day exercise energy expenditure, body composition, and reproductive and metabolic hormones were assessed. Of the total participants, 15% had low EA, 0% had low BMD, 28% had low total testosterone (TT), and 80% had low calculated free testosterone (cFT). There were no significant correlations between EA, BMD, TT, and cFT. Insulin and sex hormone binding globulin (SHBG) were below and on the upper end of the reference range for healthy male adults, respectively. Insulin was negatively correlated with total ($r = -0.330$, $p = 0.043$) and lumbar spine BMD z-scores ($r = -0.413$, $p = 0.010$). Low TT and low cFT were the most prevalent MAT conditions among all athletes. Further research should investigate the relationship between insulin and SHBG and the role of these hormones in the MAT. Novelty: Assessment of energy availability alone is not sufficient to identify physiological disturbances in collegiate male athletes. Low total and/or free testosterone may be present in some collegiate male athletes, regardless of BMD status. Low insulin and high SHBG concentration may portray the presence of conditions of the MAT in male collegiate athletes.

Murray, M. F., et al. (2022). "Overweight preoccupation is associated with eating pathology in male collegiate athletes with body dissatisfaction." Eating and Weight Disorders **27**(7): 2387-2395.

Purpose: This study examined specific aspects of body dissatisfaction and drive for muscularity as correlates of eating pathology and explored sport confidence as a moderator of these associations in male collegiate athletes. Method: Ninety-three male collegiate athletes who endorsed body dissatisfaction and were enrolled in a body dissatisfaction intervention study completed baseline measures of appearance orientation, appearance evaluation, overweight preoccupation, muscularity-oriented attitudes and behaviors, eating pathology symptoms, and sport confidence. Results: There were significant associations between overweight preoccupation and cognitive restraint, purging, binge eating, and excessive exercise, appearance orientation and cognitive restraint, negative appearance evaluation and restricting, muscularity-oriented attitudes and binge eating, and muscularity-oriented behaviors and excessive exercise. Low-to-moderate sport confidence moderated the association between muscularity-oriented behaviors and purging. Conclusion: Findings highlight a need for interventions targeting drive for muscularity and body dissatisfaction, especially overweight preoccupation, in male collegiate athletes. Findings additionally suggest a need to further examine the utility of sport confidence in prevention and intervention programs targeting eating pathology in larger samples of male athletes. Level of evidence: V, Cross-sectional descriptive study.

Naka, T., et al. (2022). "Characteristics of Upper-Limb Pull Power and Power Endurance in Japanese Female Wrestlers." *J Strength Cond Res* **36**(5): e82-e87.

Naka, T, Kanno, M, Shidochi, S, Sakae, K, and Shima, N. Characteristics of upper-limb pull power and power endurance in Japanese female wrestlers. *J Strength Cond Res* 36(5): e82-e87, 2022-This study aimed at elucidating the characteristics of upper-limb physical strength required by female wrestlers by comparing the pull power, power endurance, and number of repetitions between female wrestlers at world and national levels. The subjects were 20 female wrestlers (8 Olympic- and/or world-class and 12 national-class top-ranking individuals). The subjects assumed a lying prone (face down) position on a bench and pulled a bar from arm's length until contact with underside of bench. The weight load was increased in 10-kg steps and the upper-limb pull power was measured for each lift. To measure power endurance, the power to achieve the repetition maximum and the maximum number of repetitions were measured at the load at which they exerted their maximum power. All measurements were obtained using a GymAware power meter (Kinetic Performance Technology, Canberra, Australia). Pull power was greater at 20, 30, 40, and 50 kg in world-class wrestlers than in national-class wrestlers. No difference was observed in the time course of power endurance between the groups; however, the power in world-class wrestlers declined slower than in national-class wrestlers. Repetition maximum also tended to be higher in world-class wrestlers than in national-class wrestlers. Female wrestlers were observed to have greater upper-limb pull power in a range from low to high loads and were able to preserve repetition ability while maintaining high power. Their competitive performance seems to be related to these abilities.

Novakovsky, S. V., et al. (2022). "TECHNICAL AND TACTICAL TRAINING MODEL FOR GRECO-ROMAN WRESTLING." *Teoriya i Praktika Fizicheskoy Kultury* **2022**(2): 17-19.

Objective of the study was to develop a technical and tactical training model for Greco-Roman wrestling sport based on the modern sports training theory. Methods and structure of the study. Methodologically, the study was designed based on the P.K. Anokhin's functional systems theory; N.A. Bernstein's leveled movement construction concept; activity theory developed by psychologists L.S. Vygotsky, S.L. Rubinstein and A.N. Leontiev; the M.M. Bogen's planned/ staged motor actions formation theory, etc. Results and conclusion. Technical and tactical training may be defined as the motor skill training and practical motor skill application tactics learning system for competitive progress. We developed, based on the sound theoretical provisions, the technical and tactical training model for Greco-Roman wrestling sport as a harmonized staged system designed to master motor skills on a situation-specific, proactive and creative basis – first in the eased modeled conditions; second in the focused motor skill trainings to effectively use the basic well-trained motor skill toolkit in competitive bouts; third, in the focused creative motor skill trainings to make the athlete fit for finding best solutions under time pressure in every known motor situation; and fourth, in the creative motor skill/motor actions trainings to help find the best solutions of motor tasks in the unknown motor situations. The technical and tactical training model is recommended for practical application in wrestling sports as it was proved beneficial for the training service quality.

Nowoisky, C., et al. (2022). Analyse des Olympiazklus 2016-2020/21 im Ringen: 278-295.

With one gold (A. Rotter-Focken) and two bronze medals (F. Stabler, D. Kudla), the Olympic Games in Tokyo have been the most successful for the German Wrestling Federation (DRB) since 1992. A total of seven athletes qualified for the Olympic tournament. For Europeans, this qualification is always a special hurdle due to the high number of European nations performing on top level. While the team of the Russian Olympic Committee (ROC) and the United States of America (USA) are dominating internationally in freestyle wrestling, the level of performance in Greco-Roman wrestling, a large number of nations perform on international top-level which can be observed in different success and performance parameters. Here the team of the Russian Olympic Committee, Iran (IRI) and Cuba (CUB) were most successful, followed by Ukraine (UKR), Hungary (HUN) and Armenia (ARM). In women's wrestling Japan is still the dominating nation. Germany (GER) is also able to compete on world level, especially in Greco-Roman wrestling, in a wider range of weight classes. During the the Olympic cycle, this team always finished among the top ten at the respective annual competition highlights.

Ozan, M. and I. Secer (2022). "Investigation of the Relationship between Athletes' Psychological Resilience, Emotional Reactivity, Psychological Maladjustment and Trait Anger Control." *Retos* **46**: 143-151.

The purpose of the research is to examine the relationship between athletes' psychological resilience, emotional reactivity, psychological maladjustment and trait anger levels and the mediating role of psychological resilience in this relationship. The data were obtained from a total of 972 athletes, 298 women and 674 men, in different sports branches (boxing, wrestling, taekwondo, athletics, soccer,

volleyball, handball, basketball). In the data collection process, the emotional reactivity scale adapted to Turkish culture, the depression, anxiety, stress scale, the anger and expression style scale and the short psychological resilience scale were used. In the analysis of the data, the structural equation model was used to determine the direct and indirect predictive effects between variables. In line with the findings, although emotional reactivity in athletes exerts pressure on psychological maladjustment (depression, anxiety, and stress), psychological resilience has a protective function. It can be said that athletes with high psychological resilience may be in a more positive position in terms of showing trait anger and psychological maladjustment, whereas athletes with low psychological resilience may be in a disadvantageous position. The results of the study revealed that emotional reactivity has a positive predictor of depression, anxiety, and trait anger. On the other hand, psychological resilience was evaluated to have a strong protective function on emotional reactivity, psychological maladjustment and trait anger among athletes, and this finding was discussed in the context of the literature.

Özbay, S. and S. Ulupınar (2022). "Strength-Power Tests are More Effective When Performed After Exhaustive Exercise in Discrimination Between Top-Elite and Elite Wrestlers." Journal of Strength & Conditioning Research **36**(2): 448-454.

This study aimed (a) to analyze strength-power variables in top-elite and elite wrestlers, (b) to identify which variables allow for discrimination between them, and (c) to investigate whether the results changed when the tests were performed after exhaustive exercise. Twenty-six male wrestlers who won medals at the national championship in junior or under-23 categories participated in this study. Athletes who also won medals at the European or World Championship were assessed as top-elite (n = 13), and others as elite (n = 13). Subjects performed the leg and arm Wingate anaerobic test (anaerobic power and capacity), maximum one repetition bench press and squat test (maximal dynamic strength), handgrip and leg strength test (isometric strength), vertical and horizontal jump test (muscle power), and pull-up and push-up (strength endurance) tests. The results showed that top-elite wrestlers produced a higher output in both lower-body and upper-body Wingate average power (relative) than the elite wrestlers when the tests were performed after full rest. However, top-elite wrestlers presented higher results (relative) in all tests, except vertical and horizontal jump tests, when the tests were performed after exhaustive exercise. Furthermore, in a discriminant function analysis, the groups were correctly classified at 65.4% when the tests were performed after full rest, whereas the groups were correctly classified at 92.3% when the tests were performed after exhaustive exercise. This study indicated that the strength-power tests performed after exhaustive exercise may be more effective in discriminating between top-elite and elite wrestlers. [ABSTRACT FROM AUTHOR]

Patel, B. C., et al. (2022). Cauliflower Ear. StatPearls. Treasure Island (FL), StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC.

