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# 2019

## Annual Compilation of Wrestling Research



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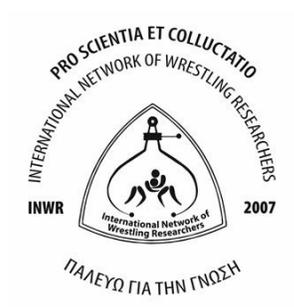
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**The Annual Compilation of Wrestling Research 2019** is compilation of published wrestling-related research published during 2019 and is provided by the International Network of Wrestling Researchers (INWR). The INWR is the largest scientific support group for a sport in the world! Our group has grown to over 500 academics, scientists, doctors and wrestling professionals, from 82 countries who are involved with the sport of wrestling. ([www.inwr-wrestling.com](http://www.inwr-wrestling.com)) Our Mission Statement is:

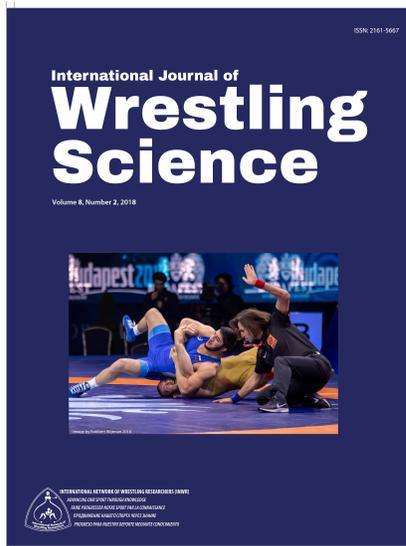
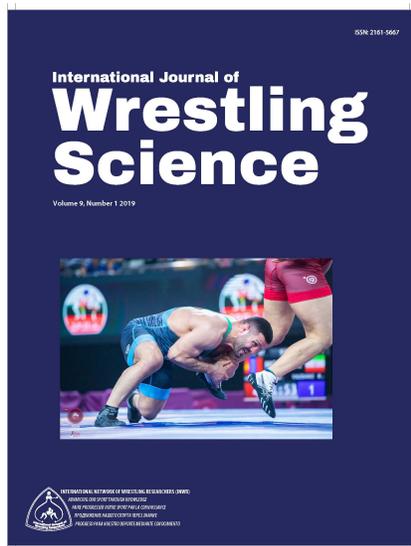
*The International Network of Wrestling Researchers (INWR) seeks to facilitate the development of wrestling around the world by drawing all wrestling sport science professionals together, in a manner that through our international and intercultural cooperation we are empowered to support the development 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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## 2019 Compilation of Wrestling Research

Ahmetov, I. I., Roos, T. R., Stepanova, A. A., Biktagirova, E. M., Semenova, E. A., Shchuplova, I. S., & Bets, L. V. (2019). Is testosterone responsible for athletic success in female athletes? , 19. doi:10.1101/557348

The aim of this study is to determine the interrelationship between the resting serum testosterone (T) levels (an inherited trait) of female athletes from different types of sporting events and their athletic success. The study involves 599 Russian international-level female athletes (95 highly elite, 190 elite, and 314 sub-elite) and 298 age-matched female controls. All subjects were age 16-35 years old and to the best of our knowledge have always tested negative for performance enhancing substances. The athlete cohort was stratified into four groups according to event duration, distance, and type of activity: 1) endurance athletes, 2) athletes with mixed activity, 3) speed/strength athletes, and 4) sprinters. Athletic success was measured by determining the level of achievement of each athlete. The mean (SD) T levels of athletes and controls were 1.65 (0.87) and 1.76 (0.6) nmol/L ( $P=0.057$ ) with ranges of 0.08-5.80 and 0.38-2.83 nmol/L in athletes and controls, respectively. No significant differences in T levels were found between different groups of athletes. T levels were positively correlated ( $r=0.62$ ,  $P<0.0001$ ) with athletic success in sprinters (runners, cyclists, kayakers, speed skaters, swimmers). Moreover, none of the sub-elite sprinters had  $T > 1.9$  nmol/L, while 50% of elite and highly elite sprinters had  $T > 1.9$  nmol/L (95% CI: 2.562-862.34; OR=47.0;  $P<0.0001$ ). We do not observe the benefits of having high T levels for success in other groups of athletes. Conversely, highly elite middle-distance ( $P=0.235$ ) and mixed activity athletes ( $P=0.096$ ) tended to have lower T levels than less successful athletes. Our data suggest that the measurement of the serum T levels significantly correlates with athletic success in sprinters but not other types of athletes and in the future may be useful in the prediction of sprinting ability.

