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2024

Annual Compilation of Wrestling Research



Wrestling's Greatest Olympian, Mijain López of Cuba, retires following his fifth consecutive Olympic Gold Medal in Paris

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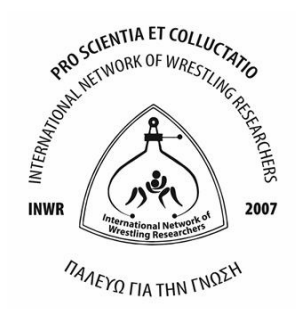
International Network of Wrestling Researchers (INWR)

Complete individual articles are available upon request

The Annual Compilation of Wrestling Research 2024 is a compilation of published wrestling-related research published during 2023 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 90 countries who are involved with the sport of wrestling. (www.inwr-wrestling.com) Our Mission Statement is:

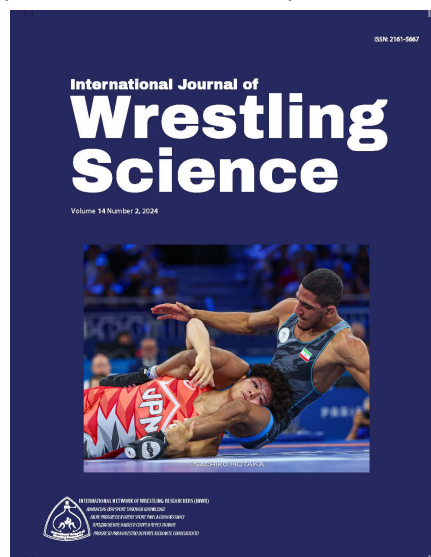
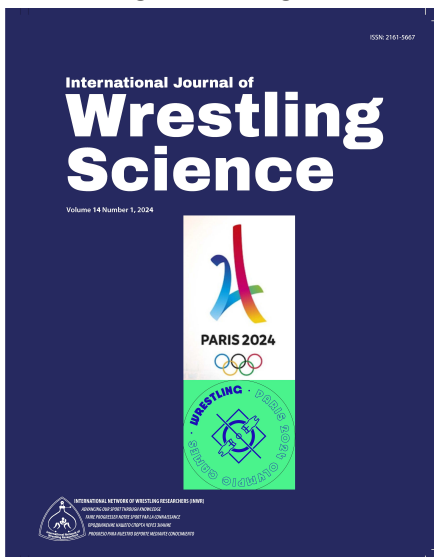
The International Network of Wrestling Researchers (INWR) seeks to facilitate the development of wrestling around the world by drawing all wrestling sport science professionals together, in a manner that through our international and intercultural cooperation we are empowered to support the development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

We have organized scientific meetings at the senior world wrestling championships and we were instrumental in working with United World Wrestling (UWW) in establishing the Scientific Commission. The INWR sponsors the **Rayko Petrov Award** memorializing the great Bulgarian wrestler, coach and prolific scholar. Each year the INWR names the person to be honored and that person delivers the memorial lecture at the INWR Annual Meeting. They are presented with the spectacular bronze trophy by Christo Christov commissioned by the Bulgarian Wrestling Federation.



The **Young Researcher Award** is also presented to a researcher less than thirty years of age.

We publish the **International Journal of Wrestling Science** which is the only journal dedicated to the study of the world's oldest sport. The International Journal of Wrestling Science is a peer reviewed journal for professionals working in wrestling and wrestling sport science. Issues are published twice a year.



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ANNUAL COMPILATION OF WRESTLING-RELATED RESEARCH FOR 2024

Abrahamson, Z., et al. (2024). "Injuries in Male and Female Wrestlers." *JBJS Reviews* 12(8): e24.00062.

With historical exclusion from the sport and lack of research on the subject, there is a paucity of data regarding the injury incidence, treatment, and recovery of female wrestlers as compared with their male counterparts. Data demonstrate that female wrestlers are more likely to experience sprains/strains, whereas male wrestlers experience more concussions and fractures. Variations in behavior and physiology including risk-taking habits and ligament laxity may contribute to differences in injury incidence between male and female wrestlers. Rapid weight loss and eating disorders are important areas of future investigation for male and female wrestlers alike.

Aquino, T., et al. (2024). "Analysis of the effectiveness coefficient in greco-roman fighting athletes at different levels of competition." *Revista Brasileira de Medicina do Esporte* 30. e2022_0222.

Wrestling is an ancient combat sport, individual and of complex performance, which integrates high technical and tactical complexity, associated with a bioenergetic interaction and a high coordinative pattern. In Brazil, the number of competitors at different levels has increased significantly in the last years, evidencing the need to search for answers that can help coaches in the different situations of the competitive calendar. The prescription of the means and methods of training in Greco-Roman wrestling aims at the development of the technical effectiveness. However, there is no evidence of indicators of technical effectiveness, in Brazilian elite athletes of Greco-Roman wrestling, in national and international competitions. Objectives The objective of the study was to verify and to compare the technical effectiveness of the wrestlers of Greco-Roman fight of the Brazilian selection, in two competitions: one in the national level and the other international. Methods Seven athletes of the Brazilian wrestling team participated of the investigation (age: 25 ± 5 years; stature: 175 ± 12 cm; corporal mass: 80 ± 21 kg). Analysis of the effective, not effective and total technique were accomplished. After identifying the normality of the data (SHAPIRO WILKS), the Student's t test was used to compare the variables, according to the moment evaluated, considering the significance level of 5%. Results The results showed a significant decrease ($p = 0.03$) in the standing effective technique and in the total effective technique ($p = 0.01$), comparing the national competition with the international competition. Conclusion Technical effectiveness of Brazilian wrestlers was found to be below the indices presented in studies with competitors from countries considered to have high world performance. In international competition, it presents a negative impact compared to national events.

Keywords: Athletes; Energy Metabolism; Athletic Performance; Wrestling

Bagot, S., et al. (2024). "The habitual degree of weight loss might be associated with specific fat and protein intakes during a period of weight maintenance in athletes used to weight variations: preliminary results from the WAVE study." *Nutrition Research* 129: 14-27.

Weight variations are common in sporting life, with important inter-individual variability in the degree of an athlete's habitual weight loss. As a part of the WAVE study (NCT04107545), the main objective of this preliminary study was to determine whether the habitual degree of weight loss was associated with anthropometric, body composition, nutritional or psychometric profiles during a period of weight maintenance in athletes accustomed to weight variations. We hypothesized that athletes accustomed to a higher habitual degree of weight loss may have a higher body weight and body fat mass, and may present a more controlled diet regimen and cognitive restriction than athletes with a lower habitual degree of weight loss. During a period of weight maintenance, 62 athletes (24.0 ± 5.3 years; 26 women) completed anthropometry and body composition measurements, a 48-hours food diary and self-reported questionnaires to determine their weight variation practice, nutritional profile and mood state. Athletes were stratified within inter- and intra-quartile groups according to their habitual degree of weight loss. Athletes with a higher habitual degree of weight loss were those who consumed more protein ($P < .001$) and less fat ($P = .01$) as

a proportion of total energy compared with those losing less weight, without any difference in body composition between the groups. The rapid weight loss score was significantly higher in individuals losing more weight ($P < .001$) and no difference was observed for the mood state profile. The present results suggest a potential control of nutritional regulation during a period of weight maintenance in order to spare fat-free mass and favor fat mass loss in athletes who are routinely losing more weight. Fat-free mass may be the main nutritional driver due to low body fat mass in athletes, which may limit the "catch-up fat" phenomenon commonly observed in nonathletic population.

Bai, Y., et al. (2024). "The reliability of specific physical fitness assessments in elite female Chinese wrestlers." Journal of Human Kinetics 94: 191-202.

The aim of this study was to evaluate the reliability of eight specific fitness tests for elite female Chinese wrestlers. Twenty-eight elite female wrestlers participated in the study (age: 26.9 ± 2.81 years). The reliability of the tests was analyzed using the intraclass correlation coefficient (ICC) and the 95% confidence interval (CI), the coefficient of variation (CV), and other metrics. The 30-s Sit-Up (SU30) and 6-m Rope Climb (RC6m) tests showed excellent reliability (ICC > 0.9). The 30-s Dummy Throw (DT30) had good to excellent reliability, while the 30-s Bridge-Return (B-R30) showed moderate to good reliability. The 30-s Burpee (BUR30), 15-s Leg Attack (LA15), 15-s Leg Defense (LD15), and Dummy Suplex and Gut Wrench (DS&GW) tests ranged from poor to good reliability. SU30, DT30, LA15, and RC6m tests displayed low variability (CV < 5%), while others exhibited moderate variability. SU30, B-R30, DT30, and RC6m tests are reliable for assessing wrestling fitness. However, BUR30 and LA15 tests showed high variability and should be used carefully. LD15 and DS&GW tests are not recommended for assessing fitness in elite female wrestlers.

Barbas, I. (2024). "COMMENTARY: PROPOSAL FOR THE FORMATION OF CATEGORIES IN WOMEN'S WRESTLING ACCORDING TO STATISTICS AND ANTHROPOLOGICAL CHARACTERISTICS BY CONTINENT." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(2): 48-49.

Recommended 10 weight categories for women from 50 to 80 kg. These categories will be formed based on physical variations by continents, taking into account the need for balance between lighter and heavier athletes. Each category tries to meet different needs depending on participation and body type.

50, 53, 57, 60, 63, 67, 70, 73, 76, 80

These categories cover the weight range from 50 to 80 kg, with a balance between lighter and heavier athletes. Classes cater to the needs of different body types, taking into account geographic diversity and the growing participation of women in wrestling internationally.

Bat-Erdene, S. and G. Lkhagvasuren (2024). "Relationship of morphofunctional indicators with indicators of general physical training of Mongolian wrestlers according to the results of multiple regression analysis." Theory and Practice of Physical Culture (8): 50-52.

Objective of the study was to identify the relationship between morphofunctional indicators and indicators of general physical fitness of Mongolian athletes. Methods and structure of the study. The work analyzes the most important characteristics and indicators of the body condition (anthropometric data, body composition data, functional parameters) of highly qualified athletes, providing significant connections with physical fitness tests. To achieve this goal, 181 highly qualified athletes, mainly involved in martial arts, were examined. Results and conclusions. Based on the results of multiple regression analysis, morphofunctional models of the motor qualities of Mongolian highly qualified athletes were built, which are based on morphological characteristics, body composition indicators obtained using the bioimpedansometry method, and functional characteristics that can be used in sports selection, at the initial stage of preparation and at the stage of individualization sportsmanship in a long-term training process.

Berejna, A. and L. Korobeynikova (2024). Peculiarities of the manifestation of the psycho-emotional state of elite wrestlers, taking into account sexual dimorphism. [Ukrainian] Єдиноборства [Martial arts]: 1(31) 16-25.

Purpose: the manifestation of psycho-emotional state in elite wrestlers with taking into account of sexually dimorphism. Material and methods. 24 elite females athletes and 33 elite males athletes specializing in freestyle wrestling were examined. All athletes were members of the Ukrainian National Team. Mental states were studied using the Luscher test. Stress resistance was studied using the «Stress test» method. All tests used, including the hardware-software complex «Multipsychometr-05». Results: based on the analysis of scientific and methodological literature, it was determined that modern sports wrestling is characterized by a high level of physical and psycho-emotional stress of the athlete in the conditions of competitive activity, and the study of the psycho-emotional state is an important issue for building a training system. The presence of sexual dimorphism with the manifestation of a psycho-emotional state in elite wrestlers has been established. It has been found that due to mental anxiety, male wrestlers have higher values of mental fatigue and internal discomfort compared to female wrestlers. This fact indicates a connection between anxiety as a pre-stress condition that causes fatigue and mental discomfort. At the same time, a higher level of stress resistance was found in men compared to women. The results indicate that a higher level of stress resistance in men is due to a slower impulsivity. In women, a decrease in stress resistance is compensated by an increase in impulsivity. The presence of lower absolute values of the vegetative coefficient in women compared to men was revealed, which indicates a reduced level of tension of vegetative regulation, and, above all, activation of the sympathetic link of the autonomic nervous system. Conclusions. The presence of sexual dimorphism in the manifestation of the psychoemotional state among highly skilled wrestlers has been established. It was found that the presence of mental fatigue and anxiety in male wrestlers leads to emotional discomfort. A higher level of stress resistance was found in male wrestlers compared to female wrestlers. Stress resistance is formed in women by adaptive behavior, tension of the autonomic nervous system regulation and the balance of emotions. In men, stress resistance is ensured by mental focus.

Keywords: wrestling, highly skilled, sexual dimorphism, psycho-emotional state, stress resistance.

Bujak, Z. and D. Gierczuk (2024). "Changes in Response Time in Elite Taekwon-Do Athletes and Wrestlers Resulting from LED Lighting Training." Polish Journal of Sport and Tourism 31: 17-23.

Introduction. Fighting effectiveness of combat sports athletes depends, among other factors, on response time. Athletes must react swiftly to various actions of their opponents during the combat. Understanding the determinants of response time can provide valuable insights and optimize the sports training process. The aim of this study was to determine the influence of Led Lighting Training (LLT) on response time of athletes representing extremely different combat sports. Material and Methods. Elite taekwon-do athletes aged 26.67 ± 7.79 years with training experience of 13.67 ± 6.75 years, and elite wrestlers aged 26.0 ± 3.74 years with training experience of 13.0 ± 3.74 years, participated in the study. Each participant performed a 6-minute physical exertion requiring concentration and proper decision-making as part of LLT. It consisted of three two-minute motor tasks performed on Batak Lite. Response time was recorded during the exercise, with one-minute breaks between motor tasks. Results. Among taekwon-do athletes, the lowest level of response was noted during the first LLT task, whereas the highest was observed in the third task. Response time significantly improved with time of exertion among taekwon-do athletes, while it remained similar among wrestlers after 2, 4, and 6 minutes of the test. Only in the first round did taekwon-do athletes and wrestlers significantly differ in response time ($p = 0.0025$). Response time and training experience did not reveal a significant correlation. Conclusions. The specificity of training, which is determined by the specificity of combat, does not differentiate elite taekwon-do athletes and wrestlers based on their response abilities. Taekwon-do athletes should control the type and duration of warm-up exercises before combat.

Can, S., et al. (2024). "The surveillance and assessment of acute injuries in different age categories in national wrestling championships." Chin J Traumatol.

PURPOSE: The purpose of this study is to surveil the injuries in wrestling according to the different age categories and wrestling styles throughout the competition season. **METHODS:** The study was designed as a descriptive study. The study was conducted during the wrestling competition season in 2023 (from January 2023 to July 2023), which includes 5 different age categories: U-15, U-17, U-20, U-23, and seniors, along with the Turkey National Wrestling Championships. The data of injuries was recorded immediately after the acute injury was treated by the medical expert during the competitions and evaluated according to the parameters that were obtained. In the statistical analysis, the frequency and percentage values were presented as descriptive statistics and the Chi-square test was used. **RESULTS:** The study incorporated a total of 6214 wrestlers and a total of 7151 wrestling bouts were performed during these competitions. The analyses indicated that the rate of injury incidence was 42.65‰ in all wrestling styles. When taking account of the injured body parts in all wrestlers' exposures, the occurrence of injuries to the head-face, neck, trunk, upper extremity, and lower extremity, rates of 17.6‰, 1.3‰, 3.6‰, 13.5‰, and 6.6‰, respectively, were observed. According to the pre-diagnosis based on freestyle, Greco-Roman, and female wrestling styles, injuries with bleeding (39.6%, 46.3%, and 14.6%, respectively) and muscle strain (37.9%, 28.7 %, and 52.6%, respectively) most often occurred. **CONCLUSION:** The study findings indicate that most cases of injury appeared to occur in bleeding and muscle strain in all wrestling styles. We suggest that medical experts should set up their health equipment with consideration to the injuries that occur most frequently.

Chernozub, A., et al. (2024). "Mechanism for assessing the adaptive reserves of elite wrestlers under anaerobic energy supply conditions." Journal of Physical Education and Sport 24(9): 1072-1079.

Background and study aim: Development an effective system for evaluating and enhancing the adaptive reserves of elite wrestlers is a critical issue in professional sports. The challenge of optimizing the functional training of athletes with high resistance to physical loads is particularly pressing. The purpose of this study is to create a mechanism for assessing the adaptive body reserves of elite wrestlers under anaerobic energy supply conditions. **Material and Methods:** The study involved 60 elite Greco Roman wrestlers, aged 19 ± 0.5 years. Two test tasks were designed: executing a suplex while alternating between three partners for 15 s (targeting the creatine phosphokinase energy system) and 40 s (targeting anaerobic glycolysis). The control occurred in a state of rest before and after the specified loads. The peculiarities of adaptive and compensatory reactions of sportsmen to physical stress were researched with the help of biochemical analysis (cortisol, CPK, LDH in the blood serum) and HRV. **Results.** Based on the initial results of the spectral analysis, athletes were divided into two groups: sympathotonics ($LF/HF > 1.5$) and parasympathotonics ($LF/HF < 1.5$). Sympathotonics had a vagal influence on the sinus node increase after 15 seconds of exercise. At the same time, the steroid hormone, the CPK, and LDH activity in the blood increased. In parasympathotonics, the vegetative balance shifted towards sympathetic regulation due to similar loads. The level of CPK and cortisol in the blood increased, but LDH parameters did not change. Depending on the shifts in the vegetative balance in response to the load within 40 seconds, the participants of each group were divided into subgroups. Athletes with both types of regulation showed a decrease in LF/HF indicators, cortisol in the blood, and an increase in LDH in response to this stimulus. An increase in LF/HF, cortisol concentration, CPK activity, and minimal changes in the level of LDH in the blood was observed in other subgroup participants after similar loads. **Conclusions.** The study results demonstrate the practicality of simultaneously using biochemical indicators of blood and HRV as informative markers for assessing the adaptation reserves of elite wrestlers. The observed changes in cortisol, LDH, CPK in the blood, and HRV indicators of athletes with different vegetative balances will change the concept of optimizing functional training.