Cauliflower ear is a deformation of the ear typically caused by direct blunt trauma to the auricle and surrounding tissue. Classically experienced by wrestlers or boxers, the condition can be seen in any activity where significant shearing or impact forces are experienced by the pinna, leading to an auricular hematoma. The hematoma then elevates the auricular perichondrium from the underlying cartilage, devascularizing the cartilage. The blood accumulates in the subperichondrial space and if left untreated can lead to necrosis, infection, and loss of cartilage. Cauliflower ear is the product of the fibrocartilage and fibrosis that occurs upon the destruction of the auricular cartilage once it loses its blood supply.

Pirruccio, K., et al. (2022). "Comparison of in-season and off-season wrestling injuries presenting to United States emergency departments: 2000-2018." Phys Sportsmed **50**(1): 54-59.

OBJECTIVES: Wrestling is a physically demanding sport with an inherently high risk of injury relative to other sports. Injury risk factors may change dramatically for athletes participating in off-season wrestling, given exposure to new opponents, training methods, and wrestling styles compared with in-season months; however, this has never been elucidated in the literature. This study seeks to characterize the injuries sustained while participating in off-season wrestling and compare them to injuries sustained during the in-season months for middle and high school age athletes. METHODS: The National Electronic Injury Surveillance System (NEISS) database was queried (2000-2018) to directly compare national estimates and injury characteristics of middle and high school age patients (11-18 years of age) presenting to US emergency departments (EDs) with wrestling-associated injuries, stratified by in-season and off-season months. RESULTS: The average annual number of patients 11 to 18 years of age presenting to US EDs with wrestling-associated injuries was 20,157 (95% Confidence Interval [C.I.] 16,622-23,691) during in-season months and 5,321 (C.I. 3,954-6,688) during off-season months between 2000 and 2018. Those sustaining in-season injuries were significantly ($p < 0.001$) more and less likely to

injure their upper trunk (8.0%; C.I. 7.1% - 8.8%) and wrists (3.7%; C.I. 3.2% - 4.2%), respectively, than those presenting with off-season injuries (upper trunk: 5.3%; C.I. 4.2% - 6.5%; wrists: 6.6%; C.I. 5.1% - 8.1%). There were no significant differences with respect to the overall prevalence of injury diagnoses between in-season and off-season patient cohorts, including for fractures and dislocations ($p > 0.05$). CONCLUSION: These findings may alleviate concerns that off-season wrestling is inherently more dangerous than in-season wrestling due to changes in wrestling styles or opponent skill levels as the prevalence of specific injury diagnoses between the two seasons is similar.

Pokhachevsky, A. L., et al. (2022). "Load adaptation of the heart rate of qualified wrestlers." *Theory and Practice of Physical Culture*(10): 40-43.

Objective of the study was to identify patterns of tolerance to extreme physical activity in highly skilled wrestlers of various specializations. Methods and structure of the study. A group of active athletes (24 people) took part in the scientific work. In the course of bicycle ergometric testing, the cardiogram of the pre-start, start and the entire load period was studied. Physical exercise tolerance (PE) was determined by the difference between the achieved maximum PE (Wmx) and power W1. Results and conclusions. The greatest maximum of PE is associated with an increase in the number of long-term differences in the prelaunch period (PS); maximum differences in start (ST) and 1 minute of load; minimizing small differences and increasing long-term differences during exercise (2-4 min); an increase in minimal and a decrease in long-term differences (7-9 min). The revealed patterns characterize the features of the formation of the maximum physical performance of wrestlers of various specializations, the dynamics of which probably underlies the formation of the optimal sports form.

Pokrywka, A., et al. (2022). "Evaluation of the use of glucocorticosteroids by athletes in Poland in the light of the amended anti-doping regulations." *Farmacja Polska* **78**(1): 3-9.

Subject of research: Glucocorticoids (GCs) have been included in the list of prohibited substances and methods in sport since 2004 by the World Anti-Doping Agency (WADA). In the latest 2022 update of the list in the World Anti-Doping Code all injectable routes of administration of glucocorticoids are prohibited for GCs use in-competition. Before January 1st, 2022, GCs were prohibited in-competition when administered by oral, intravenous, intramuscular or rectal routes, but local injections (in addition to topical applications) were allowed for a local, non-systemic effect. Aim: This study therefore aims to evaluate the use of GCs by athletes in Poland, with particular emphasis on the amended regulations. Material and methods: Doping control forms (DCFs) from 2130 anti-doping tests carried out in the period from January 1, 2020 to August 31, 2021 were assessed to investigate the list all medications the tested athletes reported on the DCFs for the 7 days prior to controls. The controlled athletes (66% male and 34% female; age $24,7 \pm 5,7$), with 1321 out-of-competition tests (62%), and 809 tests in-competition (38%). Tests were performed in 36 different disciplines with most in track and field (17.3%), weightlifting (10.0%), canoe / kayak (8.5%), cycling (7.9%), rowing (7.4%), wrestling (6.7%), and aquatics (6.3%) with athletes stratified in progressive aged groups. Statistical analyses were done using the non-parametric Chi squared test with significance set for $p < 0.05$. Results: 7.6% ($n = 162$) of the surveyed athletes declared the use of GCs in the week preceding doping control. No correlation was observed between GCs use and age of the athletes ($p = 0.275$ while prevalence of use was the highest in athletes in the 26-30 years age group. Among GCs users, prevalence was not significantly higher in male (8.1%) compared to female athletes (6.7%) ($p = 0.237$). However, there was a significant sex difference in the used substances ($p = 0.008$). Among men ciclesonide preparations (40%) were most used while women most frequently used fluticasone (19%). The intake of GCs was significantly depending on sports discipline ($p < 0.001$) with the highest GCs prevalence in shooting, pentathlon, motorcycle racing, rowing, skiing, fencing, and aquatics. Most medications with GCs used by athletes are inhaled drugs (57%) and nasal sprays (26%). Injections (7%), ointments (5%), tablets (3%), eye drops (1%) and medicated shampoos (1%) were also reported. The basic indications for the use of drugs declared by athletes during doping control are bronchial asthma (57% of cases), rhinitis (26%), pain blockade (7%), inflammatory skin diseases (5.5%), Achilles tendinitis (1.5%), Crohn's disease (1.5%), eye infections (1%), and Addison's Disease (0.5%). The time of administration of drugs, i.e. during the competition and out-of-competition periods, also significantly ($p = 0.017$) influences on the form of medicines taken by athletes. In this study, we did not observe a different prevalence of GCs use between in and out-of-competition periods ($p=0,662$) while injections were only reported during out-of-competition controls. Conclusions: In conclusion, the frequency of use of GCs was

not different during in-competition and out-of-competition periods. It seems that the use of these drugs is not related to pharmacological support in achieving a better result, but is solely due to therapeutic purposes. However, the use of various forms of GCs medicinal preparations are reported with therapeutic purposes. Since substances with different half-lives are prescribed to treat athlete's washout periods for such substances shall be carefully accounted for, even though some administration routes are allowed out-of-competition. Guidance on Therapeutic Use Exemptions (TUE) is paramount for athletes and their medical staff to cope with the current WADA regulations and prevent adverse analytical findings for GCs.

Polechoński, J. and A. Langer (2022). "Assessment of the Relevance and Reliability of Reaction Time Tests Performed in Immersive Virtual Reality by Mixed Martial Arts Fighters." Sensors (14248220) **22**(13): 4762-N.PAG. Immersive virtual reality (VR) is increasingly applied in various areas of life. The potential of this technology has also been noticed in recreational physical activity and sports. It appears that a virtual environment can also be used in diagnosing certain psychomotor abilities. The main aim of this study consisted of assessing the relevance and reliability of VR-implemented tests of simple and complex reaction time (RT) performed by mixed martial arts (MMA) fighters. Thirty-two professional MMA fighters were tested. The original test developed in the virtual environment was applied for RT assessment. The fighters' task consisted of reacting to the lighting up of a virtual disc situated in front of them by pushing a controller button. The relevance of the test task was estimated by juxtaposing the obtained results with the classic computer test used for measuring simple and complex reactions, while its reliability was assessed with the intraclass correlation procedure. Significant relationships found between the results of VR-implemented tests and computer-based tests confirmed the relevance of the new tool for the assessment of simple and complex RT. In the context of their reliability, RT tests in VR do not differ from tests conducted with the use of standard computer-based tools. VR technology enables the creation of tools that are useful in diagnosing psychomotor abilities. Reaction time tests performed by MMA fighters with the use of VR can be considered relevant, and their reliability is similar to the reliability obtained in computer-based tests

Poliakov, S. (2022). "The Construction of Masculinity in Dagestani Male Youth Communities." Europe - Asia Studies.

Drawing on 60 in-depth interviews with adolescents and young men in Dagestan, I examine the construction of masculinity in the context of a postcolonial and peripheral society undergoing a transformation associated with deindustrialisation, urbanisation and globalisation. I focus on three male communities: freestyle wrestlers, street workout athletes and devout Muslim youth. Members of these communities develop their variants of male identity, differing in their attitudes towards violence, their view of the power of elders and their form of moral sovereignty. These versions of masculinity are supported and stabilised both by configurations of power relations and mechanisms of intragroup homosociality.

Poliakov, S. (2022). "Wrestling Gym in Dagestan as a Space for Masculine Socialization." Physical Culture and Sport, Studies and Research **96**(1): 21-30.