Akhoundnia, K., Lamir, A. R., Khajeie, R., & Arazi, L. (2019). The Effect of Sport-Specific High Intensity Interval Training on Ghrelin Levels and Body Composition in Youth Wrestlers. *Annals of Applied Sport Science*, 7(1), 11-17. doi:10.29252/aassjournal.7.1.11

Background. High-Intensity Interval Training (HIIT) may affect Acylated Ghrelin (AG) through changes in body composition. Objectives. The present study was designed to investigate and compare the effects of two different orders of wrestling-based HIIT on AG levels and body composition in highly trained wrestlers. Methods. Forty-two male wrestlers (aged 16-21 years) were randomly assigned to one of three groups: HIIT23 (2 sets of 3 min wrestling techniques; by 80-90% HRmax); HIIT32 (3 sets of 2 min wrestling techniques; by 90-100% HRmax); and a control group that performed routine wrestling exercises. HIIT protocol consisted of eight techniques which were performed three days/week for eight weeks. Body composition and total plasma AG were measured 48 h before and after the protocol. Results. Body fat percentage ( $p<0.01$ ) and weight ( $p<0.05$ ) were significantly decreased in the HIIT groups from pre to post-test. There was also a significant decrease in body fat percentage of both HIIT groups compared to the control group ( $p=0.002$ ). Although a significant increase in post-test AG was observed in all the groups, AG levels in HIIT groups were approximately twofold higher than control group ( $p<0.01$ ). Conclusion. It seems that eight weeks of wrestling based HIIT can cause to significant decreases in body fat percentage and weight which is related to increase in total levels of plasma AG in highly trained wrestlers.

Alexandrova, A., Petrov, L., Makaveev, R., Tsvetanova, E., Georgieva, A., & Kolimechkov, S. (2019). ERYTHROCYTE OXIDATIVE STATUS AFTER MAXIMAL AEROBIC TEST IN WRESTLERS. *ОКСИДАТИВНЫЙ СТАТУС ЭРИТРОЦИТОВ ПОСЛЕ МАКСИМАЛЬНОГО АЭРОБНОГО ТЕСТА У БОРЦОВ*, 19(1), 15-21. doi:10.14529/hsm190102

**Abstract:** The aim of this study was to determine the changes in the erythrocyte oxidative status of the wrestlers after performing the maximal aerobic test, by registering in erythrocytes the levels of lipid peroxidation (LPO), total glutathione (tGSH) and activities of catalase (CAT), superoxide dismutase (SOD), and glutathione peroxidase (GPx). **Materials and methods.** A group of 12 healthy wrestlers conducted a treadmill maximal aerobic test, and venous blood samples were obtained before and immediately after the exercise. Erythrocytes were separated from plasma and used for spectrophotometric determination of LPO, tGSH and enzyme activities. Plasma was used for determination of hemoglobin concentration (Hb) as an index of hemolysis. **Results.** The performance of the maximal aerobic test resulted in a significant increase of Hb in blood plasma, a decrease of LPO, and no changes of the tGSH level in erythrocytes. In regards to antioxidant enzymes, our results showed an increase in the activity of GPx, while the CAT and SOD activity remain unchanged. **Conclusions.** It can be concluded that in active athletes, predominate erythrocytes that are more resistant to oxidative stress, because of the accelerated hemolysis induced by physical exercise, lead to the elimination of the old and oxidative modified cells.

Bayati, R., Majelan, A. S., Mirzaei, B., & Barbas, I. (2019). The Effect of 12 Weeks of Wrestling+ Warm-Up Program on Functional Movement Screen Scores in Cadet Wrestlers. *Annals of Applied Sport Science*, 7(1), 39-47. doi:10.29252/aassjournal.7.1.39

**Abstract:** Wrestling is one of the most popular sports in the world. United World Wrestling have developed "Wrestling+" injury prevention program similar to the FIFA 11+. **Objectives.** the aim of the present study was to investigate the effect of 12 weeks of "Wrestling+" warm-up program on Functional Movement Screen scores in cadet wrestlers. **Methods.** The study population included all cadet wrestlers of Rasht city where 24 freestyle wrestlers were selected by the convenience sampling, and further divided into intervention (n=12) and control (n=12) groups. The intervention group performed "Wrestling+" warm-up program for 12 weeks and three times a week while the control group performed routine warm-up during the period of research. Functional Movement Screen tests including Deep Squat (DS), Hurdle Step (HS), In-Line Lunge (ILL), Shoulder Mobility (SM), Active Straight Leg Raise (ASLR), Trunk Stability Push Up (PU), and Rotary Stability (RS) were used in pre- and post-program. **Results.** There was a significant increase in the total Functional Movement Screen, DS, HS, ILL, PU scores, while there were no significant differences in SM, ASLR, and RS scores in intervention group. Also, there was a %66.7 decrease in the number of wrestlers at high risk in Functional Movement Screen tests in the intervention group. There was no significant difference in any of the variables in the control group ( $p>0.05$ ). **Conclusion.** The results of this study suggested that the "Wrestling+" warm-up program can improve the fundamental movement patterns and finally it may prevent the potential injuries.