Coapstick, G.-J., et al. (2024). "Nutrition, body composition, and performance: a case study of two collegiate wrestlers: case study." Journal of Exercise and Nutrition 7(1): 14.

Introduction: This case-study examined changes in nutrient intake, body composition, and performance of two Division I wrestlers before and after competition season. Methods: Two male wrestlers were assessed during pre-season (PRE) and after the national championship tournament (POST). Body composition was determined via 7-site skinfolds to estimate body fat percent (BF%) and fat-free mass (FFM). Nutrient intake was analyzed from 3-day food recalls. A Biodex dynamometer assessed isometric strength. A stationary cycle ergometer was used to assess anaerobic time to exhaustion (TTE). Results: Both wrestlers' body mass and BF% increased at POST, while Participant 2's FFM decreased 0.9kg. Participant 2 met 44% and 67% of energy recommendations PRE and POST, respectively. Carbohydrate intake was approximately at 33% and 57% recommendations PRE and POST, while protein intake was at 75% of estimated needs. Participant 1 maintained performance from PRE to POST, while Participant 2 experienced a -15.0 and -5.0 Nm·kg⁻¹ decrease in extension and flexion strength, respectively. Conclusions: For these two athletes, under consuming energy and macronutrients seems to have a negative effect on muscle mass and strength performance, with less impact on anaerobic performance. These findings may provide insight for monitoring nutrition throughout the wrestling season to prevent decreases in strength and FFM.

Curby, D., et al. (2024). "A Comparison of Some Important Biochemical Indicators According to Escalating Physical Effort till Fatigue for Elite Freestyle Wrestlers, 800m Runners, and 200m Freestyle Swimmers." Journal of Physical Education [Baghdad] 36(1): 171-190.

It is the nature of the game and the activity that determines the characteristic of the manifestation of fatigue according to what is required by the neuromuscular work in it, as well as the changes that occur in the functional variables and the time of the differential threshold. The location of each activity and the game of these teams have been studied in a special table for energy production systems as a result of continuous changes in their laws, and are considered within the energy systems such as the anaerobic system (Phosphagine) and lactic acid for (800) m runners -freestyle swimmers (200) m in the physical effort till fatigue. The comparison in the important functional indicators for them, and the research methodology embodied in the way of working through the method used, which is the descriptive method in comparison then, the researchers identified the research community for the young national team athletes for freestyle wrestling, and the national team(800)m runners, as well as of the national team in (200) m swimming for the sports season (2022-2023), A total of 21 athletes were selected in an organized manner and distributed into three equal groups (7 athletes) for each of the three types of sports (wrestler, 200-meter swimming and 800-meter running), and the researchers would conduct tests for the research variables biochemical for the sample members, as well as some variables that have an impact on the results of the study such as (height, age, weight, and the age of training), and the homogenization of the research sample members was carried out. The results of statistical treatments were presented, analyzed, and discussed, supported by sources. The most important conclusions were that most of the activities and the variation of values are very essential biochemical indicators. The differences were significant and the positive variation in accordance to the type of sport or activity, and the last variation between the activities in terms of comparison in these variables is due to the nature and specificity in terms of the intensity of the resistances and direct and indirect friction For competitors and the expenditure of energy stored in muscles. Finally, the researchers recommended knowing the most important biochemical indicators in these events and sports as they reflect a clear picture of the individuals' internal preparations and functional responses.

Curby, D., et al. (2024). "Performance of wrestlers at the Olympic Games: gender aspect." Pedagogy of Physical Culture and Sports 27(6): 487-493.

Background and Study Aim: With the increasing popularity of freestyle wrestling, the scientific community is paying more attention to gender factors that may influence the performance and success of competitive activities.

The aim of the study was to determine differences in performance indicators between male and female wrestlers in the Olympic Games 2021. **Material and Methods.** The study included 192 athletes, consisting of 96 male wrestlers and 96 female wrestlers. An analysis of match records and video footage was conducted for women's (n=113) and freestyle (n=114) wrestling at the 2021 Tokyo Olympic Games. The assessment of performance indicators utilized an expert evaluation method. Statistical analysis of the obtained data was carried out using licensed Excel spreadsheet software. For categorical data, results were expressed in absolute numbers and percentages. **Results;** Based on the analysis of competitive activities at the 2021 Olympic Games, 12 primary technical-tactical actions were identified. The most frequently employed actions were in the standing position: leg attacks, with male wrestlers performing it 35.8% of the time and female wrestlers 30.3%; in the ground position, male wrestlers employed gut wrench (7.6%), while female wrestlers used ankle lace (9.4%). It was found that male wrestlers and female wrestlers accumulated approximately the same number of points for their actions: male wrestlers (926 points) and female wrestlers (912 points). The effectiveness in the standing position was higher for male wrestlers (720 points) than for female wrestlers (621 points). In the ground positions, female wrestlers demonstrated better effectiveness (291 points) than male wrestlers (206 points). The number of points deducted for rule violations was significantly lower for female wrestlers (8 times) compared to male wrestlers (27 times). Time stoppages during challenge reviews were fewer for female wrestlers (7 times) compared to male wrestlers (18 times). **Conclusions:** The conducted research indicates differences in the performance indicators of freestyle wrestling between men and women. Male wrestlers employ more actions in the standing position (81.7%) than female wrestlers (70.7%). Correspondingly, female wrestlers execute more actions in the ground positions (29.3%) compared to male wrestlers (18.3%). The total number of actions performed is higher for male wrestlers (579) than for female wrestlers (518). Female wrestlers achieve more premature victories (32.7% of all matches) compared to male wrestlers (24.6%). The obtained results will assist coaches in better adapting to gender differences and developing specific training programs for athletes.

Curby, D. G. (2024). "CONSIDERATIONS IN THE ESTABLISHMENT OF WEIGHT CLASSES FOR WRESTLING AND OTHER OLYMPIC COMBAT SPORTS, AND MEASURES TAKEN TO SAFEGUARD THE HEALTH OF THESE ATHLETES IN MAKING WEIGHT." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE **14**(2): 2-18.

Weight classes are used in several Olympic sports. These include the combat sports of wrestling, boxing, judo, taekwondo, and also weight lifting. They are ostensibly used to provide for fair competition, fair opportunity for athletes of various sizes to become champions, and provide safety for the participants. The weight classes currently used in competition for men and women for Olympic combat sports are listed, as well as the evolution of classes through history. One can see that the range of classes for men extends from 51 kg to unlimited, and women from 48 kg to unlimited. There are also differences in the classes used between a sports world championships and the Olympic Games. Weigh in procedures, and rationale are compared for these combat sports.

Doherty, C. S., et al. (2024). "Blood, Sweat, and Tears: Implications for Hydration Testing in Combat Sports- Investigating Body Mass Loss and Biomarker Changes." Scand J Med Sci Sports **34**(8): e14701.

Combat sports athletes often undergo rapid body mass loss (BML), which presents health risks. Hydration testing has been proposed as a possible solution to reduce or eliminate rapid BML. However, combat sports athletes may exhibit distinct physiological characteristics due to repeated exposure to BML. Thus, traditional and emerging hydration biomarkers should be investigated to determine their potential suitability for field use in this cohort. This study examined whether BML can explain changes in serum and urine osmolality (S_{osm}Δ, U_{osm}Δ), tear osmolality (T_{osm}Δ), hematocrit (HctΔ), and urine-specific gravity (USGΔ) after mild-moderate passive dehydration. Biomarker reliability was also assessed across two trials. Fifteen male and female combat sports athletes (age: 26.3 ± 5.3 years, body mass: 67.7 ± 9.9 kg) underwent a sauna protocol twice (5-28 days apart) aiming for 4% BML. The average BML in Trials 1 and 2 was 3.0 ± 0.7%. Regression analysis revealed that BML explained HctΔ (R(2) = 0.22, p = 0.009) but not S_{osm}Δ (R(2) = 0.11, p = 0.079) or other biomarkers. Intraclass correlation

coefficients (ICCs) were significant for all biomarkers except Tosm Δ (ICC = 0.06, $p = 0.37$) and post-Tosm (ICC = 0.04, $p = 0.42$); post-Hct performed best (ICC = 0.82, $p < 0.001$). Contingency tables with post-Sosm (295 mOsm/kg) and post-USG (1.020) cutoffs revealed an 80% true negative rate (TNR) and a 62% true positive rate (TPR). Increasing the Sosm cutoff to 301 mOsm/kg decreased the TNR to 52% but increased the TPR to 83%. Although blood parameters were most sensitive to BML, they could only explain 11%-22% of biomarker variation. The typical USG cutoff misclassified 42% of athletes postdehydration, and reliability was generally poor-moderate. Alternative strategies should be pursued to manage rapid BML in combat sports.

Dokmanac, M. (2024). "ANALYSIS OF THE OLYMPIC GAMES – PARIS 2024 GR-FS-WW." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE **14**(2): 29-39.

A performance data analysis of the results of the 2024 Olympic Wrestling results is presented. This year's wrestling tournament at the Paris 2024 Olympic Games produced many unexpected results. Two stand out in particular:

1. The Japanese team won a total of 11 medals in all three styles, of which 8 were gold,
2. The national teams of Asia were dominant in all three styles and won a total of 36 medals or 50% of the 72 medals awarded at the wrestling tournament.

The principle of universality was represented at these Olympic Games, as athletes from all 5 continents were represented. 60 national teams + athletes under the banner of AIN and EOR took part. A total of 291 athletes took part in the Olympic tournament: GR - 97 male wrestlers, FS - 98 male wrestlers, WW - 96 female wrestlers. In total, 26 national teams won medals at these Olympic Games (GR – 13, FS – 13, WW – 12). A total of 49 national teams won team points (GR - 30, FS - 31, WW - 27). According to the number of medals won, the most successful nations by style were: GR - Iran (4 medals), FS -Iran (4 medals), WW - Japan (6 medals). Overall, in all three styles, the most medals were won by Japan (11), Iran (8) and the USA (7).

Dokmanac, M. (2024). "COMMENTARY: PROPOSAL FOR CHANGES IN COMPETITION SYSTEM AND WRESTLING RULES FOR 2025." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE **14**(2): 45-47.

Suggestions for changes to some aspects of the rules of competition are given. These include changes in Greco-Roman style, weigh-in procedures and weight classes.

Dugan, J. E., et al. (2024). Sport-related concussions in wrestling: does mechanism of injury affect recovery? The Journal of Sports Medicine and Physical Fitness **64**(9): 942-949.

BACKGROUND: Sport-related concussions (SRC) represent a significant concern for athletes. While popular contact sports such as football and soccer have been the focus of much SRC research, wrestling has received comparatively little attention. The current study aimed to: 1) describe the mechanisms of injury leading to SRC in wrestling; and 2) compare recovery outcomes based on mechanism of injury. METHODS: A retrospective, cohort study of wrestlers aged 12-18 who sustained a concussion between 11/2017-04/2022 was performed. Contact mechanism was defined as what initiated contact with the athlete's head/body. Player mechanism was defined as the activity the injured athlete was performing when the concussion occurred. Recovery outcomes were compared using Mann-Whitney-U Tests and multivariable regression analysis. RESULTS: Seventy-three (age=15.8 \pm 1.4 years; boys=73 [100.0%]) wrestlers were included. SRCs occurred more often in competition than in practice (66.2% vs. 33.8%, respectively). Head-to-ground/wall (56.2%) and takedown (58.9%) were the most common contact and player mechanisms, respectively. Bivariate analysis showed that head-to-head/body SRCs had longer time to symptom resolution compared to head-to-ground/wall SRCs (23.0 [14.8-46.5] vs. 14.0 [6.0-30.0] days; $U = 149.00$, $P = 0.029$), though the difference did not persist in multivariable analysis. For player mechanism, non-takedowns SRCs had longer time to symptom resolution than takedown SRCs (15.0 [6.0-24.0] vs. 28.5 [13.0-

49.3]; $U=166.5$, $P=0.019$), but the difference also did not persist in multivariable analysis. Bivariate analysis revealed no significant difference in RTL between takedown and non-takedown SRCs (3.0 [2.0-6.0] vs. 4.0 [1.5-7.0]; $U=484.50$, $P=0.708$); however, in multivariable analysis, takedown SRCs were associated with longer RTL ($\beta=0.23$, 95% CI: 0.02, 0.47; $P=0.049$). CONCLUSIONS: The current study found that SRCs occurred more commonly during competitions, and head-to-ground/wall and takedown were the most common contact and player mechanism, respectively. SRCs that occurred during takedowns were associated with longer RTL.

Emmonds, S., et al. (2024). "Youth Sport Participation Trends Across Europe: Implications for Policy and Practice." *Res Q Exerc Sport* **95**(1): 69-80.

Purpose: Despite the known health and wellbeing benefits of taking part in sport for children and adolescents, it is reported that sports participation declines during adolescence. The purpose of this study was to explore current organized youth sport participation rates across Europe for both males and females and update current understanding. Method: Sport participation registration data was collected for 18 sports from 27 countries. In total, participation data was collected from over 5 million young people from Under 8s (U8s) to Under 18s (U18s). Differences in the participation rates between age categories were investigated using a generalized linear mixed effects model. Results: Overall, males were four times more likely to participate in organised youth sport than females' participants, with this trend apparent across all age categories and across most sports. There was a significant decrease across sports in participation rates for males during adolescence from U14-U16 and U16-U18. There was a significant decrease in participation rates for females from U14-U16 for most sports except but an increase in participation rates from U16-U18 for 12 out of 18 sports. Soccer (1262%), wrestling (391%) and boxing (209%) were the sports that had greater male sport participation rates. In contrast, dance sports (86%) and volleyball (63%) had more female participants than males. This research shows male sports participation is significantly greater than female in youth sport across Europe. Conclusion: Furthermore, findings showed that for both male and female participants, participation rates increased from U8-U14 for the majority of sports followed by reduced participation rates during adolescence. Findings of this research can be used by national governing bodies and sporting organizations to inform youth sport participation initiatives.

Flores, M. R., et al. (2024). "Eating behavior disorders and disordered eating habits in Spanish high-performance women's Olympic wrestling athletes." *Nutrients* **16**(5): 709.

Eating disorders (EDs) are a significant health issue in combat sports. This study investigated the differences between the different types of female wrestlers and the frequency at which EDs occur in the elite population, and it also sought to establish which factors are predictors of EDs. This study was comprised of 22 elite, female wrestlers who were selected based on the following inclusion criteria: having previously been the Spanish champion, being part of the Spanish national team, participating in at least one international championship, and having a history of ED. Data collection involved five questionnaires: demographic data, the Eating Attitudes Test-26 (EAT-26), the Bulimic Investigatory Test, the Edinburgh (BITE), the Eating Disorders Inventory (EDI-3), and the Depression, Anxiety, and Stress Scale (DASS-21). The results revealed diverse levels of depression, anxiety, and stress, with BITE scores indicating abnormal eating patterns. Group comparisons exposed significant distinctions in eating behaviors based on competition and training experience. Regression analyses showed competition and training experience as predictors of bulimia severity and symptoms. The study revealed prevalent extreme weight-control practices, including fasting, diuretic and laxative use, and binge eating. This research emphasizes the importance of EDs in Olympic wrestling, urging a comprehensive approach involving education, support, and policy implementation by coaches, health professionals, and sports organizations to prioritize athletes' well-being and discourage unhealthy weight-control practices.

Fu, P., et al. (2024). "Differences in gut microbiota and metabolites between wrestlers with varying precompetition weight control effect." *Physiol Genomics* **56**(12): 845-854.

This study intended to analyze the effects of body weight control by the diet, training adaptation, and gut microbiota metabolites of wrestlers in the week leading up to competition. According to the weight difference of wrestlers from the target weight 1 wk before the competition, those whose weight control effectiveness is less than 2 kg were classified as the CW group, whereas more than 2 kg were classified as the CnW group. The body weight, body composition, and diet of wrestlers were recorded; urine samples were taken for standard urine testing, and stool samples were collected for the analysis of gut microbiota and metabolites. The data showed that the relative values of carbohydrate and fat energy in the CnW group were significantly higher than those of the CW group, but the relative values of protein energy were significantly lower. The white blood cells, occult blood, and protein appeared in urine in the CnW group. The microbiota with higher abundance values in the CnW group were positively correlated with the relative value of carbohydrate energy, while the abundance value of *Streptococcus* was negatively correlated, and the functional prediction of differential bacteria was related to riboflavin and selenocompound metabolism. The differential metabolites of CW/CnW group were functionally enriched in the processes of lipid and amino acid metabolism. Overall, the extent of weight control in wrestlers was correlated with sensible dietary patterns, adaptability to training load, and distinct gut microbiota and metabolites. **NEW & NOTEWORTHY** The purpose of this study is to observe the differences in precompetition diet structure, adaptability to training, gut microbiota, and metabolites of wrestlers with different weight control effects and analyze the correlation between them, aiming to provide scientific guidance and advice on weight control for wrestlers.