The paper analyzes the process of sports gender socialization of boys and adolescents in the case of freestyle wrestling in Makhachkala, the capital of the Russian North Caucasus Republic of Dagestan. The methods and practices of educating future men in the wrestling gym are functionally related to the model of hegemonic masculinity rooted in the local gender and social order, which is under pressure from urbanization and modernization. The wrestling gym insulates students from both the "demoralizing" influence of the home environment and the marginalized scripts of masculinity associated with street life. Through training, boys and adolescents acquire a masculine habitus that can later become the basis for their careers in sports and other spheres of social life, as well as the social capital necessary for successful participation in coalition clinches. They internalize the principle of consistency in gender and age stratification and the lifestyle associated with the ideology of "muscular Islam."

Popov, G. I. and B. A. Sviridov (2022). "Effect of magnetic muscles stimulation on the biomechanical structure of sambo throws." Teoriya i Praktika Fizicheskoy Kultury **2022**(4): 9-11.

Objective of the study was to improvement of the biomechanical structure of throws in sambo when using magnetic stimulation of the quadriceps muscles of the thighs of athletes in the isokinetic mode of their functioning. Methods and structure of the study. Four wrestlers of the 1st category, three candidates for the master of sports and three masters of sports participated in the experiment. The average age of the subjects was 18.5 ± 3.5 years. All subjects are students and active athletes. The methodology of the experiment was as follows: Against the background of planned training work, the subjects were exposed

to magnetic stimulation in the mode for 10 consecutive days. Stimulation was given when performing an oscillatory movement of the lower leg in the isokinetic mode on Biodex. Results and conclusions. The conducted cycle of magnetic stimulation led to a predominant shift of the characteristic frequencies of the spectrum of the integrated electromyogram to a higher frequency part of the spectrum. An analysis of the phase composition of throws in wrestlers subjected to magnetic stimulation showed that after the experiment, the time of the second phase decreased and the total time for performing each of the throws decreased. Quantitative values of the parameters of dynamograms, such as the maximum repulsion force, the rate of increase in force during the vertical jump showed a significant increase in their values ($p < 0.05$ and $p < 0.01$) in wrestlers who underwent a course of magnetic stimulation. They also showed a significant ($p < 0.05$) decrease in the time to reach the maximum force.

Popovic, D., et al. (2022). "Physiological behavior during stress anticipation across different chronic stress exposure adaptive models." *Stress: The International Journal on the Biology of Stress* **25**(1): 14-21.

Anticipation of stress induces physiological, behavioral and cognitive adjustments that are required for an appropriate response to the upcoming situation. Additional research examining the response of cardiopulmonary parameters and stress hormones during anticipation of stress in different chronic stress adaptive models is needed. As an addition to our previous research, a total of 57 subjects (16 elite male wrestlers, 21 water polo player and 20 sedentary subjects matched for age) were analyzed.

Cardiopulmonary exercise testing (CPET) on a treadmill was used as the laboratory stress model; peak oxygen consumption (VO_2) was obtained during CPET. Plasma levels of adrenocorticotropic hormone (ACTH), cortisol, alpha-melanocyte stimulating hormone (alpha-MSH) and N-terminal-pro-B type natriuretic peptide (NT-pro-BNP) were measured by radioimmunoassay and immunoassay sandwich technique, respectively, together with cardiopulmonary measurements, 10 minutes pre-CPET and at the initiation of CPET. The response of diastolic blood pressure and heart rate was different between groups during stress anticipation ($p = 0.019$, 0.049 , respectively), while systolic blood pressure, peak VO_2 and carbon-dioxide production responses were similar. ACTH and cortisol increased during the experimental condition, NT-pro-BNP decreased and alpha-MSH remained unchanged. All groups had similar hormonal responses during stress anticipation with the exception of the ACTH/cortisol ratio. In all three groups, DNT-pro-BNP during stress anticipation was the best independent predictor of peak VO_2 ($B = 36.01$, $r = 0.37$, $p = 0.001$). In conclusion, the type of chronic stress exposure influences the hemodynamic response during anticipation of physical stress and the path of hormonal stress axis activation. Stress hormones released during stress anticipation may hold predictive value for overall cardiopulmonary performance during the stress condition.

Pöppel, K. and D. Büsch (2022). "Every Young Athlete Counts: Are Tailored Doping Prevention Programs Necessary in Young Elite Sports?" *Frontiers in Sports and Active Living* **4**.

Conclusions from doping prevention literature recommend tailored anti-doping education for athletes' specific needs. Newer approaches like the International Standard for Education of the World Anti-Doping Agency recommend a needs assessment before implementing measures. The International Standard for Education refers to the type of sports and its associated risk for doping. Following this idea, elite athletes from different types of sports should differ in their prerequisites for doping prevention. Consequently, the guiding research question focused on exploring the doping-prevention-related background of young athletes as a particular group for prevention efforts. Sixty young elite athletes (58.3% male) took part in a cross-sectional online survey, which was quantitatively analyzed. Participants included 26 athletes from a sport with low doping prevalence (sailing) and 34 athletes from a sport associated with high doping prevalence (wrestling). Sailors and wrestlers differed concerning the perceived resistance against doping temptations ($p = 0.031$, $r = 0.31$) and the estimated actual doping prevalence regarding sports in general (national frame: $p < 0.001$, $r = 0.60$; international frame: $p = 0.013$, $r = 0.43$). No differences between the two types of sports occurred, referring to doping attitudes, tendency to disengage morally, or topics athletes wish to learn about during doping prevention measures. All results indicated a good baseline for doping prevention with young elite athletes at the beginning of their careers. There is no sport specific needs profile that could be used as a base for tailored measures. However, the data suggest that a differentiated consideration of gender could be helpful in the planning of doping prevention measures.

Pozharskaya, E. L., et al. (2022). "Coach's personality psychological and emotional state survey." Teoriya i Praktika Fizicheskoy Kultury **2022**(3): 48-49.

Objective of the study was to survey and analyze the Greco-Roman wrestling coaches' psychological and emotional states. Methods and structure of the study. We sampled for the survey elite Greco-Roman wrestling coaches aged 30 to 52 years (n=8), former competitors and runner-ups of the All-Russian and international Greco-Roman wrestling events. The sample was surveyed by the L.N. Sobchik Individuality Typing (IT) questionnaire; A.B. Leonova Occupational Stress Scale, Neuropsychic Stability and Chronic Fatigue test, and the Emotional State Self-testing questionnaire survey; with the survey data processed by a standard statistical toolkit. Results and conclusion. Coach's occupational responsibilities are associated with high emotional and psychological stressors and, hence, expose them to stress-related health risks. The psychological protection mechanisms may include stress coping/ behavioral control strategies. Actual stress coping strategies will be customized to a range of objective and subjective factors, with the objective ones referring to the occupational responsibilities and conditions, and the subjective to the coach's personality traits. Coaches need to master modern self-control tools to effectively mitigate and control neuropsychiatric stressors by constructive stress coping strategies developed by communicative competency advancement trainings that are recommended on a yearly basis prior to every training season.

Pravdov, D. M., et al. (2022). "Method of developing the strength of the hands in young wrestlers." Teoriya i Praktika Fizicheskoy Kultury **2022**(9): 99-103.

Objective of the study was to develop and experimentally substantiate a methodology for developing hand strength in young wrestlers based on the use of a set of special exercises performed on a training device with a closed biokinematic chain of hands. Methods and structure of the study. On the basis of two sports schools-the city of Shuya and the city of Ivanovo, Ivanovo Region-in the period from 2017 to 2021, a study was conducted of 86 SAMBO practitioners. The total population of the surveyed sample of children is 12-13 years old. In the course of the work, an analysis of scientific papers on the research problem was carried out. The degree of development of the absolute strength of the hands was assessed using dynamometry, speed-strength abilities were determined when climbing a rope to a height of 5 m, strength endurance-by the duration of the hang on the crossbar. The reliability of the grips for the jacket was determined by an expert assessment. Processing of the received data using the Microsoft Office Excel 2007 software package. Results and conclusions. Developed on the basis of the results of the study, the methodology for developing hand strength in young wrestlers is built on the use of a set of exercises using a special training device "Wanderer". The effectiveness of the application of the methodology is confirmed by the results of the pedagogical experiment. For sambists from the EG, the average values of the results for all tests at the end of the pedagogical experiment are significantly higher than for young athletes from the CG ($p < 0.05$). The use of special exercises in the annual training cycle of young wrestlers, performed with a closed biokinematic chain of hands on the training device "Wanderer", allows to increase the degree of hand strength development and the efficiency of grips in the process of fighting.

Ranisavljev, M., et al. (2022). "Rapid Weight Loss Practices in Grapplers Competing in Combat Sports." Front Physiol **13**: 842992.