Behr, K. H., & Kuhn, P. L. (2019). Key factors in career development and transitions in German elite combat sport athletes. *Martial Arts Studies* (7), 19-35. doi:10.18573/mas.73

The purpose of this study was to systematically identify key factors that facilitate and constrain career development and career transitions. Semi-structured in-depth interviews were conducted and analysed using both deductive and inductive analysis. The sample was purposefully composed of 14 active (n=7) and retired (n=7) male (n=8) and female (n=6) international level athletes, including Olympic gold medalists and World and European champions with 120 medals won between them. Findings relate to difficulties and critical events in athletes' attitudes toward their career development. Six key factors were identified: second pillar, higher-level competition experience at a young age, coach, federation, setbacks, and way of coping with career termination, out of which three factors (second pillar, higher-level competition experience at young age, way of coping with career termination) were theory-based and the other three factors (coach, federation, setbacks) were collected from the transcript material. We concluded that an athletic career is a highly complex, multi-layered, and individual process. Significant differences were found between statements of student-athletes and sports soldiers concerning the second pillar and financial support. Participation at senior competitions at an early age is required for a

smooth transition to a world-class level. Other aspects, such as improved communication in federations and career assistance programmes, adaption of foreign coaches to the German sport system, and supporting activities of universities have to be investigated in further research.

Borden, E. C., Kraemer, W. J., Walrod, B. J., Post, E. M., Caldwell, L. K., Beeler, M. K., . . . Maresh, C. M. (2019). Changes of Hydration Measures in Elite National Collegiate Athletic Association Division I Wrestlers. *International journal of sports physiology and performance*, 14(10), 1378-1381. doi:10.1123/ijsp.2019-0059

Purpose: To evaluate the changes in the state of hydration in elite National Collegiate Athletic Association (NCAA) Division I college wrestlers during and after a season. Methods: Ohio State University wrestling team members (N = 6; mean [SD] age = 19.6 [1.1] y; height = 171.6 [2.9] cm; body mass = 69.5 [8.1] kg) gave informed consent to participate in the investigation with measurements (ie, body mass, urine-specific gravity [USG; 2 methods], Visual Analog Scale thirst scale, plasma osmolality) obtained during and after the season. Results: Measurements for USG, regardless of methods, were not significantly different between visits, but plasma osmolality was significantly (P = .001) higher at the beginning of the season-295.5 (4.9) mOsm.kg(-1) compared with 279.6 (6.1) mOsm.kg(-1) after the season. No changes in thirst ratings were observed, and the 2 measures of USG were highly correlated (r >.9, P = .000) at each time point, but USG and plasma osmolality were not related. Conclusions: A paradox in the clinical interpretation of euhydration in the beginning of the season was observed with the USG, indicating that the wrestlers were properly hydrated, while the plasma osmolality showed they were not. Thus, the tracking of hydration status during the season is a concern when using only NCAA policies and procedures. The wrestlers did return to normal euhydration levels after the season on both biomarkers, which is remarkable, as previous studies have indicated that this may not happen because of the reregulation of the osmol-regulatory center in the brain.

Chondronasios N. Charilaos . , & 9:1, -. (2019). ORIGIN AND SOCIAL STATUS OF THE TOP WRESTLERS IN THE ANCIENT GREEK WORLD. *International Journal of Wrestling Science*, 9(1), 34-39.

This paper attempts initially the geographical classification of the recorded Olympic victors and Olympians of antiquity in 3 different historical periods, the Archaic, Classical and Hellenistic periods. We will then attempt to analyze the social profile of the top wrestlers based mainly on references by ancient historians, writers but lyrical poets who recorded information about the social position and personal life of renowned wrestlers of that time. References to contemporary historical and archaeological finds will also help us to highlight the reasons that the Peloponnese maintains its successes from the beginnings of the recorded Olympic Games to the beginning of the Roman era and the presence and role of Olympians in public life.