Fu, P., et al. (2024). "Connection of pre-competition anxiety with gut microbiota and metabolites in wrestlers with varying sports performances based on brain-gut axis theory." *BMC Microbiol* **24**(1): 147.

OBJECTIVE: The purpose of this study is to investigate the connection of pre-competition anxiety with gut microbiota and metabolites in wrestlers with different sports performances. **METHODS:** One week prior to a national competition, 12 wrestlers completed anxiety questionnaires. Faecal and urine samples were collected for the analysis of gut microbiota and metabolites through the high-throughput sequencing of the 16 S rRNA gene in conjunction with untargeted metabolomics technology. The subjects were divided into two groups, namely, achievement (CP) and no-achievement (CnP) wrestlers, on the basis of whether or not their performances placed them in the top 16 at the competition. The relationship amongst the variations in gut microbiota, metabolites, and anxiety indicators was analyzed. **RESULTS:** (1) The CP group exhibited significantly higher levels of "state self-confidence," "self-confidence," and "somatic state anxiety" than the CnP group. Conversely, the CP group displayed lower levels of "individual failure anxiety" and "sports competition anxiety" than the CnP group. (2) The gut microbiota in the CP group was more diverse and abundant than that in the CnP group. Pre-competition anxiety was linked to Oscillospiraceae UCG_005, Paraprevotella, Ruminococcaceae and TM7x. (3) The functions of differential metabolites in faeces and urine of the CP/CnP group were mainly enriched in caffeine metabolism, lipopolysaccharide biosynthesis and VEGF and mTOR signaling pathways. Common differential metabolites in feces and urine were significantly associated with multiple anxiety indicators. **CONCLUSIONS:** Wrestlers with different sports performance have different pre-competition anxiety states, gut microbiota distribution and abundance and differential metabolites in faeces and urine. A certain correlation exists between these psychological and physiological indicators.

Gierczuk, D., et al. (2024). "Response Time of Elite Female Wrestlers." *Polish Journal of Sport and Tourism*. 31(2), 11-16

Introduction. Response time is a crucial factor influencing performance effectiveness in wrestling. A short time of response enables athletes to engage in more effective technical and tactical actions. Despite numerous scientific studies on psychomotor abilities in combat sports, there is a lack of scientific reports on women's wrestling,

especially at the highest level of performance. The aim of this study was to determine the response time of female wrestlers with different levels of sports advancement and weight classes. **Material and Methods.** Female wrestlers aged 19.08 ± 0.86 years with a training experience of 7.03 ± 1.33 years participated in the study, along with women not involved in sports training, aged 19.23 ± 0.70 years. Due to body weight, athletes were divided into two groups: lightweight and heavyweight, and based on sports achievements into medalists and non-medalist participants in the Polish Championships. Response time (including reaction time and movement time) was assessed. **Results.** The research results revealed differences in response time between wrestlers and untrained women. Wrestlers exhibited shorter response times in both reaction time and movement time. No significant differences in response time were noted between wrestlers based on weight class and sports result. **Conclusions.** Specialized wrestling training improves the response time of women, both in sensory and motor aspects. Body weight and sports results do not differentiate athletes based on response time. Further research should focus on determining different types of response time, including choice reaction, and their changes under the influence of training and competitive loads in wrestlers with varying levels of sports expertise. Additionally, effective training methods for improving reaction time should be explored.

Key words: women's wrestling, reaction time, movement time, performance

Guilheiro, L. and E. Franchini (2024). "Forecasting judo medal winners at the Olympic Games: an interaction of the International Judo Federation World Ranking List and the Elo System." Revista de Artes Marciales Asiáticas 19: 171-181.

The aim of this study was to verify which ranking list predicts Olympic results better: one created by Elo system, one using the International Judo Federation (IJF) World Ranking List (WRL), or another using the combination of both. The data utilized comprised the outcomes of 93,728 matches, encompassing 42,844 matches from the 2016 Rio Olympic Games cycle and 50,884 matches from the 2020 Tokyo Olympic Games cycle. These matches were held across 311 events, all of which contribute points to the IJF WRL. The data was sourced from <https://judobase.ijf.org>. A total of 8,142 male and 4,736 female judo athletes from all weight categories were analyzed. We employed two variables as proxies for athletes' performance throughout the Olympic cycle: the positions in the IJF WRL and the ratings from the Elo System. A binary-response model was utilized. In this model, "success" denoted an athlete receiving a medal, while "failure" indicated otherwise. A combination of the WRL and Elo system better predicted Olympic performance of judo athletes. Additionally, for each rank position an athlete improved in the IJF WRL, there was an increased probability to win an Olympic medal of approximately 7.50%, while for each 10 Elo rating score improvement, the athlete increased the probability to win an Olympic medal in approximately 9.26%. When both systems were used together, the accuracy of the model was approximately 91%, with a sensitivity of nearly 68-69%, and a specificity close to 95%, for Rio de Janeiro and Tokyo editions isolated or grouped. Such information can serve as a valuable tool for national federations staff in selecting the most suitable athletes to participate in the Olympic judo competition, if both the WRL and an Elo rating system are used together.

Guilherme, J., et al. (2024). "Identification of Genomic Predictors of Muscle Fiber Size." Cells 13(1212).

The greater muscle fiber cross-sectional area (CSA) is associated with greater skeletal muscle mass and strength, whereas muscle fiber atrophy is considered a major feature of sarcopenia. Muscle fiber size is a polygenic trait influenced by both environmental and genetic factors. However, the genetic variants underlying inter-individual differences in muscle fiber size remain largely unknown. The aim of our study was to determine whether 1535 genetic variants previously identified in a genome-wide association study of appendicular lean mass are associated with the CSA of fast-twitch muscle fibers (which better predict muscle strength) in the m. vastus lateralis of 148 physically active individuals (19 power-trained and 28 endurance-trained females, age 28.0 ± 1.1 ; 28 power-trained and 73 endurance-trained males, age 31.1 ± 0.8). Fifty-seven single-nucleotide polymorphisms (SNPs) were identified as having an association with muscle fiber size ($p < 0.05$). Of these 57 SNPs, 31 variants were also associated with handgrip strength in the UK Biobank cohort ($n = 359,729$). Furthermore, using East Asian and East

European athletic (n = 731) and non-athletic (n = 515) cohorts, we identified 16 SNPs associated with athlete statuses (sprinter, wrestler, strength, and speed-strength athlete) and weightlifting performance. All SNPs had the same direction of association, i.e., the lean mass-increasing allele was positively associated with the CSA of muscle fibers, handgrip strength, weightlifting performance, and power athlete status. In conclusion, we identified 57 genetic variants associated with both appendicular lean mass and fast-twitch muscle fiber size of m. vastus lateralis that may, in part, contribute to a greater predisposition to power sports.

Guo, K. and T. Mu (2024). "Comparative analysis of adaptive changes in immunoendocrine and physiological responses to high-intensity sprint interval training with progressive and nonprogressive loads in young wrestlers." Journal of Sports Science & Medicine **23**(2): 455-464.

Key Points - The 7-week intervention of SSIT proves to be an effective training method for freestyle wrestlers, as it significantly improves their physical fitness attributes and physiological parameters. - There was no clear evidence to suggest that either the progressed or non-progressed methods of SSIT had a superior impact on adaptations when compared to each other. - Maximizing the physical fitness and physiological parameters of wrestlers, while minimizing any alterations in immunoendocrine responses, can be effectively achieved through the utilization of both the P-SSIT and NP-SSIT techniques. **Abstract** The objective of this study was to explore the effects of a 7-week short sprint interval training (SSIT) with differing in programming volume-loads including progressive (P-SSIT) and nonprogressive (NP-SSIT) approaches on the immunoendocrine, physical fitness attributes and physiological parameters in male wrestlers during the pre-season. Thirty young freestyle wrestlers at the collegiate national-level were included in the study and were divided into three groups: P-SSIT (n = 10), NP-SSIT (n = 10), and an active control group (n = 10). The wrestlers engaged in their specific wrestling training three days weekly, while the P-SSIT and NP-SSIT groups underwent a 7-week SSIT, with scheduling in either progressed or nonprogressed volume-based overloads, three times per week. Before and after the intervention, various aspects of physical fitness (such as 20-m sprint, 4×9-m shuttle run, and maximal strength) and physiological parameters (including cardiorespiratory fitness and anaerobic power output), as well as immunoendocrine responses (such as immunoglobulin-A, testosterone, and cortisol) were measured. Following the training intervention, the control group did not show any significant changes in the variable measured; however, both the P-SSIT and NP-SSIT groups experienced significant improvements ($p = 0.001$) in physical fitness attributes and physiological parameters with effect sizes ranging from small to very large, and also more adaptive responses compared with control group ($p < 0.05$). In addition, there were no statistically significant changes observed among the P-SSIT and NP-SSIT groups in terms of immunoendocrine response to training, and physical fitness, as well as physiological parameters ($p > 0.05$). In conclusion, neither the progressed nor nonprogressed approaches of SSIT demonstrated superior effects on adaptations compared to one another. Therefore, it is recommended for strength and conditioning coaches in wrestling to incorporate both P-SSIT and NP-SSIT into their annual training plan, especially during the pre-season phase, to maximize the physical fitness and physiological parameters of their wrestlers while minimizing changes in immunoendocrine responses.

Huffman, W. H., et al. (2024). "The Delayed Presentation and Diagnosis of Youth Wrestling Injuries: A 20-Year Analysis of National Injury Data." J Am Acad Orthop Surg Glob Res Rev **8**(5).

INTRODUCTION: The nature of wrestling may lead athletes to mask injuries with the delayed presentations of youth wrestling-related injuries not being well characterized. **METHODS:** This descriptive epidemiological study queried the National Electronic Injury Surveillance System database to characterize delayed presentations of wrestling-related injuries in middle and high-school athletes. Data collection consisted of national estimates, demographics, and injury characteristics of patients with delayed (D) presentations (≥ 1 day) and same-day (S) presentations to US emergency departments after sustaining a wrestling-related injury during the scholastic wrestling season (December to February, 2000 to 2019). **RESULTS:** Of middle and high-school wrestlers presenting to US emergency departments, 5.6% (95% confidence interval [CI] 4.3% to 7.1%) reported delayed presentations

for a total of 1,110 patients (CI, 591 to 1,630) annually. Most commonly ($P < 0.001$), injuries were sustained on Saturdays in both cohorts (D, 28.2%; CI, 22.4% to 34.8%; S, 29.6%; CI, 24.3% to 35.5%). Patients reporting delayed presentations were less likely to sustain fractures (D, 11.5%; CI, 8.3% to 15.6%; S, 18.9%; CI, 15.0% to 23.5%; $P = 0.019$) and injuries of the head/neck (D, 20.0%; CI, 16.5% to 24.1%; S, 26.2%; CI, 21.4% to 31.7%; $P = 0.011$). DISCUSSION: A substantial proportion of adolescent wrestlers report delayed presentations of injuries. This emphasizes the need for vigilance in detecting subtle signs of injury.

Jafari, M.B., Barati, A., Akoochakian, M., Alizadeh, M.H., Jafari, A.B. (2024) INVESTIGATION OF THE EFFECT OF A COMPREHENSIVE WARM-UP PROGRAM ON THE FUNCTIONAL MOVEMENT PATTERNS AND LANDING ERROR OF YOUNG MALE WRESTLERS. *International Journal of Wrestling Science*, 14 (1), 33-46.

The current study aims to investigate the effect of a comprehensive warm-up program on the functional movement patterns and landing errors of young male wrestlers.

Method: For this purpose, 50 wrestlers from Karaj City were selected as available to participate in the research and then randomly divided into two equal experimental groups (25 people) and a control group (25 people). Then, The LESS test was used to evaluate the landing error, deep squat, lunge, shoulder mobility and rotational stability tests were used to measure the quality of movement patterns, and finally, the Nordic questionnaire was used to measure musculoskeletal pain. The experimental group performed special wrestling warm-up exercises for eight weeks and three sessions of 30 minutes per week.

Results: The results of the Chi-square test showed that the musculoskeletal pain in the knee area of the subjects in the experimental group improved significantly after eight weeks of training ($P=0.04$), but the musculoskeletal pain in the shoulder and trunk of the wrestlers did not improve significantly ($p>0.05$). The results of the U-Man-Whitney test showed that among the variables related to performance, no significant difference was observed in the posttest in the right and left shoulder mobility test ($P<0.05$) and in other research tests, a significant difference was observed between the two groups ($P<0.05$).

Conclusion: We conclude that trainers can use the training protocol of the present research to improve landing error and musculoskeletal pain in the knee joint, along with other common training protocols. A comprehensive wrestling warm-up program can reduce musculoskeletal pain, improve functional movement patterns, and reduce landing errors in young male wrestlers.

Jafaria, R. A., et al. (2024). "Evaluating the impact of active and passive recovery strategies and citrulline-malate supplementation in wrestling: Do the results add up?" *Acta Kinesiologica* 18(2): 58-69.

Purpose: This research aimed to investigate the impact of active and passive recovery strategies as well as Citrulline-Malate (CM) supplementation, on the performance and biomarkers, i.e., hypoxanthine and hypoxanthine-guanine phosphoribosyl transferase (HGPRT) of young, trained wrestlers during the first day of a simulated Free-Style wrestling tournament. **Methods:** A total of 12 professional freestyle wrestlers (aged 19.2 ± 1.0 years) participated in the study. In a counterbalanced crossover design, twelve wrestlers ingested either a placebo or CM (8g) one hour before the initiation of the tournament. They then completed four consecutive simulated wrestling standard performance tests, each consisting of 6-minute wrestling simulations followed by a 30-minute recovery period, alternating between active and passive recovery. **Results:** The results showed no significant effects of active versus passive recovery or CM supplementation versus placebo for various performance tests and biomarkers in trained wrestlers across multiple wrestling simulations. However, significant differences were observed in the active vs. passive recovery group for the HGPRT biomarker, burpee agility test, and RPE in the third simulated wrestling session. Other tests, such as hand grip strength, back-leg-chest, and Wrestling-Specific Performance Tests, did not show significant differences among the groups. **Conclusions:** The findings revealed that there were no significant differences in performance tests or biomarkers between active and passive recovery strategies. Similarly, CM supplementation and placebo groups have not been equally effective in all events, during the simulated wrestling conducted on trained wrestlers. Individual responses to these strategies may vary among trained wrestlers and the recovery requirements can also differ between different events.

Jagim, A. R., Moschelli, J. S., Woodroffe, L. M., Horswill, C. A., Bloomfield, S. A., Oppliger, R. A. (2024). "Contemporary Issue: Health and Safety of Female Wrestlers." *Curr Sports Med Rep* **23**(7): 262-269.

Female wrestling has grown exponentially over the past decade. Within the United States, 46 states now recognize female high school wrestling, and 153 colleges have programs. It is on track to become an NCAA championship-level sport in 2026. A primary health and safety risk among this cohort pertains to rapid weight loss strategies. These can lead to intentional caloric restriction and decreased body fatness, with the perceived goal of attaining a competitive advantage. Low energy availability and low body fatness are associated with a number of health concerns including menstrual dysfunction and loss of bone mineral density in girls and women. The current recommendation of 12% as a minimum for percentage body fat is very likely too low, opening the door for health perturbations among this population. The minimum threshold might more appropriately fall within the range of 18% to 20%. Body fat assessment methods, primarily skinfold measures that are used to guide weight class selection, have not been adequately validated among this population and therefore should be an area of research focus, while also exploring alternative assessment techniques. Further, we recommend that weight cycling, restrictive energy intake, and intentional dehydration be avoided. Research should assess the effects of frequent weight cycling (to "make weight") and prolonged periods of low body fat on the reproductive and bone health of these athletes. Finally, research and clinical evaluations on female wrestlers are limited, and we offer a list of research priorities for future investigation into this contemporary issue.

Jagim, A. R., Tinsley, G. M., Oppliger, R. A., Horswill, C. A., Dobbs, W. C., Fields, J. B., Cushard, C., Rademacher, P. D., Jones, M. T. (2024). "Collegiate women's wrestling body fat percentage and minimum wrestling weight values: time for revisiting minimal body fat percent?" *J Int Soc Sports Nutr* **21**(1): 2304561.

BACKGROUND: The estimation of body fat percentage (BF%) in wrestling is used to determine the minimum wrestling weight (MWW) and lowest allowable weight class (MWC) in which wrestlers are eligible to compete. A 12% minimum threshold is currently used for women wrestlers, yet a potential increase for safety has been discussed. Because of the novelty of collegiate women's wrestling, there is a paucity of literature available on the body composition norms of this population. The purpose of this study was to provide a descriptive summary of BF% and MWW values of female wrestlers and how MWW values would change with the use of different BF% thresholds. **METHODS:** Data from the 2022-2023 collegiate season were retrospectively analyzed resulting in a sample of 1,683 collegiate women wrestlers from the National Association of Intercollegiate Athletics (NAIA, n = 868) and the National Collegiate Athletics Association (NCAA, n = 815). All wrestlers completed skinfold assessments for weight certification at the start of the competition season. The skinfold values were used to estimate BF% using the Slaughter skinfold prediction equation. Frequency statistics and descriptive analysis were performed to compute normative MWW and BF% profiles. BF% thresholds of 12% (12MWW) and the BF% value defined as the lowest 5th percentile, which would be considered unusually lean, were used to determine the resulting MWW and MWC for each method. The lowest recorded weight and weight class division throughout the season was also recorded for each wrestler. **RESULTS:** There was a positively skewed (0.94) and platykurtic (1.86) distribution of MWW values. The median \pm interquartile range BF% for all wrestlers was $27.4 \pm 10.22\%$, with 17% BF representing the 5th percentile. Only 354 out of 1,579 (22.4%) wrestlers competed in their lowest allowable weight class, based on the 12MWW. Of these 354 wrestlers, the mean BF% was $21.3 \pm 5.2\%$ at weight certification with only n = 17 being at or below 12% body fat and an average weight loss of 11.1 ± 8.8 lbs. from the time of weight certification. Throughout the season, wrestlers competed at weights that were, on average (mean \pm SD), 19.4 ± 16.9 lbs. higher than their 12MWW (95% CI: 18.6, 20.2 lbs. p < 0.001; effect size [ES] = 1.1), 13.4 ± 19.0 lbs. higher than the 17MWW (p < 0.001; ES = 0.70), and 8.7 ± 8.3 lbs. lower than their weight at the certification (95% CI: 8.3, 9.1 lbs. p < 0.001; ES = 1.1). **CONCLUSIONS:** Nearly all BF% values were well above the 12% threshold used to determine MWW. Increasing the minimum BF% threshold from 12% to 17% would affect a small percentage of wrestlers, likely reduce the need for excessive weight cutting, and minimize the deleterious health effects of an athlete at such a low BF%.