BACKGROUND: Grappling is a wrestling style that combines different techniques such as freestyle wrestling, jiu-jitsu, judo, sambo, and others. As with other combat sports, it requires categorizing the athletes in weight classes, which leads to the use of certain methods to lose body weight in a short amount of time which poses a serious threat to athletes' health and wellbeing. Therefore, the objective of this study was to investigate the most widespread rapid weight loss (RWL) methods and sources of influence used by grappling athletes. **METHODS:** A total of 145 athletes took part in the study by voluntarily filling out a questionnaire regarding their weight loss techniques and methods. They were divided into two groups, male (27.7 ± 5.2 years, 1.76 ± 0.13 m, and 82.1 ± 20 kg) and female (27.33 ± 6.3 years, 1.65 ± 0.08 m, and 64.3 ± 10.4 kg), for further statistical analysis. After calculating descriptive statistics for all the variables, a t-test was conducted for gender differences in weight loss and weight regain, and a chi-square test measured the diversity in techniques and source of influence. **RESULTS:** Out of 145 participants, 120 athletes (85.2%) reported engaging in rapid weight loss prior to weigh-in. Coaches (52.4 and 59%) and teammates (42.6 and 22.1%) seemed to be the most influential on their rapid weight-loss strategies, whereas physicians (17.1 and 17.9%) and parents (23.2 and 23.1%) were the least influential. A statistical difference between men and women ($p = 0.05$) was found when teammates were a source of influence (42.6 and 21.1%, respectively). Regarding the methods used, both groups practiced gradual dieting (85.4 and 79.5%) as the most prevalent, followed by increased exercise

(79 and 66.6%) and sauna (78.7 and 66.6%). Moreover, men trained in plastic suits significantly more often than women (67.1 vs. 41%, $p = 0.01$). CONCLUSION: Rapid weight loss is detrimental to athletes' health and wellbeing. Hence, it is crucial to find and implement methods that will control and ultimately limit its use in combat sports. Physicians and nutritionists need to be closely linked with the staff, collaborate and supervise the weight cutting.

Roklicer, R., et al. (2022). "Rapid Weight Loss Coupled with Sport-Specific Training Impairs Heart Rate Recovery in Greco-Roman Wrestlers." *Applied Sciences (Switzerland)* **12**(7).

Wrestling is a sport that can be classified with the use of alternating aerobic–anaerobic metabolism with moderate but high-impact energy expenditure. Heart rate recovery (HRR) is the difference between heart rate during exercise and a certain amount of time after the start of recovery. The goal of this study was to determine the difference in HRR between two phases: high intensity sport-specific training (HISST) combined with rapid weight loss (RWL)—phase 1 (P1) and HISST only—phase 2 (P2). Ten national-level wrestlers were included in this study. All participants underwent HISST along with RWL procedures for P1. Seven days later, during P2, an identical training session was performed with no RWL included. We found a statistically significant difference in the values obtained after the first and second minutes of recovery in the second set for both cases ($p = 0.034$ and $p = 0.037$, respectively), with higher HR values recorded in P1. It can be concluded that there is undoubtedly a difference in HRR during training and RWL compared to HISST alone. Additionally, HISST along with RWL could compromise the aerobic component of recovery

Roklicer, R., et al. (2022). "Prevalence of rapid weight loss in Olympic style wrestlers." *Journal of the International Society of Sports Nutrition* **19**: 593-602.

Background The methodology applied for rapid weight loss (RWL) among elite wrestlers is quite unexplored. Therefore, the aim of this study was to analyze the prevalence of sources of influence and methods used for RWL and to determine the differences between wrestling styles. Methods A total of 229 wrestlers who competed at the World Championship held in Belgrade, Serbia, participated in this research. All respondents completed a questionnaire designed to evaluate RWL patterns in combat athletes. Participants were classified according to wrestling style: Greco-Roman, freestyle, and women wrestling. Results Sixty-nine percent of wrestlers had previously lost weight to compete. Most respondents start losing weight approximately seven days before a competition. Athletes reported that they commonly reduced 3.84 ± 2.82 kg to reach the target weight. The wrestling coach represents the most influential person in terms of RWL strategies, while nutritionists and physicians have the least impact on the weight-cutting process. Regarding the methods applied, differences between all the three styles were found in the following variables: training in a heated room, restricting fluid ingestion, training in plastic suits, gradual dieting, increased exercise, diet pills, and sauna. The most frequently used techniques were increased exercise, gradual dieting, training in a heated room, and sauna for all competitors. Diet pills, diuretics, laxatives, and vomiting were the least implemented methods. Conclusions The obtained results suggest that most wrestlers practice RWL despite the harmful health effects. The education of wrestling coaches is necessary in order to control and decrease the negative impact of RWL.

Sabillah, M. I., et al. (2022). "The effect of plyometric exercise and leg muscle strength on the power limb of wrestling athletes." *Journal of Physical Education and Sport* **22**(6): 1403-1411.

This study aims to find out: (1) the difference in influence between plyometric exercises side-to-side box shuffle and box jump on limb power; (b) differences in the influence of players who have high and low leg muscle strength against limb power; and (c) the interaction between plyometric exercises side-to-side box shuffle and box jump and limb muscle strength to leg power in wrestling athletes. This type of research is an experiment using a 2×2 factorial design. The population in this study was a South Coastal District wrestling athletes who numbered 38 people. The sample in this study amounted to 20 people who were taken using purposive sampling techniques, then performed ordinal pairing to divide each group. The instrument used is to measure the strength of the leg muscles, namely the leg and back dynamometer, while the power of the limbs uses vertical jump. The data analysis technique used is ANOVA two-way. The results showed that: (1) There was a significant difference in influence between plyometric side-to-side box shuffle and box jump exercises against power limbs in wrestling athletes, with a value of $F 4.865$ and a significance value of $p 0.045 < 0.05$. The side-to-side box shuffle exercise group was higher (good) compared to the box jump exercise group with a post-test average difference of 8.41. (2) There is a significant difference in influence between athletes who have the high and low

leg muscle strength to leg power in wrestling athletes, with proven value $S F 20.74$ and significance values $p 0.000 < 0.05$. Athletes who had high leg muscle strength were higher (good) compared to players who had low leg muscle strength, with an average post-test difference of 17.38. (3) There is a significant interaction between plyometric exercises (side-to-side box shuffle and box jump) and leg muscle strength (high and low) to leg power in wrestling athletes, with a value of $F 41.819$ and a significance value of $p 0.000 < 0.05$. There is a significant difference in influence between plyometric side-to-side box shuffle exercises and box jump on the increase in leg power in wrestling athletes. The side-to-side box shuffle exercise group was higher (good) than the box jump training group against the increase in leg power. There is a significant influence comparison between athletes who have high and low leg muscle strength to the increase in leg power in wrestling athletes. Athletes who have high leg muscle strength are higher (good) than athletes who have low leg muscle strength against the increase in leg power. There is a significant interaction between plyometric exercises (side-to-side box shuffle and box jump) and leg muscle strength (high and low) to the increase in leg power in wrestling athletes.

Sabry, G. E., et al. (2022). "The effect of bridge exercises on the postural deviations and spinal cervical vertebrae deformities among wrestlers." *International Journal of Advanced and Applied Sciences* 9(8): 21-27.

This study aims to identify the effect of these exercises on the bridge skill on the cervical vertebrae of the players, using modern technology by the Posture Pro 8 device, which is a high-tech device in determining the prediction of future deformations, which may occur as a result of practices and exercises that lead to the occurrence of complications, and the study sample was selected from the players of the Shooting Sports Club in Mahalla city in Egypt, and the bridge exercises were applied to that sample, and the results of the study showed no change the significant effect of bridge exercises on the occurrence of anterior or lateral deviations in the cervical vertebrae, as shown by the results of the studies. It founds that all values of the effect size in the frontal and lateral deviations are less than 80.0, which is of unremarkable effect and the total deviations between the pre and post -measurements of the group under study have an unremarkable effect as well, as the value of the rate of change ratios ranged between 0.441%.

Sciranka, J., et al. (2022). "Time-motion analysis in freestyle wrestling: Weight category as a factor in different time-motion structures." *Ido Movement for Culture* 22: 1-8.

Background. There is limited knowledge of the time-motion structure of bouts in Freestyle wrestling. Problem and aim. The main goal of this study was to determine the effort and pause ratios in Freestyle wrestling. Methods. 297 bouts from the Freestyle wrestling World Championships 2018 were analyzed. Bouts were divided into three weight classes (lightweight, middleweight, heavyweight. For the time-motion analysis, Kinovea software was used. Results. The effort:pause ratio was determined at 2.4:1. The number of work periods per bout was 8. Most of the bout time was spent in a standing position during the preparation phase. The heavyweight wrestlers spent statistically significant less time in the standing position during the execution time compared to light-and middleweights. The effort and pause ratio for lightweights, middleweights, and heavyweights were determined at 2.2:1, 2.4:1, and 2.5:1, respectively. Conclusions. The results of our study can be used to prescribe physical training. Future time-motion analyses are needed.

Selitrenikova, T., et al. (2022). "Transcranial electrical stimulation to increase psychophysiological stability, technical and tactical readiness of MMA fighters." *Journal of Physical Education and Sport* 22(6): 1419-1425.

An increase in the psycho-physiological level as well as technical and tactical readiness in martial arts refers to the leading factors allowing an athlete to effectively conduct a bout with an opponent. The study of various means and methods aimed at optimizing these factors is an urgent problem in the sports world. Research aim: to study the effect of transcranial electrical stimulation to improve the psychophysiological stability, technical and tactical readiness of MMA fighters. Research materials and methods. The research project was carried out in the pre-competition period with MMA athletes engaged in wrestling clubs in St. Petersburg (Russia) participation. CG and EG groups were formed, each of 10 people aged 18-27. The training structure was the same in both groups (2 times a day with an interval of 6 hours). In EG, for 8 days, the course of transcranial direct current stimulation (tDCS) was used, which consisted of 1 daily session in the afternoon, in the interval of 1-2 hours before training. Some tests were used to study the psycho-physiological status of all athletes: «Distribution of attention», «Memory for numbers», «Information reception», «Stress level» and «Immediate recall test». The state of the athletes' body vegetative balance was assessed by heart rate variability (HRV). With the use of control exercises and analysis of control bouts video recordings, CG and EG athletes' high-stakes testing of the technical and tactical readiness was carried out. Research results. At the beginning of the project, the psycho-physical

as well as technical and tactical indicators of the athletes in both groups did not significantly differ from each other. At the end of the project, the values of all indicators of psycho-physiological tests and heart rate variability were significantly better for the athletes of the EG than for the athletes of the CG. Conducting a tDCS course in EG athletes affected a significantly greater increase in quantitative and qualitative indicators of the level of technical and tactical readiness of MMA fighters'. Conclusions. The use of transcranial electrical stimulation during the annual macrocycle for mixed martial arts athletes in the pre-competition period showed a high efficiency of increasing their technical and tactical readiness and urgent recovery after intensive training activities.

Skurvydas, A., et al. (2022). "What Types of Exercise Are Best for Emotional Intelligence and Logical Thinking?" Int J Environ Res Public Health **19**(16).

The aim of our study was to determine whether EI and LT vs. intuitive thinking (CRT score) are related to participation in professional sports, independent exercise, and exercise at a gym/health center compared with no exercise. We selected 20 of the most popular types of exercise in Lithuania among respondents who exercise independently or at a gym/health center, and we ranked these types of exercise according to the participants' emotional intelligence and logical thinking. We studied 4545 women and 1824 men aged 18-74 years with a focus on whether emotional intelligence and logical thinking are related to type of exercise. Participation in any exercise was significantly related to emotional intelligence in men and women. Women in professional sports solved the lowest number of logic tasks. Women who exercise independently or at a gym/health center had better logical thinking than those who do not exercise. Among men, logical thinking was not associated with the type of exercise. We found the tendency for a negative correlation between EI and LT in the 20 most popular types of exercise. Emotional intelligence correlated positively with participation in MVPA. The highest emotional intelligence was in women who participate in dance or Pilates and in men who participate in martial arts, wrestling, boxing, or yoga. Logical thinking was the highest in men who participate in triathlon and in women who perform CrossFit. Men who practice martial arts or track and field and women who participate in cycling were in the top five for emotional intelligence and logical thinking.

Sobyanin, F. I., et al. (2022). "Stages of emergence and development of freestyle wrestling in the West Kazakhstan region of the Republic of Kazakhstan." Teoriya i Praktika Fizicheskoy Kultury **2022**(4): 92-94.

Objective of the study was to substantiate the stages of development of freestyle wrestling in the West Kazakhstan region of the Republic of Kazakhstan. Methods and structure of the study. The work was carried out on the basis of the Belgorod State University and the West Kazakhstan Innovation and Technology University in 2018-2022. We used historical and culturological-acmeological approaches, analysis and generalization of data from special literature, electronic sources, archive documents of the West Kazakhstan region, a survey of trainers, a study of the reporting materials of the department of physical culture and sports of the West Kazakhstan region. Results and conclusions. The most important factors that determine the periodization of the development of freestyle wrestling in the region of the West Kazakhstan region are identified: the effectiveness of the activities of coaches and athletes, the nature of the expansion of the scope of freestyle wrestling in the region, the quantitative composition of coaching staff and their qualifications, scientific, methodological and logistical support, social historical changes in the region, economic provision, demographic dynamics, organizational and managerial activities. As a result of the study, four stages in the development of freestyle wrestling in the region were identified: the stage of the origin and initial development of freestyle wrestling in the West Kazakhstan region; the stage of the spread of freestyle wrestling in the region; stage of intensive development of freestyle wrestling; the stage of reaching the maximum achievements of athletes of the region in freestyle wrestling. The established time periods and the main trends of the stages show the progressive nature of the development of freestyle wrestling in the region.

Sobyanin, F. I., et al. (2022). "Evaluation of the activities of a wrestling coach." Theory and Practice of Physical Culture(6): 25-28.

Objective of the study was to develop a methodology for evaluating the activities of a wrestling coach. Methods and structure of the study. Scientific work is organized at the faculties of physical culture at the University of Innovation and Technology of Western Kazakhstan, Utemisov Western Kazakhstan University and Belgorod State National Research University in 2017-2021. The analysis of special scientific literature, a survey of coaches and athletes, the study of competition protocols and regulatory documents, analysis of performance results, and mathematical modeling were used as research methods. Results and conclusions. The proposed methodology is based on the well-known and specific indicators of professional achievements of an individual coach and the received sports achievements of

each athlete trained by him, entered into the formula for mathematical calculations. The meaning of these calculations is to determine the arithmetic mean from the sum of the achievements of the coach and his athletes, divided by the number of athletes with the coach. The developed methodology for determining the effectiveness of the activity of a coach in freestyle wrestling and wrestling Kazakhsha-kures is a set of evaluative actions of the coach and his students, followed by the introduction of indicators into the proposed formula and the calculation of the coefficient of effectiveness of the coach. The technique is universal, practical, can be easily modified, and is widely used not only in martial arts, but also in other sports. It allows you to systematically monitor the dynamics of the effectiveness of the work of coaches and compare the effectiveness of both individual coaches and their groups within the same sports organization or between them.

Stachoń, A., et al. (2022). "The distribution of subcutaneous fat and fat pattern among male athletes of different combat sports." *Archives of Budo* **18**: 87-101.

Background and Study Aim: Material and Methods: Results: Conclusions: The distribution of fat can be of great importance to an athlete's body function, because individual adipose tissue deposits differ in metabolic and endocrine activity. The aim of the study was the answer to the question: whether the fat patterns of combat sports athletes differ among disciplines. Anthropometric measurements and body composition assessment of 390 combat sports athletes (boxing, Brazilian jiu-jitsu/BJJ, judo, karate, kick-boxing taekwondo, wrestling) were conducted. The body fat characteristics were determined based on skinfolds measurements, bioelectrical impedance analysis and also subcutaneous fat indices. The distribution of subcutaneous adipose tissue is similar in karate, taekwondo, judo and BJJ athletes, while the pattern of subcutaneous fat in boxers, kick-boxers and wrestlers differs slightly. Men practicing particular sports differ in limb to trunk subcutaneous fat proportion, as well as in total body fat. Kick-boxers have the highest proportion of subcutaneous fat, while judo and BJJ athletes have the lowest one. BJJ athletes are characterized by the greatest difference in subcutaneous fat distribution – limb fat is half that of the trunk. The distribution is more balanced in karate, kick-boxing and taekwondo athletes. In terms of total body fat content the wrestlers dominate, whereas judo and BJJ athletes had the lowest one. Athletes representing various combat sports are characterized by different fat patterns. This became particularly apparent when the analysis simultaneously considered the thickness of the skinfolds in different parts of the body, the relative size of subcutaneous fat, and the percentage of total fat, as well as the distribution of subcutaneous fat on the limbs and torso.

Stanbouly, D., et al. (2022). "Craniofacial injuries from the sport of wrestling: a query of the National Electronic Injury Surveillance System (NEISS)." *Oral Maxillofac Surg* **26**(3): 393-400.

PURPOSE: The purpose of this study was to provide a novel report on the head and neck injuries from the sport of wrestling and their characteristics in the USA. MATERIALS AND METHODS: This is a 20-year retrospective cross-sectional study conducted using the National Electronic Injury Surveillance System (NEISS). Reports were included in the analysis if the injury stemmed from combat with another person. The predictor variables were obtained from both patient and injury characteristics. The principal outcome variable was admission rate, which was used to proxy the severity of the injury at hand. Bivariate analysis (i.e., chi-square and independent sample tests) was used to determine if an association existed between two variables of interest. RESULTS: The final sample in our study consisted of 4485 cases of craniofacial injuries secondary to wrestling. The increase in injuries from the year 2000 to 2019 was significant ($P < 0.05$). The average age of patients was 15.73 (range: 3 to 59 years old). Virtually all of the injuries occurred in males (95.6%). The majority of patients was under the age of 18 (82.3%). With regard to race, white wrestlers (57.1%) comprised the majority of patients. Insight into race was not available for 1245 patients (27.8%). Most wrestling-related injuries took place during the winter season (60.6%). Concussion was the most common primary diagnosis (29.0%). The head (57.1%) was the most commonly injured craniofacial region. The most common setting in which the injury took place was a place of recreation/sports (49.9%). Among the mechanisms of injuries, the take-down (26.5%) was the most common. Patients who were thrown/taken down (5.04%) were significantly more likely to get admitted ($P < 0.01$) relative to patients who were injured otherwise (2.6%). Similarly, patients who fell/tripped (6.6%) were significantly more likely to get admitted ($P < 0.05$) relative to patients who were injured otherwise (3.1%). While cases of concussion (6.0%) were significantly more likely to get admitted ($P < 0.01$) relative to other cases, cases of contusions/abrasions (0.6%) were significantly less likely to get admitted ($P < 0.01$) relative to other cases. Similar to contusions/abrasions (0.2%), lacerations were significantly less likely to get admitted ($P < 0.01$) relative to other cases. Patients aged 12-18 ($P < 0.01$) were most likely to suffer concussions, whereas patients aged 19-34 ($P < 0.01$) were least likely to suffer concussions. In contrast to concussions, patients aged 12-18 ($P < 0.01$) were least likely to suffer

lacerations, whereas patients aged 19-34 ($P < 0.01$) were most likely to suffer lacerations. Patients aged 6-11 ($P < 0.01$) were most likely to be thrown/taken-down whereas patients aged 19-34 ($P < 0.01$) were least likely to be thrown. Patients aged 19-34 ($P < 0.01$) were most likely to be collided against intentionally, while patients aged 6-11 ($P < 0.01$) were least likely to be collided against intentionally. Patients aged 34 years or older were most likely to fall/trip, while patients aged 12-18 ($P < 0.01$) were least likely to fall/trip. CONCLUSIONS: Certain types of injuries that occur during wrestling are more or less common depending on the age groups involved in the sport. Concussions were the most common injury incurred overall, and the head is the most commonly affected craniomaxillofacial area. Take-downs were the most likely mechanism of injury to lead to hospital admissions. The average number of wrestling injuries increased over 20 years being analyzed in this study. Future studies should investigate methods to lessen concussions in wrestling, decrease the number of illegal moves performed, and look into ways to mitigate harm from take-downs, given the increasing number of injuries acquired from this sport.