Jagim, A. R., Tinsley, G. M., Opplinger, R. A., Horswill, C. A., Dobbs, W.C., Fields, J.B., Bloomfield, S.A., Jones, M.T. (2024). "Differences In Body Fat Percentage And Minimum Wrestling Weight Values Between NCAA and NAIA Women Wrestlers." Medicine & Science in Sports & Exercise 56(10S): 818.

The estimation of body fat percentage (BF%) in wrestling is used to determine the minimum wrestling weight (MWW) and lowest allowable weight class for wrestlers to compete in. The current minimum threshold for BF% used to calculate MWW is 12% for women wrestlers, yet a potential increase has been discussed. Because of the novelty of collegiate women's wrestling, there is a paucity of literature available on the body composition norms of this population. PURPOSE: The purpose of the present study was to characterize the BF% and MWW values of collegiate women wrestlers. METHODS: Data from the 2022-2023 collegiate season was retrospectively analyzed using a sample of 1,648 collegiate women wrestlers from the National Association of Intercollegiate Athletics (NAIA, n = 866) and the National Collegiate Athletics Association (NCAA, n = 782). Data were extracted from the weight certification submission system provided by the National Wrestling Coaches Association. All wrestlers completed skinfold assessments for weight certification at the start of the competition season, with values entered into the system to compute BF% using the Slaughter skinfold equation. RESULTS: There was a positively skewed (0.94) and platykurtic (1.86) distribution of MWW values. Table 1 provides a summary of MWW and BF% values. When pre-season weight was compared to the MWW, wrestlers competing in the NCAA were farther from MWW than those in the NAIA (NCAA: 13.4 ± 7.9 vs. NAIA: 12.1 ± 7.8 kg, $p < 0.001$). CONCLUSION: Wrestlers competing in the NCAA had a slightly higher BF% and lower MWW compared to those competing in the NAIA. Increasing the minimum BF% threshold from 12% to 17% (5th percentile) would affect a small percentage of wrestlers. On average, wrestlers were 13 kg away from their MWW at the start of the season.

Jalowska, P., et al. (2024). "Influence of coping with stressful situations on changes in aerobic capacity and post-workout restitution coefficient in the period of immediate preparation for the European men's cadet wrestling championship." Front Psychol 15: 1433772.

AIM OF THE STUDY: The research goal of the study was to determine the relationship between coping with stressful situations and the level of aerobic capacity and post-workout restitution, as well as the changes that occur between these variables through the period of training camp preceding international men's championship competitions in age cadet. Two research hypotheses were verified. The athletes will maintain or improve the results obtained in the performance test and the post-workout restitution coefficient during the immediate preparation period for the European Championships (H1), and the style of coping with stressful situations significantly affects changes in aerobic capacity and the post-workout restitution coefficient during the immediate preparation period for the European Championships (H2). MATERIALS AND METHODS: The athletes of the National Men's Team of Poland in classical style wrestling (n = 16). Coping with stressful situations was examined using the Coping Inventory for Stressful Situations (CISS). Aerobic capacity was analyzed using the Maximal Multistage 20-m Shuttle Run Test. The level of post-exercise restitution was calculated using the Klonowicz coefficient of restitution. RESULTS: There was a significant increase in aerobic capacity levels ($p < 0.001$), a decrease in resting HR ($p < 0.002$), HR 1' after the test ($p < 0.0031$), and HR 5' after the test ($p < 0.007$). There was a significant correlation between emotional coping style and avoidant style focused on looking for social contacts vs. HR 3' after the test and ($r = 0.60$; $p < 0.015$) and HR 5' after the test ($r = 0.57$; $p < 0.020$). In addition, a correlation was noted between avoidant style and maximum aerobic speed ($r = -0.64$; $p < 0.008$), and avoidant style focused on substitute activities vs. distance and maximum aerobic speed ($r = -0.72$; $p < 0.002$). CONCLUSION: It is reasonable to implement psychological training and regular monitoring of mental preparation in the national men's team training program for athletes competing in wrestling.

Jesus, F., et al. (2024). Water intake in athletes: Agreement between food records and isotope-dilution methods. Clinical Nutrition **43**. 370-378.

Background: Although water intake (WI) is commonly estimated through self-reporting, its inaccuracy is reported. Water turnover (rH₂O)-derived WI is the reference method; however, it is costly. The study aimed to validate alternative methods for determining WI in a group of athletes.

Methods: Eighty-two athletes (20.4 ± 5.1 years; 28 females) were included in this cross-sectional validation study. Doubly labelled water (DLW) determined rH₂O and rH₂O-derived WI by subtracting metabolic, transcutaneous, and inspired water from rH₂O (reference). The rH₂O components were determined by alternative approaches: i) average values of macronutrients instead of individual food records (DLW-derived WI); ii) estimating total energy expenditure (TEE) and rCO₂ through a predictive equation instead of DLW (2H-derived WI); iii) estimating rH₂O by prediction equation (equation-derived WI). Food records were employed to determine WI (food record-derived WI).

Results: Only DLW-derived WI showed no significant differences compared to reference in both sexes (females: 2 mL/day, p = 0.183; males: -4 mL/day, p = 0.118). 2H-derived WI showed significant but small differences (females: 23 mL/day, p = 0.001; males: 32 mL/day, p < 0.001) while food record-derived WI showed the largest differences (females: -924 mL/day, p < 0.001; males: -1504 mL/day, p < 0.001). DLW-derived and 2H-derived WI showed good performance [r² > 0.987 and concordance correlation coefficient (CCC) > 0.993], while food record-derived WI showed poor performance [r² < 0.031 and CCC < 0.133]. Conclusion: Although some alternative approaches provide adequate estimates, DLW- and 2H-derived WI are the only valid methods to determine WI in our sample of competitive athletes. These approaches are less costly and could contribute to the development of WI guidelines for athletes. Food records underestimate WI, but evidence-based recommendations could reduce misrecordings.

Kapedani, K. and A. Bulku (2024). "A perspective on European U-17 wrestling." Journal of Physical Education and Sport **24**(2): 260 - 266.

Introduction: Wrestling is an individual sport, which involves anaerobic power as a result of high load on the metabolic systems, where quick energy provides a short movement with explosive power and maximum strength. In modern wrestling, only a talented and prepared wrestler can achieve high international results. The ability of a wrestler to achieve a competitive result will depend from condition anthropometric and physical, mental, and socio-psychological preparation. The purpose Main purpose of this study is calculation of data, which show parameters and different technical-tactical coefficients. Methods: A total of 226 matches were held for the U17 European Wrestling Championship, for Greco-Roman wrestling 191 wrestlers from 31 countries participated, and 206 matches for Freestyle wrestling from 29 countries with men's wrestling (freestyle only). Data analysis identified significant changes. All data analysis was performed through the statistical package SPSS (Statistical Package for Social Sciences, version 20.0) and M.Office.Excel 2010. Pearson and Spearman correlation coefficients were used to evaluate linear associations of numerical variables. For all applied statistical procedures, values of p=0.05 were considered statistically significant. Results and discussion The research data obtained from this international European event held in the final stage in Tirana show that both Greco-Roman and Freestyle wrestling styles have made progress in increasing the quality of sport, which is expressed in increase in rhythm of the efficiency, rivalry of the matches held for each weight category. Conclusions In order to reach figures of contemporary high levels, coaches and wrestlers increase their general work, especially special training. Referring to specific indicators, it is necessary for trainers and specialists to strengthen their work in a year by applying different grips not only in demonstrative conditions but especially in increase of a large neuro-muscular tension.

Karcher, S. C., et al. (2024). "Wash-In Silver Nanoparticle Laundry Additive Was Not Effective in Reducing Bacterial Load on Wrestling Apparel." J Athl Train **59**(11): 1126-1131.

CONTEXT: The best practice for cleaning wrestling mats is using a residual disinfectant with continued antibacterial action. Recently available wash-in silver additives claim to confer a residual effect to fabric. OBJECTIVE: To test the efficacy of laundering with a wash-in silver additive in reducing athletes' exposure to potentially infectious microbes on apparel. DESIGN: A 4-part controlled laboratory study/parallel group comparison study. (1) To test whether fabrics in athletic clothing would be affected differently, we applied bacteria to control fabrics washed in detergent alone and test counterparts washed in detergent plus wash-in silver additive. Bacteria were applied to fabrics, extracted, plated, incubated, and counted. (2) To see if wash-in silver affected various bacteria differently, we washed cotton t-shirts with detergent alone or with detergent plus wash-in silver. We applied 4 bacterial species commonly found in the wrestling environment. Bacteria were extracted, plated, incubated, and counted. (3) To see if wash-in silver was effective in reducing bacterial contamination during practice, 32 collegiate wrestlers paired off with one wearing a test silver-treated t-shirt and their partner wearing a control shirt. Wrestler rotations exposed shirts to 2, 4, or 8 wrestlers. Identical swatches of fabric were cut from the t-shirts. Bacteria were extracted, plated, incubated, and counted. (4) We simulated prolonged/repeated bacterial exposure as occurs during tournaments by applying bacteria directly to silver-treated and untreated singlet material repeatedly over time. Test samples were taken at regular intervals to see if bacterial growth was inhibited by the presence of the silver nanoparticles. Bacteria were extracted, plated, incubated, and counted. SETTING: Laboratory and practice. PARTICIPANTS: Collegiate Division III wrestling team. MAIN OUTCOME MEASURE(S): Wash-in silver would be considered effective if a statistically significant reduction in bacterial count was observed at 95% confidence. RESULTS: Wash-in silver reduced bacterial growth at low levels of contamination but did not significantly reduce bacterial growth at levels seen during contact sport competitions. This was true for all bacterial species and all fabrics tested. CONCLUSIONS: The environmental and potential health risks in using a wash-in silver nanoparticle laundry additive in the wash cycle for clothing worn by wrestlers outweigh any potential infection control benefits to these athletes. We do not currently recommend adopting wash-in silver treatment as part of the laundering regimen for wrestling programs until further testing of alternate methods of silver impregnation into sports fabrics has been investigated.

Karninčić, H., et al. (2024). "Advice on Regulating Body Mass in Wrestling from the Most Cited Combat Sport Literature-A Systematic Review." J Funct Morphol Kinesiol **9**(4).

Background: Since studies on the subject of weight reduction in wrestlers vary in opinions regarding health, performance, and legal regulations, a review of the most cited literature in other combat sports was carried out. Methods: By searching the WOS and Scopus scientific databases, the top 60 cited papers were identified, and ultimately, 13 articles that met the inclusion criteria for this review were selected. Findings and conclusions: Apart from the advantages gained in strength and mass through weight reduction, a mental advantage is also obtained. The period between weigh-ins and the actual bouts is considered crucial for the preservation of performance. When the rules allow for a longer recovery period, this enables aggressive, harmful, or prohibited weight reduction methods to be employed by some wrestlers. A chronic reduction in body weight is regarded as a long-term health issue but may be ignored by wrestlers. There has been no progress in the attempt to regulate the problem of rapid weight loss (RWL) within wrestling in the past thirty-five years. If any change is to be brought about, the engagement of all federations, clubs, WADA, and all individuals involved in this issue (athletes, coaches, parents, doctors, etc.) is deemed necessary.

Kimura, M., et al. (2024). "Leg attack proficiency and physical fitness of national tournament winners among Japanese male elementary (U-12) and junior high school wrestlers (U-15)." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE **14**(1): 2-8.

This research aims to clarify the relationship between the tackle technique and physical fitness/motor skills of male elementary school wrestlers(U-12) and junior high school wrestlers(U-15). It also aims to compare the developmental trends of physical fitness and motor skills from the perspective of competitive levels and create foundational data contributing to the development of wrestling skills. The participants included 69 male wrestlers from 5th grade elementary to 3rd grade middle school. The measured variables consisted of height, weight, body fat percentage, standing long jump, lateral jump (side steps), and repetition training of the tackle technique used in actual wrestling practice. As a result, it was suggested that explosive power and agility may be involved in the tackle technique of elementary and middle school wrestlers who win medals at national tournaments in Japan. Furthermore, it was revealed that medal-winning athletes excel in agility, and the proficiency in tackle technique differs at the boundary of the middle school level.

Kohanevich, A. and G. Korobeynikova (2024). "Factor structure of the functional state of qualified wrestlers at the stage of special basic training." [Ukrainian] Scientific Journal of National Pedagogical Dragomanov University Series 15 Scientific and pedagogical problems of physical culture (physical culture and sports): 272-277.

Changing the rules of wrestling competitions leads to an increase in tension and intensity of competitive activity. This requires wrestlers to have a high level of functional fitness. Therefore, monitoring the functional state of qualified wrestlers is necessary for correcting the training process. In article the factor structure of the functional state of qualified wrestlers at the stage of special basic training was considered. The parameters of heart rate variability, mental states and neurodynamics characteristics were studied. Purpose of work to determine the factor structure of the functional state of qualified wrestlers at the stage of specialized basic training. Methodology. The 31 qualified wrestlers, age 14-16 took part in the study. The analysis revealed a relative autonomic balance between the sympathetic and parasympathetic parts of the autonomic nervous system in the examined athletes. In addition, qualified wrestlers have an optimal mental state that corresponds to the balance of excitation and inhibition processes and optimization of decision-making processes under time constraints. It was revealed that the structure of the functional state of qualified wrestlers includes complex characteristics that support the main elements of the functional system, ensuring the adaptation of the athletes' body to the training process. The resulting factor structure indicates two factors: "morphofunctional" and "neurodynamic". The first factor reflects the level of functional readiness and the level of training of wrestlers. In fact, the first factor is the basis of the formation of the functional state of highly qualified wrestlers, which reflects the main factors of the functional system responsible for the formation of the functional state of wrestlers. The second factor reflects the wrestlers' ability to optimally perceive and process information from the environment under conditions of physical and neuropsychic stress. Conclusions. Respectively, for optimization of functional state in qualified wrestlers should be considered level of functional fitness and ability of athlete to perception and information processing.

Kondo, E., et al. (2024). "Nutritional and Training Strategies for Actual Competition in World-Class Japanese Female Wrestler: A Case Report." Journal of Nutritional Science and Vitaminology 70(1): 72-75.

Wrestlers have a risk of relative energy deficiency in sports because they believe that they can gain an advantage over their opponents by temporarily adopting weight-making strategies even women. However, precise methods of making weight and the effect of manipulating body mass (BM) on health and performance in female wrestlers have not been reported. Our study aimed to report a case of weight making in a world-class female wrestler, who won the world competition seven times in 5-y and had oligomenorrhea. We obtained the BM, blood, urine, and saliva samples, hand grip strength, subjective condition a month before the match (baseline), and 3-d before the match (day-3), and food and physical activity records during baseline and 10 d before the competition. The wrestler lost 4.7% of BM from baseline to day-3 and 7.6% of BM to the match by method to reduce energy intake and enhance dehydration. Hand grip strength did not change by weight loss. After weigh-in, the wrestler took the recovery food containing 4.9 g/kg BM of carbohydrate. Although these weight strategies may at least contribute to the success of wrestlers, the impact on health needs to be clarified in future studies.

Korobeynikov, G., et al. (2024). Decision-making and motor skills in elite wrestlers. 10th International scientific conference on kinesiology. Book of abstracts, OPATIJA, CROATIA, SEPTEMBER 12_15, 2024.

Introduction Decision-making is an important problem in modern sports psychology (Raab & Araújo, 2019). Time of decision-making is of great importance in combat sports (Korobeynikov et al., 2022). Martial arts are characterized by the manifestation of complex motor skills in a competitive fight. The athlete must adequately perceive the opponent's activities and implement motor skills (Russo, Ottoboni, 2019). The research aimed to study decision-making and motor control in elite wrestlers. Methods 34 elite athletes were examined. The complex method of decision-making and the effectiveness of the motor skills of elite wrestlers were assessed. Computer equipment "Multipsychometer-05" was used. Sensorimotor reaction, balance of nervous processes, non-verbal intelligence, decision-making time, and time it took to implement specific skills are assessed. Results All athletes were divided into fast ability (18 persons) and low ability (16 persons) to decision-making. The results showed that athletes with quick decision-making perceive non-verbal information faster and have better time and quality indicators for performing special skills. In addition, fast decision-makers show greater impulsivity and a predominance of nervous system arousal. The speed of decision-making among elite wrestlers corresponds to an increase in arousal and impulsiveness. This contributes to better implementation of special motor skills. Conclusions The ability to make decisions contributes to the implementation of motor skills in elite wrestlers.

Korobeynikov, G., et al. (2024). "PSYCHOPHYSIOLOGICAL STATES OF ELITE WRESTLERS AFTER CRITICAL LIFE EVENTS." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(2): 40-44.

The current stage of human development is characterized by the emergence of new risks and military conflicts. One of the large-scale ones is Russia's military aggression against Ukraine. Negative consequences of the war can be mental disorders and post-traumatic stress in the civilian, as well as the athlete population.

Kovbasiuk, A., et al. (2024). "A taste of ambrosia: Do Olympic medalists live longer than Olympic losers?" Scand J Public Health: 14034948231219833.

OBJECTIVE: To investigate the longevity of a large sample of Olympic Games participants, considering the interaction between different types of sports and medal awards. METHODOLGY: Data scraping from Wikipedia and Wikidata allowed us to collect a sample of 102,993 famous athletes. We selected 20 of the most populated disciplines to make the groups comparable. We conducted a comparison of life duration on a subset of 17,194 elite athletes, predominantly male, dead at the time of analysis. RESULTS: Olympic medalists' lifespan was shorter than non-medalists. Athletes in such disciplines as boxing, weightlifting, ice hockey, cycling, football, swimming, and wrestling lived significantly shorter lives than the mean of the group of athletes. In contrast, the duration of life in athletes involved in athletics, rowing, fencing, artistic gymnastics, shooting, cross-country skiing, sailing, and equestrian sports was highest compared with the mean of the group. CONCLUSIONS: Disciplines classified as engaging mostly power were linked to shorter lifespans, whereas those involving predominantly skill were associated with longer life durations. The interaction of being a medalist and sport was found to be significant. Medalists in the disciplines of athletics, basketball, boxing, equestrian sports, wrestling, and water polo had significantly shorter lives (the final item was insignificant after correction for multiple comparisons). Olympic achievement was linked to length of life in mainly individual, not team, sports.

Kurt, C., et al. (2024). "Acute effects of slow, moderate, and fast tempo dynamic stretching exercises on power in well-trained male wrestlers." Journal of Human Kinetics 93: 155-165.

Due to the potential detrimental effects of static stretching exercises on subsequent muscle power performance, athletes and trainers have started to replace static stretching with dynamic stretching exercises in

their training routines. However, there are no well-accepted guidelines regarding dynamic stretching variables, including tempo/velocity, volume (reps and sets), etc. Therefore, this study aimed to evaluate the acute effects of slow, moderate, and fast tempo dynamic stretching exercises on jump height, relative power, the reactive strength index, and leg stiffness in well-trained male wrestlers. Seventeen wrestlers (aged 20.00 ± 4.06 years, wrestling experience 6.00 ± 3.09 years, and training volume per week 10.00 ± 5.69 hours) took part in the experiment under four conditions (control session, slow tempo dynamic stretching, moderate tempo dynamic stretching, and fast tempo dynamic stretching) on separate days with a 72-h interval in between, following a randomized, crossover study design. The control session consisted of a 10-min jog on a motor-driven treadmill at 6 km/h and a 0% slope. Dynamic stretching sessions consisted of seven dynamic stretching exercises performed at 50 bpm, 100 bpm, and 120 bpm, following a 5-min warm-up on a treadmill at 6 km/h and a 0% slope. After each condition, wrestlers performed a 2 x 30-s repeated vertical jump test with 5-min rest intervals in between. The best results for jump height, relative power, the reactive strength index, and leg stiffness were registered for statistical analysis. One-way repeated ANOVA results demonstrated that there were no significant differences in pairwise comparisons of all variables obtained after the four different conditions ($p > 0.05$). Overall, none of the slow, moderate, and fast tempo dynamic stretching exercises led to a change in repeated jump performance of well-trained male athletes. Further studies are needed to clarify the acute effects of different tempo dynamic stretching on muscular performance in well-trained wrestlers.

Latyshev, S. V. (2024). "Proposals for the edition of the federal standard of sports training for the sport «Wrestling»." Theory and Practice of Physical Culture (7): 64-66.

Objective of the study was to present recommendations on the revision of the Federal Standard of Sports Training for the sport «Wrestling». Methods and structure of the study. The work analyzed the content of the federal standard of sports training for the sport «wrestling» (order of the Ministry of Sports of the Russian Federation dated November 30, 2022 No. 1091). Results and conclusions. The analysis showed that the Standard needs to be finalized in accordance with the requirements of the theory and practice of training athletes in the following areas: first - the unification of types of sports training in the structure of the educational and training process, their volume and dynamics at the stages of sports training, second - standards for monitoring the level of special physical preparedness.

Lee, Y. S., et al. (2024). "Nutritional knowledge, eating habits, factors affecting muscle damage, and antioxidant enzyme levels of Korean wrestlers." Phys Act Nutr 28(1): 52-58.

PURPOSE: The aim in this study was to investigate the diet and nutritional knowledge of elite Korean wrestlers and verify the differences in their exercise performance, muscle damage indicators, and antioxidant enzyme levels according to wrestler level. **METHODS:** A 7-day dietary and nutrition knowledge survey was administered to 30 adult male elite wrestlers (national team: $n=11$; professional team: $n=19$). The Wingate test was conducted for 60 seconds to analyze muscle damage indicators and antioxidant levels. Blood and blood lactate concentration analyses were performed four times; the statistical significance level of all data was $p<0.05$. **RESULTS:** Significant differences were found in general nutrition knowledge questionnaire (GNKQ) scores ($p=0.043$), diet ($p=0.001$), anaerobic performance ($p=0.001$), muscle damage indicators ($p=0.026$), antioxidant levels, and blood lactic acid concentrations (30 min after exercise, $p=0.007$; 90 min after exercise, $p=0.038$) between the national and the professional groups. **CONCLUSION:** To the findings confirm the relationship between the differences in diet, nutrition, and motor function for wrestlers of different expertise levels. In a follow-up, a comprehensive study on nutrition knowledge, athlete training, and weight loss is needed that considers a wider scope of subjects and analyzes additional variables.

Loffing, F., et al. (2023). "Lateral preference in complex combat situations: Prevalence and relationship with general measures of hand and foot preference." Laterality 29: 1-26.

Laterality is considered relevant to performance in combat sports with particular emphasis being placed on fighters' handedness and combat stance. Such approach, however, may fall too short to understand the role of laterality in sports where fighters are allowed to use their hands and feet standing and on the ground. Here, we referred to grappling sports (i) to estimate lateral preferences in selected combat situations and (ii) to test for an association between those preferences and common measures of hand and foot preference. Based on the responses of 135 experienced grapplers who participated in an online questionnaire lateral preference, at the group-level, was revealed in 12 out of 18 combat situations. At an item-level, common measures of lateral preference and grappling-specific lateral preference were related in three out of 36 conditions (footedness only, not handedness). Across items, scores in a grappling-specific laterality index were positively related with foot but not with hand preference scores. Implications for the assessment of lateral preference in combat sports and the use of item-specific terminology in this context are discussed. On a broader scale, we also elaborate on potential consequences of our findings with regard to evolutionary explanations of the maintenance of left-handedness in humans.

Lucena, F. J., 14 (1), 47-49. (2024). "THE METHODOLOGICAL PROCESS FOR TEACHING AND LEARNING OF TECHNIQUES – TACTICS IN OLYMPIC WRESTLING “In Search of Sports Mastery.” INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(1): 47-49.

This material is developed under a descriptive methodological paradigm and aims to invite the coaches in charge of the sports training of the Olympic Wrestler to reflect on the importance that is acquired from the pedagogical and methodological point of view when the responsibility is assumed. To perform functions as a professional. Sports training in Wrestling must be seen as a process of Comprehensive Education, which requires detailed attention in multiple aspects, in order to guarantee a sufficiently complete sports development in these athletes. When objectives are established focused on teaching Technique – Tactics. Not only should attention be paid to technical movements; Likewise, aspects that are related to acyclic psychomotor skills, physical preparation and the psychological-mental factor must be addressed. Not paying attention to the joint development of these methodological components would undoubtedly create deficiencies in the fighters that would harm their life as a competitor. The training of fighters increasingly makes you more demanding and among its Technical-Tactical preparation components, we cannot fail to mention what is related to the Mental and Psychological part. Mental training is as important as technical – tactical and physical. The objectives for the mental and psychic part are aimed at the ability to concentrate, pressure management, motivation, resilience and the ability to maintain a positive attitude and emotional control during their training and competition programs. Seen from another perspective, in the process of learning to fight, it is of great interest to keep the pedagogical precepts in mind. These refer to structured teaching and learning in a systematized manner promoting an environment where fighters can acquire effective skills and abilities, while developing their physical and mental capabilities safely and efficiently. Likewise, the medical component and applied sciences must be considered. They ensure that all practices are backed by scientific evidence paying attention to the health and safety of the fighters. This involves an understanding of exercise physiology, sports nutrition, injury recovery and prevention, among others. Ignoring these precepts or not applying them properly in teaching-learning and training programs can result in poor training, increase the risk of injury and limit the sporting success of Olympic Wrestlers. Therefore, for Olympic Wrestling, it is essential to adopt a multidisciplinary approach to training, which takes into account all these factors and consolidates the comprehensive development of each wrestler. Wrestlers have great biopsychophysiological and kinesthetic potentialities, which will be used to the maximum when the pedagogical, medical, sociological and science precepts applied to sports are respected. A fighter with extraordinary physical work capabilities and a deficiency in his technical-tactical-mental development would be of no use; or have high technical-tactical-mental development and present a deficiency in the physical aspect, apart from the values that sports practice promotes. Therefore, the essential thing about comprehensive sports training in wrestling, and especially at school or developmental ages,

is the awareness of the meaning of the CEF (Physical Effort Capacity) as well as the educational and scientific principles, as mechanisms to guarantee high-level development in future fighters.

Lukic-Sarkanovic, M., et al. (2024). "Acute muscle damage as a metabolic response to rapid weight loss in wrestlers." Biomedical Human Kinetics 16(1): 99-105.

Study aim: Dietary and non-dietary weight loss methods are highly prevalent among combat sports athletes (CSA). Most CSA undergo rapid weight loss (RWL) usually a week before the competition to reduce their body mass and thus compete in the lowest weight category possible. The objective of the study was to distinguish the impact of high-intensity sport-specific training (HISST) combined with RWL (phase 1 - P1) on muscle damage markers as well as the effects of HISST alone (phase 2 - P2). Material and methods: This crossover study was carried out on 12 male wrestlers. It consisted of initial measurement (IM), high-intensity training combined with RWL of 5% (P1), and high-intensity training without RWL (P2). After each phase, muscle damage markers were measured, including myoglobin, aldolase, creatine kinase, aspartate aminotransferase, alanine aminotransferase, and lactate dehydrogenase. Results: A substantial increase in analyzed biomarkers was evident in both phases (P1 and P2). However, higher levels of almost all biomarkers were observed in the phase that included RWL compared to the second phase, with a greater significance level. Conclusions: Our study revealed that 5% RWL combined with HISST impacted the assessed biomarkers to a greater extent than HISST alone, thus providing strong evidence of the influence of RWL on muscular damage in wrestlers. In order to minimize the adverse health-related effects induced by weight reduction, coaches and athletes should use caution when considering weight management methods.

Marigi, E. M., et al. (2024). "Outcomes of Shoulder Instability Surgery in Competitive Wrestlers: Outcomes, Reoperations, and Return to Play at 5 Years' Mean Follow-up." Am J Sports Med 52(3): 586-593.

BACKGROUND: Wrestling is a physically demanding sport with young athletes prone to traumatic shoulder instability and a paucity of data evaluating the results of shoulder instability surgery (SIS). PURPOSE: To assess reoperation rates, patient-reported outcomes, and return to wrestling (RTW) after SIS in a cohort of competitive wrestlers. STUDY DESIGN: Case series; Level of evidence, 3. METHODS: All competitive wrestlers with a history of shoulder instability and subsequent surgery at a single institution between 1996 and 2020 were identified. All directions of shoulder instability (anterior shoulder instability [ASI], posterior shoulder instability [PSI], and traumatic multidirectional shoulder instability [TMDI]) were analyzed. Exclusions included revision SIS and <2 years of follow-up. Athletes were contacted for determination of complications, RTW, and Western Ontario Shoulder Instability Index scores. RESULTS: Ultimately, 104 wrestlers were included with a mean age at initial instability of 16.9 years (range, 12.0-22.7 years), mean age at surgery of 18.9 years (range, 14.0-29.0 years), and a mean follow-up of 5.2 years (range, 2.0-22.0 years). A total of 58 (55.8%) wrestlers were evaluated after a single shoulder instability event, while 46 (44.2%) sustained multiple events before evaluation. ASI was the most common direction (n = 79; 76.0%), followed by PSI (n = 14; 13.5%) and TMDI (n = 11; 10.6%). Surgical treatment was most commonly an arthroscopic soft tissue stabilization (n = 88; 84.6%), with open soft tissue repair (n = 13; 12.5%) and open bony augmentation (n = 3; 2.9%) performed less frequently. RTW occurred in 57.3% of wrestlers at a mean of 9.8 months. Recurrent instability was the most common complication, occurring in 18 (17.3%) wrestlers. Revision SIS was performed in 15 (14.4%) wrestlers. Across the entire cohort, survivorship rates free from recurrent instability and revision surgery were 90.4% and 92.5% at 2 years, 71.9% and 70.7% at 5 years, and 71.9% and 66.5% at 10 years, respectively. Preoperative recurrent instability was an independent risk factor for postoperative recurrent instability (hazard ratio, 3.8; 95% CI, 1.33-11.03; P = .012). CONCLUSION: Competitive wrestlers with multiple dislocations before initial clinical evaluation were 3.8 times more likely to experience postoperative recurrent instability. Patients should be counseled that despite SIS, only 57.3% returned to wrestling after surgery.

Matic, R., et al. (2024). "Sports event quality and athlete's behavioural intentions at the World Wrestling Championship." Management & Marketing **19**: 419-440.

The COVID-19 pandemic caused unpredictable times and led to changes in tourism, sporting society, and events organisations. Sports events were postponed or cancelled. Indeed, there was a need to reconstruct the event circumstances for safety reasons. Therefore, this study aimed to provide insights into relationships between sports event quality, satisfaction, and behavioural intentions (repeated destination visits, positive word-of-mouth communication) during the implementation of COVID-19 security risk measures. The sample included 150 athletes from the U23 World Wrestling Championship organised in Belgrade, Serbia, in 2021. The sport event quality, satisfaction, and behavioral intentions were measured with a questionnaire. The proposed model was assessed using a confirmatory factor analysis with structural equation modeling using Smart PLS, SPSS, and AMOS. Results revealed a significant direct effect of the sport event quality (core dimension) and an indirect effect across satisfaction (tangibles and COVID-19 risk measures) on the athletes' behavioural intentions. As wrestlers lived in a „bubble” and competed without spectators during the competition, it is not a surprise that the core dimension of service quality, including the competition itself, the opening ceremony, organisation, time schedule, medal ceremonies, and the total quality of the event, has a significant impact for wrestlers' likelihood of coming back to the city or the country and to recommend the destination to others. This study contributes to advancing the general scientific knowledge concerning understanding sports events from the aspect of sports tourism and event organisation, especially in the post-COVID-19 era.

Keywords: event quality; behavioural intentions; satisfaction; COVID-19 security measures; event organisation.

Matkarimov, R., et al. (2024). "Improving the technical and tactical characteristics of elite wrestlers." Slobozhanskyi Herald of Science and Sport 28(4): 197-203.

Background and Study Aim. Technical and tactical actions in wrestling have different approaches to the implementation of the athlete's competitive activity. However, in practice, we can see that the use of scientific research to improve the technical and tactical actions of elite wrestlers is not used enough. Purpose: to explore the technical and tactical performance of elite wrestlers. Material and methods. A total of 96 elite wrestlers aged 21-28 practicing Greco-Roman and freestyle wrestling were examined. All athletes were divided into two groups: control (n=48) and experimental (n=48).

Results. The obtained results showed that when using the program for improving technical and tactical movements in elite wrestlers, the indicators of throws improved by an average of 13% ($p < 0.05$). In addition, throws with a back bend, shoulder and backbend increased by an average of 11% ($p < 0.05$). Some technical throws improved by about 12% ($p < 0.05$). Analysis showed improvements in decision-making and movement skills in elite wrestlers in competitive wrestling. The obtained results show a decrease in the duration of the implementation of special wrestling skills in real conditions. The study of technical readiness revealed that a decrease in the time of implementation of special wrestling skills in elite wrestler's competitions leads to a faster implementation of throws.

Conclusions. The proposed approach to improving technical and tactical correction leads to an improvement in the ability to make decisions and implement motor skills among elite wrestlers in competitive fight.

Melnyk, O., et al. (2024). "Features of sports careers of women's Olympic wrestling champions." [Ukrainian] Єдиноборства: 61-70.