Tabasi, S. R., et al. (2022). "Proprioception and dynamic balance performance in wrestlers: Freestyle vs. Greco-Romana." *Science and Sports* **37**(5-6): 494.e491-494.e497.

functionSummaryObjectives. — The aim of this study was to compare proprioception and dynamic balance between freestyle and Greco-Roman wrestlers. Equipment and methods. — In this study, 42 national level wrestlers (freestyle [FS], $n = 21$ and Greco-Roman [GR], $n = 21$) volunteered to participate and performed a battery of tests including: Y balance-test and upper quarter YBT to measure lower and upper-extremity balance performance, an electrogoniometer to measure proprioception and range of motion, and dynamometer to measure sense of force and muscles strength in wrestlers. Results. — No significant differences were observed in YBT ($P = 0.37$), ankle plantar flexor strength ($P = 0.44$), range of motion in ankle plantar flexion ($P = 0.42$) and shoulder flexion ($P = 0.75$) between the GR and FS wrestlers. There were significant differences in YBT-UQ ($P = 0.001$), shoulder flexor strength ($P = 0.002$), error sense of force in ankle plantar flex-ors ($P = 0.001$) and shoulder flexors ($P = 0.037$), error joint reposition in ankle plantar flexion ($P = 0.001$) and shoulder flexion ($P = 0.001$) between the GR and FS wrestlers. It seems that a difference in the nature of exercises and competitions in FS and GR wrestlers needed different adaptations in muscular and neuromuscular performance.

Tarabrina, N. Y. and T. Wilczewski (2022). "Role of muscle relaxation in the correction of vestibulo-respiratory reactions in athletes." *Theory and Practice of Physical Culture*(5): 41-44.

The aim of the study was to study the possibility of using muscle relaxation as a means of correcting the negative influence of vestibular loads on the function of external respiration of wrestlers. For 81 athletes-wrestlers (men) (19.41 ± 1.66 years), the parameters of the tone of paravertebral muscles (TPM) of the reflexogenic vascular zones segments and the indices of spirometry at rest, after presentation of a vestibular load (Series-1), after the combined action of active traction rotational muscle relaxation (ATRM) and vestibular load (Series-2) were studied. It was shown that vestibular loads increase the tone of the cervical muscles in wrestlers by 4.72-11.54% ($p < 0.05$). After the combined action of ATRM with vestibular loads, there was a significant decrease in myotonus at the VG15 point: up to 19.12% ($p < 0.001$). In Series-2, the constants of the respiratory system significantly increased: vital lung capacity (VC) by 4.55% ($p < 0.01$), maximum lung ventilation (MVV) by 6.55% ($p < 0.01$) with a decrease in frequency respiration RR by 26.41% ($p < 0.001$) and an increase in respiratory volume by 15.19% ($p < 0.01$), which indicates an increase in the efficiency and effectiveness of breathing under conditions of vestibular loads. The method can be used in training process, sports medicine and physical rehabilitation.

Tarakanov, B. I., et al. (2022). "Dynamics of achievements of Russian women wrestlers on the international arena." *Teoriya i Praktika Fizicheskoy Kultury* **2022**(7): 3-5.

Objective of the study was to conduct a systematic analysis of the dynamics of the sports results of Russian women wrestlers at the largest competitions in 2017-2021 and to make proposals for improving the quality of training of highly qualified athletes. Methods and structure of the study. To obtain initial information, video recordings of fights, referee notes and final protocols of the world championships 2017, 2018, 2019, 2021 and the Olympic tournament in Tokyo were studied and analyzed, followed by systematization of the data obtained in terms of identifying the dynamics of sports achievements of female wrestlers of the Russian national team. A detailed analysis of current trends in the dynamics of the results of Russian female wrestlers on the international mat is presented. A significant decrease in results was revealed at the 2017, 2018 and 2021 World Championships, as well as at the Games of the XXXII Olympiad in Tokyo (2020). An analysis of the reasons for this decline is given and recommendations are given, the implementation of which will increase the level of achievements of female athletes based on the intensification of scientific and methodological support for their training and competitive activities.

Taree, A., et al. (2022). "Analysis of surgery rates among 25 national collegiate athletic association sports." Phys Sportsmed **50**(1): 30-37.

OBJECTIVES: While injuries among collegiate athletes are common and well-studied, there have been no studies comparing which sports and injury types have the highest operation rates. This information would be valuable for athlete governing bodies and providers to improve player safety. Our hypothesis was the surgery incidence rates vary substantially between sports and injury types, with football and knee injuries representing the sport and injury type with the highest respective surgery rates. **METHODS:** This was a descriptive epidemiology study of all injuries requiring surgery as recorded in the National Collegiate Athletic Association (NCAA) Injury Surveillance Program (ISP) for academic years 2004-2005 to 2013-2014. Surgery incidence rates (and 95% confidence intervals, CI) were calculated for each sport (per 10,000 athletic exposures [AE]) and for the most common injury types, by academic year. In addition, absolute numbers of performed surgeries were calculated as well as rates of return to sport. **RESULTS:** Sports with the highest surgery incidence rate (per 10,000 AEs) were women's gymnastics (8.9; 95% CI 7.2-10.9), men's football (6.1; 95% CI 5.8-6.4), and men's wrestling (5.3; 95% CI 4.5-6.3). Absolute numbers of injury-related surgeries performed were greatest for men's football (n = 31,043), women's basketball (6,625), and men's basketball (5,717). Anterior cruciate ligament tears had the greatest surgery incidence rate per 100,000 AEs for all sports combined (7.95; 95% CI = 7.5 to 8.5), and also represented the injuries with the lowest rate of return to sport. **CONCLUSION:** Women's gymnastics, men's football, and men's and women's basketball are NCAA sports with an elevated risk of injury requiring of surgery. The results from this study can guide the NCAA and providers regarding which sports should be the focus of future research, new injury prevention strategies, and healthcare personnel allocation during events.

Telles, T. C. B., et al. (2022). "Galhofa: the Portuguese wrestling between tradition and survival." Galhofa: la lucha portuguesa entre tradición y supervivencia. **17**(1): 38-49.

This paper aims to present the galhofa, a traditional wrestling style practiced in Portugal, especially in Trás-os-Montes, in the northern region. Part of an oral and folk tradition, galhofa has survived with no systematic organization, either regarding its rules or even its techniques. Thus, this paper is focused on introducing and discussing the galhofa as an activity between tradition and sportization. Data was collected in Bragança in 2019 through interview and immersion activity, along with images and videos from field research conducted in Parada between 1997 and 2001. Both the visit to Bragança and the analytical process were conducted via phenomenology and inspired by esthesiology and emersiology. Overall, the experience of galhofa encompasses a free way of fighting with the main objective of keeping the opponent's back and shoulders on the floor for a few seconds. It is historically related to a manly activity and it is often associated as a ritual of passage from adolescence to manhood. As the only traditional Portuguese wrestling modality surviving nowadays, the galhofa can be considered as a very unique fighting practice. However, there are some shared aspects with other martial arts and combat sports, especially more traditional ones, such as capoeira, loita or lucha leonesa. Under the risk of disappearing, it faces an ongoing sportization process, which includes a more gender equality agenda and a systematic organization of techniques and competition procedures. Relevant changes have also been made towards making this practice more popular and widely known, such as establishing it as part of the undergraduate curriculum on Sports degree at the Polytechnic Institute of Bragança.

Tkachuk, M. G., et al. (2022). "Sexual diformism of morphological indicators in representatives of various types of single combats." Teoriya i Praktika Fizicheskoy Kultury **2022**(4): 60-62.

Objective of the study was to comparison of morphological indicators in representatives of boxing and freestyle wrestling from the position of sexual dimorphism.
Methods and structure of the study. 73 sportswomen and 71 athletes specializing in boxing and freestyle wrestling, aged 18-25 years old, with a sports experience of at least seven years and a sports qualification from adult category I to master of sports, were examined. The control group of 42 women and 40 men of the same age consisted of persons not related to sports. The anthropometric examination included measuring the length and weight of the body, longitudinal, transverse and girth dimensions of the body, the thickness of the skinfolds. According to the J. Mateigka method, the component composition of body mass was calculated. Somatotypes were determined according to the scheme of B. Heath and L. Carter.

Results and conclusions. A different degree of severity of sexual dimorphism of somatic status was revealed in representatives of various types of martial arts. Gender differences in morphological parameters are more pronounced in wrestlers than in boxers.

Tomin, M., et al. (2022). "Investigating the impact behavior of wrestling mats via finite element simulation and falling weight impact tests." *Polymer Testing* **108**: N.PAG-N.PAG.

In this paper, a novel approach is used to represent the viscoelastic behavior of cross-linked polyethylene foams at high strain rate: a compressible hyperelastic material model is combined with the Rayleigh damping method. We developed finite element models to simulate the impact tests described in the international assessment protocol of wrestling mats. The accuracy of the finite element analysis was validated with experimental data. We showed the nonlinear viscoelastic nature of the foam material by determining the relationship between the damping ratio and maximum compressive strain. We demonstrated the applicability of the method through the quality assessment of wrestling mats, and determined the minimum required thickness to prevent traumatic head injuries. The modeling and testing method can be implemented in the study of sandwich structures, thus the design process can be simplified. With further development, our approach can be used to design multilayered wrestling mats with better energy absorbing characteristics. • The behavior of cross-linked polyethylene foams at high strain rates was analyzed. • The hyperfoam material model and the Rayleigh damping method were combined. • Finite element models were developed and validated by experimental impact tests. • The minimum required mat thickness was determined to prevent traumatic head injuries. • The modeling approach can be used to design safer, multilayer wrestling mats

Tonoyan, K., et al. (2022). "Biological Markers of Training Level among Qualified Greco-Roman Wrestlers." *Open Access Macedonian Journal of Medical Sciences* **10**: 12-15.

BACKGROUND: The article presents the dynamics of biochemical indicators showing the tension of body functional systems in qualified Greco-Roman wrestlers at the pre-competition stage. Biochemical indicators can be regarded as the markers of training level, as a reflection of adaptive changes during performing training loads.

AIM: The study aims to examine the adaptive reactions of body internal systems in wrestlers to the load performed at the stage of pre-competition training.

METHODS: The methodological basis of the study is the examination of the reaction of body functional systems in wrestlers (n = 24) in response to the load performed at the stage of pre-competition training. The basis of the studied indicators of wrestlers' organisms is the dynamics of the enzymatic activity (ALT and AST), the activity of creatine phosphokinase, and the balance of anabolic and catabolic processes in the course of a 2-week macrocycle of the pre-competition training.

RESULTS: A high level of enzymatic activity (ALT and AST) was noted as the response to shock training load in the first and the second training macrocycles against the background of a negative trend during the entire sports event, which indicates a directed decrease in the heart's tension muscle, being an indicator of adaptive changes occurring in wrestlers' body energy. The high variability of AST indicators on the first day and creatine phosphokinase throughout the entire pre-competition training pointed out an individual level of adaptive reactions of the athletes' bodies in response to the training load taken.

CONCLUSIONS: The results of the study have shown notable dynamics in the indicators of the enzymatic activity of AST, creatine phosphokinase, and the hormone cortisol in a series of shock training loads, as the response to adaptive changes in body energy systems, the value of which should be considered during the pre-competition training.

Tripp, M. (2022). "Cornish wrestling in the nineteenth century." *Sport in History*.

During the first half of the nineteenth century the Cornish economy was thriving, dominated by the metal mining industry. When the economy was thriving Cornish wrestling was at the height of its popularity when a large number of wrestlers entered numerous tournaments for lucrative prizes and witnessed by large crowds. It was also the time when the sport flourished in London. The leading wrestler during this period was Tom Gundry, who in a relatively short career won many of the tournaments in Cornwall, Devon and London and consequently was able to amass a significant sum in prize money. Despite his prominence he occasionally resorted to match-fixing or 'faggoting' with his opponents. During the second half of the nineteenth century, however, there was a collapse of the economy which had a deleterious effect upon Cornish wrestling with decreases in numbers of wrestlers, tournaments, prize money and spectators. The sport also disappeared from London. The common thread running throughout the nineteenth century is a 'persistence of difference'. Cornwall's historical experience was different from the rest of Britain and that difference has persisted over time and has led to a unique identity. Cornish wrestling contributed to the construction of that identity.

Uddin, N., et al. (2022). "A Survey of Combat Athletes' Rapid Weight Loss Practices and Evaluation of the Relationship With Concussion Symptom Recall." *Clinical Journal of Sport Medicine* **32**(6): 580-587.

Objective: There is a high incidence of concussion and frequent utilization of rapid weight loss (RWL) methods among combat sport athletes, yet the apparent similarity in symptoms experienced as a result of a concussion or RWL has not been investigated. This study surveyed combat sports athletes to investigate the differences in symptom onset and recovery between combat sports and evaluated the relationships between concussion and RWL symptoms. Design: Cross-sectional study. Setting: Data were collected through an online survey. Participants: One hundred thirty-two (115 male athletes and 17 female athletes) combat sport athletes. Interventions: Modified Sport Concussion Assessment Tool (SCAT) symptom checklist and weight-cutting questionnaire. Main Outcome Measures: Survey items included combat sport discipline, weight loss, medical history, weight-cutting questionnaire, and concussion and weight-cutting symptom checklists. Results: Strong associations ($r_s = 0.6-0.7$, $P < 0.05$) were observed between concussion and RWL symptoms. The most frequently reported symptom resolution times were 24 to 48 hours for a weight cut (WC; 59%) and 3 to 5 days for a concussion (43%), with 60% to 70% of athletes reporting a deterioration and lengthening of concussion symptoms when undergoing a WC. Most of the athletes (65%) also reported at least one WC in their career to "not go according to plan" resulting in a lack of energy (83%) and strength/power (70%). Conclusions: Rapid weight loss and concussion symptoms are strongly associated, with most of the athletes reporting a deterioration of concussion symptoms during a WC. The results indicate that concussion symptoms should be monitored alongside hydration status to avoid any compound effects of prior RWL on the interpretation of concussion assessments and to avoid potential misdiagnoses among combat athletes.

Ulupınar, S. and S. Özbay (2022). "Energy pathway contributions during 60-second upper-body Wingate test in Greco-Roman wrestlers: intermittent versus single forms." *Res Sports Med* **30**(3): 244-255.

This study aimed to investigate the energy pathway contributions and physiological and performance responses between a 10 × 6-second intermittent sprint test (IST) and a 60-second single maximal test (SMT). Seventeen highly trained male Greco-Roman wrestlers participated in this study. Participants completed the 60-second upper-body Wingate tests, both intermittent and single forms. The contributions of the oxidative, glycolytic, and ATP-PCr pathways were estimated using mathematical methods based on lactate values and oxygen consumption kinetics of rest, exercise, and recovery phases. The main findings indicated that total energy expenditure (TEE) and the contribution of oxidative, glycolytic, and ATP-PCr pathways were 514 kJ, 45%, 11%, and 44% for IST (overall: sprints + rest intervals); 333 kJ, 14%, 17%, and 69% for IST (sprints only); and 159 kJ, 31%, 38%, and 31% for SMT, respectively. TEE and ATP-PCR pathway contributions were higher in the IST (both overall and sprint only), whereas glycolytic pathway contribution and delta lactate were higher in the SMT. Absolute oxidative contribution was similar, but relative oxidative contribution was higher in the SMT. Additionally, mean power was higher in the IST than SMT, whereas peak power, peak and mean heart rate, and ratings of perceived exertion were similar.

Uzer, O., et al. (2022). "The posture of high-level wrestlers affects their functional movement patterns: An observational study." *Science and Sports*.

Objectives: Although there are reports in the recent literature demonstrating the epidemiology of injuries in the wrestler population, no study could be found which has investigated the effect of posture on the functional movement patterns in wrestlers. This study was planned to investigate the effect of posture on the Functional Movement Screen (FMS) scores in wrestlers. Equipment and methods: The study included 68 male (30 greco-roman and 38 freestyle) wrestlers. Spine posture and flexibility were measured via Spinal Mouse (SM). The New York Posture Rating (NYPR) and FMS Test Kits were used to evaluate overall body posture and functional movement patterns, respectively. Results: Significant weak correlations were found between the FMS sub-parameters, SM sub-parameters and NYPR total score ($\rho = -0.265-0.297$; $P < 0.05$). There was a significant weak to moderate relationship between FMS and SM spine-check sub-parameters ($\rho = -0.262-0.372$; $P < 0.05$). A significant weak to moderate correlation was found between NYPR sub-parameters for abdominal, chest, foot, shoulder and head postures and all FMS sub-parameters excluding rotation stability ($\rho = 0.329-0.504$; $P < 0.05$). There was no relationship between FMS, SM and NYPR total scores. Conclusions: Postural deviations in wrestlers especially in the columna vertebralis may disrupt the biomechanical alignment of the upper and lower extremities, causing the joints to fail to perform arthrokinematic and osteokinematic movements at the appropriate angles, increasing the risk of injury to the wrestlers. The results of this study, in which the general body postures of wrestlers were evaluated and monitored, showed that the effects of posture on functional movements patterns help to predict the risk of injury and can play a protective role in wrestlers.

Veraldi, S., et al. (2022). "Tinea corporis gladiatorum." Italian Journal of Dermatology and Venereology **157**(2): 121-125.

Tinea corporis gladiatorum (TCG) is a variety of tinea corporis transmitted by repeated and close skin contacts among athletes, in particular wrestlers and judokas. *Trichophyton tonsurans* is the most frequently isolated dermatophyte. Cases of TCG were reported in USA, Iran, Japan, Turkey and France, where wrestling or judo are popular. No cases of TCG were reported in Italy. The typical clinical presentation of tinea corporis is not always present in TCG: a bacterial folliculitis-like appearance is not rare. Fluconazole is the therapy of choice.