Purpose: to identify the features of the sports career of Olympic champions in women's wrestling. Material and Methods. The main materials for the study were personal indicators of the sports career of 18 Olympic champions in wrestling (data were taken from the official website of UWW (<https://unitedworldwrestling.org>)). Research methods: analysis and synthesis, documentary method, comparison, methods of mathematical statistics. The study analyzed the careers of 18 freestyle wrestlers from 5 Olympic Games who won the title of champion in

these competitions. The study took into account all the performances at official competitions (continental championships and world championships in all age groups and the Youth Olympic Games) of wrestlers. Results: it was found that in 5 Olympic Games, which included women's wrestling in the program (since 2004), 18 athletes won 18 out of 24 possible Olympic gold titles. The youngest age of the first performance at official international competitions before the Olympic triumph among the studied athletes was 15 years old. The latest first performance in the international arena among the study participants was recorded at the age of 25. It was found that the period from the first performance at official competitions to the gold medal at the Olympic Games was 5-9 years. It was also found that the shortest period from the first performance in the international arena to winning the Olympic Games was 2 years, and the longest was 15 years. To win Olympic gold, athletes had to participate in 9 official international competitions on average. The average age at which female athletes won at the Olympics is 22. Conclusions. To win gold at the Olympics, highly skilled wrestlers usually need to participate in a fairly large number of international competitions. However, there are exceptions in history among female athletes who have managed to reach the highest podium much faster and with fewer international competitions. This largely depends on individual characteristics and the specifics of the wrestlers' training system. Keywords: free wrestling, women, highly qualified sportswomen, competition, Olympic Games.

Méndez Rodríguez, J. P., et al. (2024). "Relationship between the 2D:4D ratio, physical performance variables, and body composition in elite wrestling athletes." Retos: nuevas tendencias en educación física, deporte y recreación 61: 946-952.

Background: The 2D:4D ratio in various sports has revealed significant relationships between this digit indicator and sports performance, but few studies have focused on elite wrestlers. Thus, the present study has two main objectives: firstly, to present descriptive data comparing it between genders, and secondly, to identify significant correlations with the 2D:4D ratio. Methods: A total of 22 wrestlers participated in the study, and their anthropometric variables, bilateral 2D:4D ratio, muscle power (CMJ), isometric traction strength, and handgrip strength were compared. Results: The findings show significant correlations between the right 2D:4D ratio and residual mass ($r = .46$; $p < .05$); Z-Score transverse thorax ($r = .61$; $p < .01$); inversely with ectomorphy ($r = -.46$; $p < .05$) and handgrip strength ($r = .43$; $p = .042$); and the left 2D:4D with Z-Score chest girths ($r = .45$; $p < .05$) and Z-Score weight ($r = .43$; $p = .042$). Conclusions: It is concluded that the 2D:4D ratio could be a predictive indicator of body composition components as well as a measure of handgrip strength performance and respiratory capacity in Olympic wrestling athletes.

Milovančev, A., et al. (2024). "Cardiac biomarkers alterations in rapid weight loss and high-intensity training in judo athletes: a crossover pilot study." J Sports Med Phys Fitness 64(11): 1224-1233.

BACKGROUND: Studies evaluating alterations in cardiac biomarkers in rapid sport-associated weight loss (RWL) and high-intensity sport-specific training (HISST) are lacking. This pilot study aimed to examine the effects of RWL and HISST on heart rate, blood pressure, cardiac biomarkers, and left ventricular systolic function. Nine elite male judokas participated in the presented survey. METHODS: The athletes underwent a baseline assessment and two testing protocols, the first phase with RWL where they had to lose 5% of their body weight simultaneously with HISST, and the second phase after 7 days, in which only HISST was performed. Participants underwent electrocardiogram, biomarker, and transthoracic echocardiogram evaluation after each phase. RESULTS: In the first phase (RWL and HISST) athletes, heart rate increased significantly, 58.11 (7.78) versus 79 (9.25), $P=0.001$; as well as cardiac biomarkers: lactate dehydrogenase isoenzyme 175.33 (31.22) vs. 238.56 (56), $P=0.003$; aspartate aminotransferase 16.56 (4.61) vs. 29 (9.96), $P=0.027$; creatine kinase isoenzyme-MB 13 (11.5;24) vs. 29.11 (10.05), $P=0.004$; and high sensitivity cardiac troponin 10 (0) vs. 14.49 (6.4), $P=0.045$. In the second phase, only HISST was associated with a significant increase in the alanine aminotransferase isoenzyme, 37.78 (11.22) vs. 26 (8.03), $P=0.024$, together with creatine kinase 472 (185;654) vs. 166.88 (56.57), $P=0.01$, compared to the initial

measurement. CONCLUSIONS: RWL combined with HISST produced significant alterations in cardiac biomarkers without impairment of left ventricular systolic function.

Noriega Gómez, J. C., et al. (2024). "Exercises to develop the musculature in the execution of projection techniques in wrestlers." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(1): 50-57.

In Olympic Wrestling, high levels of strength are required to execute technical movements; physical activity requires conditioning of the muscular structure that allows knowing the state of operation that makes it possible to make decisions as corrective measures in combat, the study that is present aims to select exercises to develop the muscles involved in the execution of throwing techniques in youth wrestlers of the Greco-Roman style, so as to verify the conditions in which they are to achieve outstanding results in the short and medium term in competitions; The investigation is directed to the search of an approach to the determination of exercises to develop the musculature in the execution of projection techniques in wrestlers of the Greco-Roman style of the Villa Clara province in the category 16-18 years. It responds to one of the problems present in the training process in general, since currently a large number of exercises are used to control and plan work with overloads, which is aggressive for the integrity of the health of the athlete because he manages to make maximum efforts in each of the exercises to be measured. To achieve this, different research methods at the theoretical, empirical and statistical-mathematical levels were used. The study was carried out taking into account the guidelines of the Comprehensive Athlete Preparation Program, the Technological Demands of Olympic Wrestling and the application of control and evaluation of projection techniques during competitions; It was distinguished by the theories that support and organize them, which allows controlling the progress of the current process and the future preparation of these youth fighters. The work carried out during the construction, evaluation and application of the research made it possible to demonstrate that it meets the essential scientific-technical requirements to efficiently conduct this process. The main results obtained are: the assessment of the solidity of the study carried out, determination of the conditions in which the youth wrestlers are found.

Özal, N., et al. (2024). "Effect of External Ear Deformity on Hearing in Wrestlers." Am J Audiol 33(3): 863-873.

PURPOSE: Cauliflower ear in wrestlers can lead to hearing impairment. This study primarily aims to assess the hearing of wrestlers with bilateral cauliflower ears and determine their external ear canal (EEC) resonance frequencies. Our second aim is to evaluate their hearing quality, speech, and spatial perception. METHOD: This study included 28 male wrestlers aged 18-35 years with bilateral cauliflower ears, as well as 27 male participants in the control group with no wrestling history. The participants' hearing thresholds were determined across the frequency range of 125-16000 Hz for air-conduction and 500-4000 Hz for bone conduction. EEC resonance frequencies were measured. Additionally, all participants completed the Turkish version of the Speech, Spatial, and Qualities of Hearing Scale (SSQ) questionnaire. RESULTS: Wrestlers with cauliflower ears exhibited significantly higher hearing thresholds, particularly at frequencies above 4000 Hz ($p < .05$). Analysis of EEC resonance showed a shift to higher frequencies in the second resonance peak of the right ear ($p < .001$) and the first resonance peak of the left ear ($p = .045$). SSQ scores revealed that wrestlers had higher spatial perception ($p = .046$), hearing quality ($p = .004$), and general scores ($p = .042$) in comparison to the control group. CONCLUSIONS: Blunt traumas in wrestlers, leading to cauliflower ear, can result in hearing loss. Moreover, deformities in the external ear affect the resonance frequencies of the EEC. Therefore, it is crucial to advocate for the use of ear protection equipment among wrestlers. When fitting hearing aids, attention should be given to changes in the EEC resonance frequency.

Patel BC, Hohman MH, Hutchison J, Hatcher JD. Cauliflower Ear. 2024 May 1. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 29261905.

Cauliflower ear deformity descriptions date back to early Roman and Greek history. Literary and artistic collections from those periods are replete with accounts of the deformed or damaged ears of wrestlers, boxers, and

other pugilists. Notably, the term "earmark" was coined during this period because wrestlers could be recognized by the characteristic appearance of their misshapen pinnae.

Medical appreciation for this affliction has a similar storied past. Though case descriptions may be found in Hippocrates' works, formal research into the disease did not begin until the mid-1800s. A second idiopathic mechanism was thought at the time to be responsible for cauliflower ear deformity besides direct trauma. The idiopathic hypothesis is derived from observations of people of advanced age or with mental health conditions.

The more conventional understanding of cauliflower ear developed in the 20th century, relating the pathology to a maladaptive and overly exuberant inflammatory response to the presence of an auricular hematoma or abscess (see **Image**. Auricular Hematoma). However, patients often find cauliflower ear deformity to be both unsightly and inconvenient, regardless of the cause. The condition may interfere with earphone-wearing, which is popular in modern times. Thus, preventing and treating this condition are important for emergency healthcare providers and surgical specialists.

Auricular Histology

The outer ear comprises several layers crucial for its function and protection. The skin covers both the external ear canal and auricle. The outer ear skin has essential structures, including hair follicles, sebaceous glands, and sweat glands, offering defense against environmental factors and aiding in temperature regulation. The epidermis is comprised of stratified squamous epithelium, providing a barrier against pathogens and preventing water loss. The dermis is situated below the epidermis, housing blood vessels, nerves, and connective tissue, providing structural support, and supplying nutrients to the overlying layers.

The auricle's core structural component is elastic cartilage, responsible for its shape and flexibility. Chondrocytes lie within a matrix of collagen and elastin fibers, though cartilage is poorly vascularized. The perichondrium is a layer of fibrous tissue surrounding the cartilage. This layer offers structural support to the elastic cartilage, supplies oxygen and nutrients to cartilage cells through its rich vascular supply, and contains chondroblasts responsible for cartilage repair and growth. The perichondrium also serves as an attachment site for the overlying skin, anchoring it in place and ensuring the auricle's integrity.

Notably, the outer ear's anatomy exhibits distinct features. The concave (inner or anterior) side has a thin subcutaneous layer and is closely attached to the auricular perichondrium. In contrast, the auricle's convex (outer or posterior) side has a thicker subcutaneous stratum and a muscle layer superficial to the perichondrium. The auricle remains susceptible to environmental influences and trauma despite its protective layers. Structural disruption can lead to complications like cauliflower ear deformity.

Piri, E., et al. (2024). "Investigation the Relationship Between Anthropometric Variables and Vo2max in Young and Adolescent Professional Wrestlers of the National Team." Journal of Physiology of Movement & Health 4(2): 41-50.

Background and purpose: Studies show that anthropometric indicators and aerobic fitness produce different responses in athletes of different sports fields. The purpose of this study was to investigate the relationship between anthropometric variables and Vo2max in young and adolescent professional wrestlers of the national team. Materials and methods: This research was descriptive-correlation study. The statistical population of the present study included 43 young professional wrestlers of the Iranian national team, of which subjects were voluntarily and available, with an average age of 17.72 ± 0.76 , an average height of 173.11 ± 8.05 and the weighted average was 73.07 ± 20.51 (22 teenage wrestlers and 21 young wrestlers). The subjects' anthropometric indices were measured using the body composition device and VO2max by the gas analyzer and Bruce test. In the inferential statistics section, the Shapiro-Wilk test was used to check the normality of the data distribution, and the Kendall test was used to check the correlation between the variables due to the non-parametric nature of the Vo2max data. SPSS version 26 software was used to analyze the data obtained from the research and Excel was used to draw the corresponding graphs. Also, the significance level of the tests in this research was considered to be $P \leq 0.05$. Results: The results showed that the minimum, maximum and average height, weight, fat-free mass, body mass index and maximum oxygen consumption of young professional wrestlers were more than the group of teenage, and the maximum percentage of fat in the group of adolescent wrestlers. The results showed that the comparison of body mass index, fat-free mass and fat percentage with maximum oxygen consumption in adolescent

showed a significant and inverse difference. Also, we showed a significant relationship between the body mass index and fat-free index of the two groups. Conclusion: It seems that young wrestlers performed better compared to adolescent wrestlers due to greater adaptability. But more studies are needed to prove the best in this field.

Poecoco, E., et al. (2024). "Fasting in Judo-Between Healthy Weight Control and Health Hazard: A Narrative Review." Obesities 4: 453-467.

Rapid weight loss strategies and weight cycling (losing and gaining weight repeatedly) are acknowledged problems in sports with weight categories, including judo. Extreme fasting, especially if combined with dehydration and intense physical exercise, may harm health and development, particularly those of children and teenagers engaging in judo competitions. However, there is substantial evidence for positive health effects of other forms of fasting. Here, we aim to provide an updated overview of the potential health risks associated with extreme dietary strategies in judo and contrast them with health-promoting fasting approaches. We conclude that the literature on the long-term health consequences of fasting in judo is scarce. This applies specifically to its potential association with eating disorders. Although many reports have highlighted the short-term risks of rapid weight loss, vulnerability and protection factors remain poorly understood. Rigorous scientific studies are needed to disentangle the factors that render fasting in judo healthy or unhealthy, considering both physical and mental health. We argue that a better understanding of weight management in judo is crucial to preventing health risks and designing healthy weight loss strategies, especially for young athletes.

Polevaia-Secareanu, A. (2024). "ON THE PROBLEM OF THE USE OF COMBAT MEANS IN THE DEVELOPMENT AND SOCIALIZATION OF CHILDREN WITH AUTISTIC SPECTRUM DISORDER." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(1): 58-62.

Numerous studies show that children with autism have reduced motor skills [5,6,7]. However, recently we can observe the participation of people with special needs in various recreational, physical education and sports activities, including sports achievements [1,2]. Consequently, the therapeutic programs must be oriented towards the formation of basic motor skills, movement patterns and motor activity that increases physical competence, in day-by-day life by use of different types of sports [3]. The system of martial arts is no exception, which can be considered as one of the forms of psychosocial adaptation. For a more complex analysis of the role played by sport in this issue we asked the following question: "What types of sports, in your opinion, can be used for the development and socialization of autistic children. We found, the majority of respondents preferred "Swimming" – 46.02%, the second choice was "Team sports" – 40.708%, and the third place was offered to "Gymnastics", "Combat sports" took the fourth place out of seven presented (36.28%). The following sports have not been overlooked as well, "Horseback riding" – 21.24%, "Athletics" – 17.70% and "Table tennis" – 0.88%.

Prasaja, M. D. and S. Widiastuti (2024). "ARM SLAM SKILL TRAINING MODEL FOR BEGINNER WRESTLING ATHLETES." Gladi Jurnal Ilmu Keolahragaan (Jakarta) 15(4): 578-584.

This study aims to improve the throwing skills of wrestling athletes aged 13-15 years. The research was carried out in early June to late June 2024 at the POPB DKI Jakarta Wrestling Sports Hall. The study was attended by all wrestling athletes aged 13-15 years, consisting of 30 athletes. The method used in this study is Research & Development with the ADDIE method. The instrument used is the Arm Throw skill test for ages 13-15 years which has been validated by martial arts expert lecturers, wrestling lecturers and wrestling coaches. Based on the initial test data for arm throw skills, an average result of 95.8333 was obtained. Then after being given training material in the study to improve wrestling arm throw skills for ages 13-15 years for 8 meetings, a final test was carried out with an average result of 104.5333 There is an increase in wrestling arm throw skills for ages 13-15 years.

Qi, S., et al. (2024). "Study on the Polymorphic Loci of Explosive Strength-Related Genes in Elite Wrestlers." *Genes* 15(8): 1068.

This investigation aimed to explore the relationship between Chinese elite wrestlers and the polymorphic loci of explosive strength genes, and to further explore the feasibility of its application to athlete selection. The snapshot technique was used to resolve the polymorphic loci of explosive power genes in the wrestler group (59 elite wrestlers) and the control group (180 ordinary college students), and to analyze the genotype frequencies and allele frequencies of each group. A chi-square test was performed on the genotype and allele distribution data of each group to analyze the loci of explosive power genes that were associated with elite wrestlers. The loci that had an association with elite wrestlers were combined with the genotyping data, and the dominance ratios of the genotypes were calculated using the chi-square test to determine the dominant genotypes associated with elite wrestlers. The *VDR* gene rs2228570 locus exhibited statistically significant differences in genotype and allele distributions between elite wrestlers and the general population ($p < 0.01$). At the rs2228570 locus of the *VDR* gene, the difference between the CC genotype and other genotypes was statistically significant ($p < 0.05$). The rs2228570 locus of the *VDR* gene was identified as the locus associated with Chinese elite wrestlers. The polymorphism of the *VDR* gene can be used as a biomarker for Chinese wrestlers, and the CC genotype can be used as a molecular marker for the selection of Chinese elite athletes in this sport. However, expanding the sample size of elite athletes is necessary to further validate the scientific validity and feasibility of these findings.

Keywords: wrestling; explosive power; single-nucleotide polymorphism; gene selection

Radák, Z., Aczél, D., Fejes, I. *et al.* Slowed epigenetic aging in Olympic champions compared to non-champions. *GeroScience* (2024). <https://doi.org/10.1007/s11357-024-01440-5>

The lifestyle patterns of top athletes are highly disciplined, featuring strict exercise regimens, nutrition plans, and mental preparation, often beginning at a young age. Recently, it was shown that physically active individuals exhibit slowed epigenetic aging and better age-related outcomes. Here, we investigate whether the extreme intensity of physical activity of Olympic champions still has a beneficial effect on epigenetic aging. To test this hypothesis, we examined the epigenetic aging of 59 Hungarian Olympic champions and of the 332 control subjects, 205 were master rowers. We observed that Olympic champions exhibit slower epigenetic aging, applying seven state-of-the-art epigenetic aging clocks. Additionally, male champions who won any medal within the last 10 years showed slower epigenetic aging compared to other male champions, while female champions exhibited the opposite trend. We also found that wrestlers had higher age acceleration compared to gymnasts, fencers, and water polo players. We identified the top 20 genes that showed the most remarkable difference in promoter methylation between Olympic champions and non-champions. The hypo-methylated genes are involved in synaptic health, glycosylation, metal ion membrane transfer, and force generation. Most of the hyper-methylated genes were associated with cancer promotion. The data suggest that rigorous and long-term exercise from adolescence to adulthood has beneficial effects on epigenetic aging.