Wankhade, B., et al. (2022). "Paget–Schroetter syndrome: An unfamiliar cause of upper-limb deep venous thrombosis." International Journal of Critical Illness & Injury Science **12**(1): 54-57.

Paget–Schroetter syndrome (PSS), which is also called "effort thrombosis," is a venous variant of thoracic outlet syndrome. We report a rare case of upper-limb deep venous thrombosis (ULDVT) in a young patient who was later diagnosed as PSS. PSS is a rare cause of ULDVT, and it is usually seen in young adults who are involved in strenuous physical activity. PSS is either due to anatomical abnormality of the thoracic outlet or due to repeated microtrauma to the endothelium of the subclavian/axillary vein. Clinically, the patient usually presents with signs and symptoms of ULDVT. Noninvasive Doppler ultrasonography is the initial investigation of choice, but computerized tomography and digital subtraction angiography are the gold standards for diagnosis. Treatment consists of therapeutic anticoagulation, catheter-directed thrombolysis, first rib resection, and postoperative oral anticoagulation. Although the PSS less likely causes pulmonary embolism, it can contribute to postthrombotic syndrome. PSS is a rare and distinct clinical entity, and most emergency care or primary care physicians are unaware of this condition. PSS requires rapid diagnosis, timely thrombolysis, and prompt referral to a vascular and thoracic surgeon.

Wiacek, M., et al. (2022). "Correlations between Anthropometric Measurements and Sports Discipline Aptitude." Applied Sciences (Switzerland) **12**(12).

Background: Sports specialization is required for the advancement of elite-level skills of a competitor. Therefore, this study attempted to assess the applicability of anthropometric measurements for a tailored selection of sports disciplines. Methods: The sports disciplines studied in this report were wrestling, triple jumping, badminton, and tennis. The data used in this study were obtained from a PubMed search. Literature-derived data were used as a template to build a random Gaussian population of $N = 500$ subjects used for ratio calculation using the error propagation approach. The obtained ratios encompassed height/sitting height, height/length, height/arm length, height/waist circumference, height/chest circumference, sitting height/leg length, sitting height/arm length, sitting height/waist circumference, sitting height/chest circumference, arm/leg length, and arm length/forearm length. Results: There is a clear relationship between a sports discipline and the distribution of the anthropometric ratio. The anthropometric measurements of wrestlers are the most outstanding among the disciplines studied. The use of machine learning algorithms, that is, the decision tree classifier, allows for building a model able to distinguish between the disciplines of sports studied. Conclusions: The presented approach allows for selection of a specific sports discipline for a young person. Moreover, an extension of the model built by other sports disciplines and anthropometric measurement may be a practical tool for selecting sports subjects.

Wojcik, M., et al. (2022). "Application of Functional Tests in the Prevention from Musculoskeletal Injuries in Young Classical Style Wrestlers." Journal of Mens Health **18**(5).

Background: Wrestling is a contact sport with a high risk of injury occurrence caused by typical motor system dysfunctions. In wrestling training, a high value is put on the development of power and muscle strength, however, a program aimed at improving motor control is not introduced. Methods: The study involved 25 men wrestlers from School of Sporting Excellence in Radom Poland. To identify musculoskeletal system weak links low threshold Performance Matrix Tests were used. An analysis of weak links occurrence in biokinematics chain was done using ANalysis Of Variance (ANOVA), location and direction of weak links occurrence was identified. Results: The low threshold tests provide the information that tested athletes ($n = 25$) have weak links in musculoskeletal system. Player's training experience has significant influence on their occurrence $Pr (>F) 0.01809$. The values $p_3 = Pr (>F) 0.03215$ and $p_5 = Pr (>F) 0.04042$ reflect significant correlation with occurrence of weak links number in various places in wrestlers' musculoskeletal system. The results $Pr (>F)$ for training frequency, wrestlers age and sports level indicate no significant effect of these characteristics on weak links location in

musculoskeletal system. Conclusions: Obtained results lead to the following conclusions: (1) training loads in wrestling cause weak links occurrence in musculoskeletal system among juniors; (2) wrestlers training in junior category significantly affects weak links occurrence in chain of musculoskeletal system in different locations; (3) wrestlers training frequency does not have a significant impact on weak links location estimated by low threshold tests.

Yıldırım, Y., et al. (2022). "The effects of dynamic and static stretching exercises performed to elite wrestlers after high intensity exercise on heart rate variability." Science and Sports.

Objectives: Determining which recovery method is more effective for the athlete to maximize the level of recovery after the competition as soon as possible is important in terms of preparing the athlete for the next competition. We aimed to examine the effects of dynamic and static stretching exercises performed after work-out on the heart rate variability in elite wrestlers. Equipment and methods: Twelve elite men freestyle wrestlers who continue training in Turkish Olympic Preparation Center (TOPC) in Bursa province (mean age 18.7 ± 1.5 years, weight 78.28 ± 13.0 kg, height 161.17 ± 46.1 cm), have participated in this study voluntarily. The study was completed on 3 different work-out day. Twelve participants were randomly divided into 3 groups. On the first work-out day, the same exercise program was applied to all 3 groups (6 minutes 30 seconds/one wrestling match time), then static stretching was applied to the 1st group, dynamic stretching to the 2nd group and passive resting to the 3rd group. On the second and third work-out days, the groups were moved crosswise. Thus, all participants applied all stretching exercises on 3 different days. During the exercise program and stretching exercises, heart rate variability of all participants was recorded with a Polar v800. Analyzes were performed with SPSS for Windows 23.0 (SPSS Inc, Chicago, USA) statistical program. Comparison of the differences was done by the Two-Way ANOVA test. Bonferroni test was used for pairwise comparisons. Cohen's d value was used to determine the effect size (ES). Statistical significance was accepted as $P < 0.05$. Result and conclusion: Significant differences were found between groups in RR triangular index, VLF, PNS index parameters. As a result of the study, it can be said that, among three different recovery methods after work-out, static stretching application increases VLF and PNS INDEX values and supports recovery in a shorter period.

Yu, X., et al. (2022). "Research on the Protection of Extensor and Flexor Muscles in the Waist and Back of Competitive Athletes." BioMed Research International: 1-8.

In the past, in the study of special sports quality of heavy antagonistic sports events, the study of strength quality training was emphasized. The transformation of athletes' strength quality to special strength was highlighted, and the special exercises which tended to be consistent with the characteristics of wrestling events were added. However, in competition and training, athletes' spine bears a heavy load. Long-term static contraction of lumbar muscles can lead to excessive local load and injury of lumbar muscles. In this paper, the test results of athletes' joints are analyzed, and the waist protection scheme for athletes' strength training is obtained. First of all, solve the problem of athletes' action mode and improve athletes' muscle endurance. All special sports quality evaluation can reach a good level. Then, enhance athletes' explosive power. Thus, all special sports quality evaluations can reach an excellent level. It is concluded that the waist and back are the key parts to support their participation in various sports, maintain body balance, and realize power transmission. Through the study, it is found that there are significant differences in the muscle strength indexes of the maximum strength of the waist and back of athletes of different levels, which fully proves the characteristics of the maximum strength of the waist and back. Through the test, we can understand the flexion and extension strength, range, speed, force, and flexion and extension ratio of athletes' joints and take timely optimization measures according to the test results to avoid sports injuries in training. It has a key guiding significance for the measurement, analysis, and evaluation of athletes' joint muscle strength, as well as rehabilitation training after injury and prevention of reinjury.

Zaborova, V., et al. (2022). "The study of the relevance of macro- and microelements in the hair of young wrestlers depending on the style of wrestling." Front Endocrinol (Lausanne) **13**: 985297.

While participating in an intensive training process, the athlete's body requires not only energy, but also specific macro- and microelements. The purpose of this study was to show the meaning of monitoring the level of mineral trace elements in athletes-wrestlers during physical activity. As an experimental group, 66 male wrestlers aged 18-20 years with at least 3 years of intensive wrestling experience were examined. The control group consisted of 92 young cadets of military school aged 18-20 years, who had previous sports training, but were not engaged in wrestling. To determine the quantitative content of trace elements, the hair was cut from the back of the head for the entire length in an amount of at least 0.1 g. an examined using the mass spectrometer ICP-MS Agilent 7900. Strong positive correlations were found

for sodium with potassium and rubidium, magnesium with calcium, potassium with rubidium, and rubidium with caesium among wrestlers. Wrestlers were found to have higher levels of a number of macro- and microelements, including toxic ones.

Zalewski, A., et al. (2022). "Tinea Gladiatorum: Epidemiology, Clinical Aspects, and Management." Journal of Clinical Medicine **11**(14).

Tinea gladiatorum (TG) is a fungal skin infection that occurs among wrestlers and other contact sport athletes with a varied prevalence rate. The most common causative factor responsible as well for local outbreaks of the infection is an anthropophilic dermatophyte species—*Trichophyton tonsurans* (*T. tonsurans*). The purpose of this study was to gather current data about TG, including epidemiology, possible diagnosing methods, clinical features, treatment approaches, and potential prevention techniques. We also performed a systematic review of studies describing TG incidence. The prevalence of the disease varied from 2.4% up to 100%. That wide range of variability forces medical practitioners to update knowledge about TG and points to the fact that it still may be a diagnostic and therapeutic challenge. Spreading awareness among athletes and trainers is one of the most important preventive steps.