Reale, R., et al. (2024). "Acute and Chronic Weight-Making Practice in Professional Mixed Martial Arts Athletes: An Analysis of 33 Athletes Across 80 Fights." *International Journal of Sport Nutrition and Exercise Metabolism* 34: 1-11.

Mixed martial arts' popularity has increased in recent years, alongside descriptive research and evidence-based performance recommendations. Guidelines for (both chronic and acute) weight making exist; however, how these translate in real-life scenarios and detailed investigations on practices in larger groups deserve attention. The present study examined the body mass (BM) and composition of 33 professional mixed martial arts athletes preparing for 80 fights. Athletes were supported by on-site dietitians, who encouraged evidence-based practices. Fasted BM was measured throughout the last ~10 days before all bouts (acute weight management phase). A subset of athletes had body composition assessed before and after the chronic weight loss phase for 40 fights. Most athletes engaged in chronic BM loss, and all engaged in acute weight loss. Many lost fat-free mass (FFM)

during the chronic phase, with rates of BM loss <0.5% best preserving FFM. Regardless of losses, the present athletes possessed greater FFM than other combat sport athletes and engaged in greater acute weight loss. Dehydration in the 24–48 hr before the weigh-in was not reflective of weight regain after the weigh-in, rather BM 7–10 days before the weigh-in was most reflective. These findings suggest that many mixed martial arts athletes could increase FFM at the time of competition by maintaining leaner physiques outside of competition and/or allowing increased time to reduce BM chronically. Acutely, athletes can utilize evidence-based protocols, eliminating carbohydrates, fiber, sodium, and finally fluid in a staged approach, before the weigh-in, reducing the amount of sweating required, thus theoretically better protecting health and preserving performance.

Reider B. Grappling With Injury. *The American Journal of Sports Medicine*. 2024;52(3):583-585.
doi:[10.1177/03635465241230333](https://doi.org/10.1177/03635465241230333) Editorial

Roelands, B. and Š. Bogataj (2024). "Optimizing Athletic Performance Through Brain Endurance Training." *Int J Sports Physiol Perform* 19(10): 973-974.

Combined physical and cognitive training, or brain endurance training (BET), is an innovative training methodology that integrates both physical and cognitive components within a single training session. This approach can be further refined based on the timing of cognitive training, categorized as before (pre-BET), during (intermixed-BET), or after (post-BET) physical training. BET is typically implemented over multiple sessions per week for an extended period of time (starting from 4 wk). The rationale behind BET is that it leverages the combined effects of physical and cognitive training on brain function and structure, potentially producing synergistic benefits that enhance both general brain health and general performance capacity.

Roklicer, R., et al. (2024). "Influence of rapid weight loss on hematological parameters in national-level wrestlers." *10th International scientific conference on kinesiology. Book of abstracts*: 211.

Purpose Rapid weight loss (RWL) is well-known phenomenon amongst wrestlers. It is characterized by a reduction of ~5% of body weight during the last week before the competition, with the aim of increasing the probability of winning against a potentially lighter athlete. Along with traditional weight loss procedures, competitors usually attend high intensity sport-specific training (HISST) sessions to facilitate the weight reduction. The aim of this study was to determine the influence of RWL together with HISST and the impact of HISST without RWL on hematological parameters in wrestlers. Methods The sample consisted of 12 Greco-Roman wrestlers (mean body weight 73.48±4.52 kg, age 24.3±5.1 years, body height 175.22±3.68 cm). The investigation consisted of 3 phases: Initial measurement (IM), high-intensity sport-specific training combined with RWL of 5% (phase 1 - P1) and only high-intensity sport-specific training (phase 2 -P2). In P1 wrestlers used self-chosen procedures of weight cutting. After each phase blood sampling was performed to measure the changes in hematological parameters: red blood cells (RBC), hemoglobin (HGB), hematocrit (HCT), white blood cells (WBC) and platelet (PLT). Results All of the athletes reduced 5% of their body weight successfully. The number of RBC significantly decreased in P2 compared to IM (p=0.030). The values of this parameter were also lower during P2 compared to P1 (p=0.009). HGB content significantly decreased in the P2 compared to P1 (p=0.012). The HCT concentration significantly decreased in P2 compared to IM (p=0.005). Lower values of this variable were recorded during P2 when compared to P1 (p=0.010). A significant increase in the number of WBC was registered during P1 (p=0.000) and P2 (p=0.000) compared to the IM. The level of PLT increased significantly during P1 compared to IM (p=0.003), while in P2 recorded values were significantly lower compared to P1 (p=0.001). Conclusion The results of this study showed that weight loss of 5% when practiced both with and without HISST stimulated alterations in the examined parameters. Specifically, when RWL was combined together with HISST increase in considered variables was induced to a higher extent compared to the HISST performed alone, revealing a considerable impact of weight cutting procedures on hematological parameters

Samokha, A., et al. (2024). "UKRAINIAN ROOTS OF IVAN PIDDUBNY." International Journal of Wrestling Science **14**(1): 9-32.

The Ukrainian philosopher Hryhoriy Savych Skovoroda said, "Know your land... Yourself, your family, your people, your land - and you will see your way in life". Human identity is determined by two main factors: genealogy and self-identification. In total, more than 250 families, about 700 people, were investigated in the genealogical tree of the great Piddubny family. The main documents are stored in the state archives of Ukraine. These are original documents that do not raise doubts about their authenticity. Records of church metric books are informatively valuable. Ivan Piddubny's ancestors, like other Cossacks, were farmers and defenders of their homeland. Thus, there is the Piddubny surname in the "Register of the Zaporizhzhia Army of 1649", which was compiled after the signing of the Peace of Zborivsk..

Santos, D., et al. (2024). "A scoping review of rapid weight loss in judo athletes: prevalence, magnitude, effects on performance, risks, and recommendations." Physical Activity and Nutrition **28**: 001-012.

[Purpose] Combat sports, such as judo, are weight categorized. Weight control was established to promote fair disputes among individuals. However, combat sports athletes adopt rapid weight loss (RWL) to obtain an advantage over smaller and lighter opponents. This scoping review article presents the prevalence, magnitude, and methods of RWL and its effects on physical and competitive performance, health risks, and psychological effects. Specific recommendations for attenuating the effects of RWL are also presented. [Methods] Studies were retrieved from Web of Science, PubMed, and Scopus databases. Four hundred and forty-six articles were identified, of which fifty-three were considered eligible for this review. [Results] The results showed that the prevalence of RWL was between 40% and 92.9% and that athletes reduced their body mass by approximately 5%. Although the literature suggests that RWL impairs the performance and psychological well-being of athletes, these results were obtained when recovery time was not provided. [Conclusion] No negative effects on performance were observed when the recovery time was >4 h. However, health risks due to RWL practices should be considered, and RWL should be avoided.

Schultz, C. M., et al. (2024). "Primary Care Considerations for the Adolescent Wrestler." Curr Rev Musculoskelet Med **17**(10): 422-433.

PURPOSE OF REVIEW: Adolescent wrestlers undergo intense physical combat. While guidelines are effective in keeping the sport safer, concerns specific to the adolescent wrestler may be missed at primary care visits without knowledge of the unique challenges faced by these athletes. The following review highlights important characteristics of the adolescent wrestler which are of interest to primary care providers. RECENT FINDINGS: Recommendations for concussion management are evolving to gradual return-to-sport after physician clearance rather than total sport removal. Prolonged skin-to-skin contact also places athletes at greater risk of dermatologic infections, which often require removal from competition, treatment, and/or coverage. Finally, adolescent nutritional literature recommends limiting pre-match weight loss to 3-5% body weight due to noted kidney damage that may result from larger deficits. Adolescent wrestlers are more prone to acute injuries than chronic overuse injuries, with most injuries occurring above the trunk. Primary care providers should consider obtaining imaging to rule out severe injuries or referring to specialist providers. Current guidelines for skin infections require frequent pre-match skin checks and mandatory waiting periods when certain infections are identified. However, the primary care provider is well-equipped for more in-depth skin examination, discussion of skin hygiene, and appropriate treatment of skin infections. Athletes attempting to meet lower weight classes may put themselves at risk of acute kidney damage, under-fueling, and eating disorders. Current guidelines attempt to mitigate excessive weight changes in the adolescent wrestler during competition season, but primary care providers should emphasize healthier methods of weight fluctuation and look for indicators of physiological or psychological effects.

Seker, R., et al. (2024). "Determination of weight loss methods and effects among wrestlers before an official championship." Front Nutr 11: 1505759.

INTRODUCTION: It is known that combat athletes frequently lose weight before a competition. This study aimed to determine the weight loss methods before an official championship and the effects of these weight loss methods on the performance of wrestlers. **METHOD:** The sample of the study consisted of 350 competitive wrestlers. The "Athlete Weight Loss Methodology and Effects Scale" and personal information form were used as data collection tools in the study. In the data analysis, independent samples T-test, One-way ANOVA, and Pearson correlation analysis were used in addition to descriptive statistics. **RESULTS:** Wrestlers generally reported dieting by restricting fatty (89.1%) and carbohydrate (83.4%) foods. It was observed that they preferred jogging with a raincoat (89.1%) and/or using the sauna (79.7%) as a weight loss method. Wrestlers also reported that they performed weight loss, although at a low level, by using ergogenic aids such as laxatives (31.7%) and/or diuretic pills (28.0%). They were observed to experience physiological effects such as muscle cramps (72.9%), injury (71.1%), and/or difficulty breathing (60.9%), as well as psychological effects such as feeling extremely tired (81.7%), stress (79.7%), decreased performance (78.6%) and/or extremely irritability (71.4%). It was determined that there was no difference between the weight loss methods and effects of the wrestlers according to their gender and wrestling style ($p > 0.05$). On the other hand, it was determined that the diet level of U20 wrestlers was higher than U17 ($p < 0.05$) and Senior wrestlers and that U17 and U20 wrestlers were exposed to higher levels of physiological and psychological effects than Senior wrestlers ($p < 0.05$). **CONCLUSION:** It was determined that wrestlers preferred methods such as restricting food and fluids, using a sauna, and jogging with a raincoat to lose weight. It is necessary to prevent young wrestlers from losing weight before the competition. Thus, it is possible to prevent wrestlers in their development period (U17 and U20) from being exposed to physiological and psychological effects caused by losing weight.

Shadgan, B., et al. (2024). "Wrestling injuries during the 2016 Rio and 2020 Tokyo Olympic Games." Br J Sports Med 58(15): 818-825.

OBJECTIVES: To evaluate and compare the injuries of Olympic wrestlers during the 2016 Rio and 2020 Tokyo Olympic Games held in August 2021 due to the COVID-19 pandemic. **METHODS:** In this descriptive epidemiological study, injury report forms were used to collect and analyse injury data during the competitions. **RESULTS:** During 410 matches in the Rio Olympic Games, 21 injuries were recorded among 346 wrestlers (112=women), a rate of 5.1 injuries/100 bouts and 6.1 injuries/100 athletes. During 322 matches in the Tokyo Olympic Games, 28 injuries were recorded among 287 wrestlers (96=women), with 8.7 injuries/100 bouts and 9.8 injuries/100 athletes. However, these apparent differences in injury rates between Tokyo and Rio were not statistically significant (injuries/bout: $p=0.057$, 95% CI: 0.31 to 1.02; injuries/athlete: $p=0.087$, 95% CI: 0.33 to 1.08). Mild injuries comprised the greatest proportion of injuries in both Olympic Games. Severe injuries accounted for 0%, 16.7% and 36.4% of injuries in Greco-Roman, Freestyle and Women's wrestling, respectively. **CONCLUSION:** Most wrestling injuries in the 2016 Rio and 2020 Tokyo Olympic Games were mild skin injuries in the head and face regions due to direct body contact during standing positions in the 1/8-final round of wrestling competitions. No critical injury was observed during the recent Olympic Games. Attention should be drawn to preventing upper limb joint dislocations as common severe injuries in both Olympic Games. While not statistically significant, the Tokyo Games, after the COVID-19 pandemic, witnessed a higher injury occurrence than the Rio Games.

Slacanac, K. and M. Dokmanac (2024). "AGING IN WRESTLERS: STRUCTURE OF WON MEDALS, MOST SUCCESSFUL TEAMS, AND WRESTLERS BY CONTINENTS AT THE OLYMPIC GAMES 2024." INTERNATIONAL JOURNAL OF WRESTLING SCIENCE 14(2): 19-28.

Given these insights, there is a need for a detailed analysis of the technical and tactical actions of teams and individual wrestlers, including techniques, wrestling positions, time spent, and overall efficiency. This will help

determine the true reasons behind the superior performance of Asian wrestlers compared to their European counterparts, particularly in terms of medal wins. This paper defined the structure of medals won by continent, determined the structure of medals won by nation, and identified the best wrestlers by style. Japan, the United States of America, and the Islamic Republic of Iran were the most successful nations. Asian countries won 50% of all medals, while European wrestlers experienced a notable decline in the number of medals (27.77%) and their performance quality. In Greco-Roman wrestling (GR), lower WQ (points per minute), the total number of points scored, and points per match are observed than in Freestyle Wrestling (FS) and Women's Wrestling (WW). This highlights the reduced efficiency and attractiveness of the GR style. Additionally, some nations granted citizenship to foreign wrestlers who subsequently won medals for them in these Olympic Games. The study also pointed out the extremely high efficiency among Japanese female wrestlers, in contrast to the low efficiency (only 16.67%) of European female wrestlers compared to GR and FS. This disparity indicates underdevelopment in women's wrestling in Europe, highlighting areas for further research and improvement. A comprehensive performance analysis of teams and wrestlers is crucial, focusing on techniques, wrestling positions, timing, and overall efficiency. Such analysis could reveal the reasons behind the superior performance of Asian wrestlers compared to their European counterparts and help guide improvements.

Slacanac, K., et al. (2024). "Competition performance of the Croatian wrestling team at major competitions." 10th International scientific conference on kinesiology. Book of abstracts: 641-645.

Monitoring of competitive performance in wrestling over the years has evolved, and the results of analyses are publicly available immediately after the competition. Analyses of major wrestling competitions provide wrestlers and coaches with feedback on competitive efficiency and allow for better technical-tactical preparation of wrestlers. To improve the competitive efficiency of Croatian wrestlers in major wrestling competitions, an analysis was conducted to determine the structure of offensive and defensive activities. The analysis of the differences in won and lost points by Croatian Greco-Roman wrestlers in the major wrestling competitions in the Olympic cycle 2020-2024 shows that they significantly won points using passivity (22,0%) and gut wrench techniques (38,6%), while they lose the most points using techniques such as take down (12,4%), hip turning throw (5,9%), forward bending throw (7,6%), and lifts (22,4%). The results of this study indicate a deficit in the defensive phase in the parterre position and very weak offensive efficiency compared to the modal characteristics of medalists in major wrestling competitions. Further analysis of tactical preparations, biomechanical and conditioning readiness analysis for each wrestler, analysis of implemented training programs (number of days, sparring partners, training duration), and timing of Croatian wrestlers' form is necessary. The limitation of refers to use of different names of variables as well as use different set of variables in other studies, because of that it is necessary to standardize and precisely describe variables to be appropriate, understandable and apply to next researches.

Snyder, E. M., et al. (2024). "Decreasing Incidence of Youth Wrestling Injuries: A 10-Year Analysis of National Injury Data." Orthop J Sports Med 12(12): 1-6.

BACKGROUND: Wrestling is among the most common youth sports in the United States, with about 260,000 high school participants annually. There is a lack of literature investigating wrestling injury profiles and mechanisms of injuries. In the past 15 years, urgent care utilization has increased, and National Federation of State High School Associations (NFHS) concussion protocols have been developed and implemented. **PURPOSE/HYPOTHESIS:** The purpose of this study was to analyze causes, diagnoses, body parts, and trends associated with wrestling injuries presenting to US emergency departments. It was hypothesized that there would be (1) decreased overall injuries presenting to emergency departments because of increased urgent care utilization and (2) decreased concussions because of the NFHS rule implementation and revision. **STUDY DESIGN:** Descriptive epidemiology study; Level of evidence, 3. **METHODS:** Youth wrestling injuries presenting to US emergency departments between January 1, 2013, and December 31, 2022, were queried from the National Electronic Injury Surveillance System database. The data included date of presentation, age, sex, race, body part,

injury diagnosis, disposition, and a brief injury narrative. National estimates (NE) were calculated using the associated statistical weight of the reporting hospital. Linear regressions were performed to investigate the relationship between year and NE for overall injuries, diagnoses, body parts, mechanisms of injury, and other subanalyses. Statistical significance was set at $P < .05$. RESULTS: A total of 8628 (NE = 296,502) wrestling injuries met the inclusion criteria for this study. The mean age at presentation was 14.3 ± 2.6 years (range, 3 to 18 years). The shoulder (NE = 43,207 [14.6%]), head (NE = 40,875 [13.8%]), and knee (NE = 30,218 [10.2%]) were the most injured body parts. The most common diagnoses were strain/sprain (NE = 91,924 [31%]), other/not stated (NE = 53,736 [18.1%]), and fracture (NE = 52,261 [17.6%]). Common mechanisms of injury included not specified (NE = 148,169 [50%]), impact with mat (NE = 61,557 [20.8%]), and abnormal rotation/strain (NE = 37,449 [12.6%]). Overall injuries ($P = .01$) (coefficient: -1763 [95% CI, -2963 to -563]) and concussions ($P = .01$) (coefficient: -178 [95% CI, -302 to -55]) statistically significantly decreased. CONCLUSIONS: Our study showed a trend in the decrease in overall injuries and concussions in high school wrestlers. Strains/sprains were the most common diagnoses with the shoulder being the most common site. Youth wrestlers would benefit from future research analyzing risks associated with these injuries as well as advances in protective gear.

Song, M., et al. (2024). "Analysis of Severe Spinal Injuries in Korean Elite Female Wrestlers." *Applied Sciences* 14: 7250. <https://doi.org/10.3390/app14167250>

Women's wrestling is actively practiced in many countries. While severe spinal injuries pose a threat to an athlete's career and health, research on severe spinal injuries in female wrestlers remains limited. The aim of this study was to investigate the characteristics of severe spinal injuries and post-injury management in Korean female wrestlers. We enrolled 54 female wrestlers participating in the national team selection competition. Interviews were conducted to examine the characteristics of spinal injuries that resulted in a time loss of more than three weeks from training throughout their athletic careers and their post-injury management practices. Approximately 46% of participants experienced severe spinal injuries, and 52% faced re-injuries during their wrestling careers. These injuries predominantly occurred during technical training due to overuse during tackling and standing attacks. The most frequent injuries were lumbosacral disc injuries (72%) and cervical disc injuries (20%), with 36% requiring surgery. Nearly half of the injured athletes received specialized rehabilitation, yet roughly 76% resumed training without medical clearance. Athletes injured during their student years were notably less likely to receive specialized rehabilitation compared with those injured during their professional careers ($p = 0.011$). On average, athletes returned to play within 2.7 to 3.0 months. Spinal injury characteristics and post-injury management were not significantly different between the light- and heavyweight classes. While Korean female wrestlers are at a high risk of experiencing severe spinal injuries and re-injuries during their careers, appropriate post-injury management is often lacking, highlighting the need for proactive intervention by healthcare professionals to prevent recurrent spinal injuries in female wrestlers and to ensure safe return to training.

Tawfeeq Ezzi, T. A. F. and F. Aziz (2024). "The impact of using functional strength exercises to develop some physical capabilities and enhance the performance of wrestling grips." *Proximus Journal of Sports Science and Physical Education* 1(4): 92-102.

The study's objectives were to prepare functional strength exercises that would improve the research sample's physical capabilities and wrestling grip performance as well as to ascertain the effects of utilizing these exercises to improve the research sample's physical capabilities and grip performance. The researchers used the appropriate strategy to address the research issue because experimentation was a key component of the procedure. The researchers' selection of the sample was one of the most important stages and processes of the investigation. The researchers undoubtedly considered the research sample as soon as they started deciding on the topic and goals of the study. Consequently, a sample of twenty-two wrestlers from the advanced division who were practicing at the Al-Adhamiya Club's wrestling facility were used for the study. Al-Adhamiya Sports Club wrestlers were purposefully chosen for the competition. This led to an increase in the study sample size to 20

wrestlers, or 90.9% of the total research population. The researchers used anthropometric measures to confirm the sample's homogeneity. The findings demonstrated that functional strength training significantly improved the experimental group's physical capabilities in the wrestlers' physical capabilities tests compared to the control group in the post-test. In the physical capabilities tests among the wrestlers, functional strength exercises also revealed a substantial difference in performance levels between the experimental and control groups in the post-test, favoring the experimental group. Regarding the recommendations, they state that functional strength exercises should be used to improve wrestlers' physical capabilities and that these exercises must replicate the performance of the skill, which includes training the muscles involved in the wrestling grip.

Thomas, T., et al. (2024). "Staphylococcus aureus infections in wrestlers: a cause for concern." Arch Dermatol Res **317**(1): 24.

TOPCU, A. and C. EDİS (2024). "The Effects of in-Class Educational Games on Reaction and Agility Skills in Female Wrestling Athletes." International Journal of Sport, Exercise and Training **10**(4): 249-256.

Aim: The aim of this study was to investigate the effects of educational games including perception, decision making and reaction skills on agility and reaction skills.

Methods: A total of 24 young female wrestling athletes who regularly train 5 times a week were included in the study (Training Group= age: 20,08±2,19 year, height: 1,60±5,33 cm, body weight: 59,50±10,38 kg, BMI: 22,94±3,19, Control Group= age: 17,83±2,43 year, height: 1,62±,07 cm, body weight: 59,61±11,61 kg, BMI: 22,43±3,50). The training group was asked to play 8-week educational games involving perception, decision making and reaction skills for 30 minutes in the classroom environment without much effort before routine wrestling training. Visual hand reaction (dominant, non-dominant and mixed hand), Y-Reactive and Speedcourt® agility tests were performed before and after the training sessions.

Results: Paired sample t test was used for intra-group comparison analyses and independent sample t test analyses were used for comparison statistics of data between 2 groups. The Y-Reactive agility of the training group was statistically significant ($p < 0.05$) from the first test data after 8 weeks. In the post-test analyses between the two groups, a significant difference was found only in the Speedcourt® agility test ($p < 0.05$). There was no statistical difference between Y-Reactive agility and hand reaction tests in the post-tests ($p > 0.05$). **Conclusion:** The 8-week, 30-minute educational games applied in the classroom environment have positive effects on agility skills. Teachers and coaches can contribute to the development of agility skills not only in the field environment but also in the classroom environment by playing logical and purposeful educational games.

Tutar, M., et al. (2024). "An investigation of some motoric characteristics of national elite wrestling athletes." Science, Movement & Health **24**(1): 50-57.

Aim. This study reveals the data of the analysis of the motoric characteristics of thirty National A wrestling athletes, ten Greco-Roman, ten freestyle and ten female. **Methods.** The study included 10 national wrestling athletes, 10 freestyle and 10 female National A wrestling athletes. **Results.** These data show a high level of training of the athletes and confirm the specificity of these tests for single fights. The applied tests are informative for the estimation of the functional state of athletes. The dynamics of their results gives the necessary information to predict the success of athletes and can be used in monitoring their condition. **Conclusions.** As a result of the tests performed in elite athletes, it is recommended to give special exercise movements for muscle groups with muscle imbalances.

Verna, R. (2024). "Doping yesterday, today, tomorrow: A challenge for the clinical laboratory." Malays J Pathol **46**(1): 1-10.

This work highlights the role of the clinical laboratory, in the early detection of the use of substances prohibited for doping. This is because most people who practice sports today are non-professional athletes and amateurs, in particular young kids. These persons are not subjected to anti-doping controls but are at risk for their health. Endocrinologists and laboratory tests, by detecting evidence of such usage can help protect their health. Anti-doping testing require specific instruments for qualitative and quantitative chemistry, to meet regulations of official competitions but are impossible to be used in every person because of high cost. A particular role the clinical laboratory can acquire in the future is through its molecular biology sections, when genetic doping will probably be a reality and quantitative chemistry will be unable to detect it. A brief history of doping is provided to understand the reasons of its spread. Although doping has great resonance nowadays, it is not a recent problem. It was common among ancient Greek wrestlers and Romans, who used mixtures of herbs and stimulants. Ancient Greece started the Olympic Games and winners assumed great esteem, akin to demi-god status. Therefore, any attempt to improve athletic performance was a norm, also because the damage caused by the substances used was not known at that time. The use became so widespread that soldiers also used drugs to better combat during recent wars, and doping was practiced by athletes, actors and musicians in attempts to obtain better performance results. Today, doping has been refined so as not to be discovered and there is a continuous race between those who promote new substances and those who, like the World Anti-Doping Agency (WADA), were created to defend the health of athletes and comply with regulations of competitions. The clinical laboratory plays a fundamental role in identifying the use of prohibited substances, especially in competitions not classified as official, which are the majority and involve thousands of amateurs. In this paper a series of laboratory tests are proposed in this perspective, at low cost without the need of qualitative/quantitative chemical analyses required by the sport jurisdictions. Finally, a glance into genetic doping illustrates a likely future and imminent practice.

Yildiz, M., et al. (2024). "Relationship between training load, neuromuscular fatigue, and daily well-being in elite young wrestlers." Research quarterly for exercise and sport **95**(2): 303-312.

Purpose This study investigated acute workload (wAW), chronic workload (wCW), acute: chronic workload ratio (wACWR), training monotony (wTM), perceived load training strain indicators (wTS), and countermovement jump (CMJ) as indicators of wellness in one season and defined weekly variations. In addition, we analyzed the relationships between training load measurements and weekly reports. **Methods** 16 elite young wrestlers were monitored daily with individual observations for 46 consecutive weeks throughout the season. Training load was obtained using the session rating of perceived effort. wSleep, wStress, wFatigue & wMuscle Soreness well-being were monitored daily using the Hooper index. **Results** As a result of the analysis, it was found that there is a moderate relationship ($r = 0.51$, $p = .003$) between ACWR and w mean load (A.U.) and a high relationship ($r = 0.81$, $p < .001$) between monotony and strain. **Conclusion** All variables other than ACWR, w mean load, strain, and monotony presented small and statistically insignificant relationships. These results provide coaches and practitioners with new insights into perceived loads and health changes during a season at the elite youth level.

Yoo, S., et al. (2024). "Severe injuries in elite Korean male wrestlers: a comparison study between wrestling styles." The Korean Journal of Sports Medicine **42**(2): 105-112.

Purpose: This study aimed to examine the experience of severe knee, shoulder, and ankle injuries in elite Korean male wrestlers, focusing on a comparison between Greco-Roman (GR) and freestyle (FS) wrestling. **Methods:** A total of 90 wrestlers (46 GR and 44 FS aged 24.8 ± 3.7 years) who participated in the national team selection tournament voluntarily participated in this study, selected by random sampling. A standardized questionnaire was used to collect data on severe injuries to the knee, shoulder, and ankle that resulted in a time loss of ≥ 3 weeks. **Results:** Approximately 41% of all participants experienced severe injuries to the knee, 21% to the shoulder, and 30% to the ankle. FS wrestlers were significantly more likely to experience severe knee injuries than GR wrestlers ($p < 0.001$), and they tended to require more time to return to play. Significant differences in specific maneuvers that caused severe knee ($p < 0.001$), shoulder ($p = 0.011$), and ankle ($p = 0.002$) injuries were

observed by wrestling style. Conclusion: The current findings indicate that the patterns of severe injuries in wrestling may vary by wrestling style, emphasizing the importance of developing wrestling style-specific injury prevention and management strategies.

Yoshida, E., et al. (2024). "Evidence of weight loss in junior female judo athletes affects their development." Front Sports Act Living **6**: 1420856.

PURPOSE: The facile manipulation of body weight in junior athletes has the potential to pose significant risks to their lifelong health. In judo, which is a weight class sport, pre-competition weight loss is widespread even among juniors, but information on the current situation is scarce, especially for female athletes, for whom it is important to provide adequate nutrition and enhance bone mass during the growth period, and the details of the current situation are not clear. Therefore, the purpose of this study was to determine the actual weight loss during the growth period in junior female judo athletes and its subsequent impact on their health. **METHODS:** The survey was a cross-sectional survey of junior female judo athletes in Japan using a questionnaire. Participants were asked to respond via an online questionnaire about their weight, height, weight loss experience, menstruation, competition results, and other lifestyle. **RESULTS:** 51.8% of subjects experienced weight loss for competition during their junior high school years (ages 12-15). Those who experienced weight loss during secondary sexual characteristics were found to be significantly shorter in current height than those who did not ($p < 0.05$). Weight loss during secondary sexual characteristics did not affect current menstrual cycle. There was no significant difference in competition results due to the experience of weight loss during junior high school ($\chi^2(2) = 4.485$, $df = 3$, n.s.). **CONCLUSIONS:** These findings suggest that weight loss during the growth spurt phase may adversely impact normal development. It also suggested that weight loss during the junior high school years may not be a strategy to bring about better competition results. These observations indicate the need for education on appropriate class selection and weight control for junior athletes in weight class competitions.

Yu, L., et al. (2024). "Influence of slow and rapid weight loss periods on physiological performance, mood state and sleep quality in male freestyle wrestlers: a study from Sichuan Province, China." Frontiers in Psychology **15**: 1445810.

Objective: This study aims to investigate the changes in physiological performance, mental state and sleep quality during the weight reduction phase prior to competition in male freestyle wrestlers. **Methods:** This study included 16 male freestyle wrestlers from Sichuan Province, China. Participants were evaluated at three time points: the first day of slow weight reduction (T1, March 26), the first day of rapid weight reduction (T2, April 26) and the day before the competition (T3, May 3), and measurements were taken for physiological performance, mood state and sleep quality. **Results:** The most relevant findings indicated the following: Morning heart rate, creatine kinase and fatigue scores increased by 12.6, 64.6, and 19.0%, respectively, from T1 to T2 ($p < 0.05$), and decreased by 14.1, 36.6, and 16.8%, respectively, from T2 to T3 ($p < 0.05$). Hemoglobin and testosterone levels decreased by 3.0 and 16.8%, respectively, from T1 to T3 ($p < 0.05$), and by 2.9 and 18.2%, respectively, from T2 to T3 ($p < 0.05$); The secondary findings revealed the following: The total mood disturbance scores decreased by 3.8% from T2 to T3 ($p = 0.072$), positive mood scores decreased by 9.0% from T1 to T2 ($p = 0.090$), the Pittsburgh Sleep Quality Index total scores increased by 14.4% from T1 to T2 ($p = 0.323$) and total work output and average power output decreased by 7.3 and 7.8%, respectively, from T1 to T3 ($p = 0.067$, $p = 0.052$); Regression analyses predicted negative mood ($Y1 = 62.306 - 0.018 \times \text{maximum power output}$) and sleep quality ($Y2 = 2.527 + 0.278 \times \text{Immunoglobulin G}$) during the weight reduction period. **Conclusion:** The combined slow and rapid weight reduction approach effectively minimized body fat in athletes with limited effect on their physiological performance and sleep quality. However, the effects were adverse on certain health variables and anaerobic power in Chinese male freestyle wrestlers. The identified correlations between negative mood and maximum power, and between sleep quality and immunoglobulin G, shed new light on factors influencing athletes' well-being during weight reduction, and underscored the need for careful monitoring of physiological variables in future weight management strategies.

Zhang, Y. and Y. J. Sim (2024). "Effects of circuit weight training by intensity on stress hormones and antioxidant capacity in high-school wrestlers." *J Exerc Rehabil* **20**(5): 183-188.

We aimed to investigate the effects of 8-week circuit weight training by intensity on blood stress hormones and antioxidant capacity in high-school wrestlers. This study involved 27 male wrestlers with >2 years of wrestling experience who were randomly assigned to either a low intensity (n=13) or a high-intensity circuit weight training group (n=14). The participants performed circuit weight training for 60 min per session, 3 times per week for 8 weeks. The low- and high-intensity circuit weight training exercises were performed at 50%-60% and 70%-80% of one-repetition maximum for 10 stations, respectively, and 8-15 repeated sessions per station were performed in order. No changes were observed in adrenocorticotrophic hormone (ACTH), cortisol, epinephrine, and norepinephrine levels between the two training groups. When compared to levels before the training, ACTH and epinephrine levels decreased, whereas cortisol levels increased. However, no difference was observed in norepinephrine levels. Further, no differences were observed in malondialdehyde (MDA) and glutathione peroxidase (GPX) levels between the two groups. However, MDA and GPX levels were increased from those before training. Changes in superoxide dismutase levels were observed between the two groups, but the change was significant only in the high-intensity circuit weight training group. Long-term training did not increase lipid peroxidation, but increased the activity of antioxidant enzymes that defend against oxidative stress. The antioxidant defense system in tissues can be regulated by exercise intensity as well as physical training status.

Zhong, Y., et al. (2024). "The Practice of Weight Loss in Combat Sports Athletes: A Systematic Review." *Nutrients* **16**(7).

The aim of this systematic review is to comprehensively assess the weight loss (WL) practices in different combat sports (CS). The review protocol was preregistered with PROSPERO [CRD42023487196]. Three databases were searched (Web of Science, EBSCOhost, and PubMed) until 8 December 2023. Eligible studies had to meet five criteria: they must have been (a) written in English, (b) published in a peer-reviewed journal, (c) used a survey design to investigate the WL practices of CS athletes, and (d) reported the WL methods used by athletes using a five-point scale. Twenty-six studies (3994 participants from 14 CS) were included. This review found that (1) WL is highly prevalent in CS athletes; (2) many CS athletes started losing weight for competition as teenagers two to three times a year; (3) CS athletes usually lose <5% body weight in 7-14 days before competition; (4) increasing exercise and gradually dieting are the most commonly used WL methods; and (5) the influence of scientific practitioners on athletes is negligible. The habitual practices of CS athletes may be relatively harmless, but in some special cases, CS athletes also perform extreme WL practices. Scientific practitioners have little influence on their WL practices, which may form a vicious cycle of non-qualified influence.