Cintineo, H. P., & Arent, S. M. (2019). Anticipatory Salivary Cortisol and State Anxiety Before Competition Predict Match Outcome in Division I Collegiate Wrestlers. *J Strength Cond Res*, 33(11), 2905-2908. doi:10.1519/jsc.0000000000003376

Anticipation of exercise and other stressors has been shown to result in physiological and psychological changes, which include increased levels of cortisol and anxiety. Combat sports, in particular, typically elicit robust anticipatory responses because of the distinct nature of these sports. Therefore, the purpose of this investigation was to examine the relationship between state anxiety scores, anticipatory cortisol response, and performance outcomes in college wrestlers. A secondary purpose was to determine the correlation between anticipatory cortisol and state anxiety scores. Twenty-six collegiate wrestlers were recruited to undergo saliva collection and to complete the State Anxiety Inventory before a wrestling match and again on a rest day in a time-matched, control session. Univariate analyses revealed that both

salivary cortisol and anxiety were greater before competition than on a rest day. In addition, it was found that losers had higher levels of anticipatory cortisol and anxiety compared with winners. A significant correlation between salivary cortisol and anxiety was found as well. These data show that higher cortisol and anxiety may negatively affect performance. Athletes and coaches should work together to determine optimal levels of arousal and should aim to replicate this during both training and competition to ensure consistently high levels of performance through appropriate preparation.

Dalal, P. J., Purkey, M. R., Price, C. P. E., & Sidle, D. M. (2019). Risk factors for auricular hematoma and recurrence after drainage. *Laryngoscope*. doi:10.1002/lary.28310

**OBJECTIVES/HYPOTHESIS:** To review an institutional experience with auricular hematoma across all clinical settings including the emergency department (ED) and outpatient clinics at an urban tertiary care academic hospital, characterize practice patterns across setting and specialty, and assess for factors predictive of treatment success. **METHODS:** Patients presenting to the ED, admitted to an inpatient ward, or seen in the outpatient setting between 2000 and 2017 with a diagnosis of auricular hematoma were reviewed. A number of relevant patient features including demographic factors, medications, and social risk factors were analyzed, as were several factors related to the presentation and management of the hematoma to identify variables of clinical significance. **RESULTS:** A total of 87 individual cases were identified. Auricular hematomas most commonly occurred in males after sports-related trauma (e.g., martial arts, wrestling, boxing). Factors associated with lower rates of recurrence included initial treatment by or in consultation with an otolaryngologist and application of a bolster dressing. **CONCLUSIONS:** In our cohort, initial management of auricular hematoma by an otolaryngologist or with an otolaryngology consultation and placement of a bolster dressing was associated with lower rates of hematoma recurrence.

Dehnou, V. V., Azadi, S., Gahreman, D., & Doma, K. (2019). The effect of a 4-week core strengthening program on determinants of wrestling performance in junior Greco-Roman wrestlers: A randomized controlled trial. *J Back Musculoskeletal Rehabil*. doi:10.3233/bmr-181328

**Abstract:** Core-strength is vital for Greco-Roman wrestling, although studies have yet to establish the effectiveness of core-specific training in this sport. **PURPOSE:** To examine the effect of core-specific strength training on determinants of Greco-Roman wrestling performance in elite junior athletes. **METHODS:** Twenty state-level, junior, Greco-Roman wrestlers were randomized into a core-specific training group (COR; n= 12) and a control group (CON; n= 8). The COR group undertook a 4-week, core-specific training program concurrently with their typical training program, whilst the CON group completed 4 weeks of typical training only. Both groups completed overhead medicine ball throw (OMBT), Suplexes, bridges and medicine ball chest throw (MBCT) prior to and following the intervention. **RESULTS:** The COR group demonstrated significantly greater improvement in bridges ( $p= 0.037$ ;  $F= 5.046$ ) and OMBT ( $p< 0.001$ ;  $F= 26.43$ ) than the CON group, with moderate to large between-group effect sizes ( $ES = 0.79-2.35$ ). In addition, the effect size calculations were moderate-to-large (0.79-0.87) for Suplex and MBCT, with measures for the COR group greater than the CON group. **CONCLUSION:** Accordingly, core-specific training programs should be combined with wrestling-specific conditioning programs to improve back and hip extensor performance in junior Greco-Roman wrestlers.

Demirel, A., Baykara, M., Koca, T. T., Berk, E., & Gencay, O. A. (2019). Comparison of vascular arterial stiffness parameters of adolescent wrestlers with healthy subjects: Is heavy training harmful for wrestlers? *Journal of Back and Musculoskeletal Rehabilitation*, 32(1), 155-160. doi:10.3233/bmr-171083

**BACKGROUND:** The effect of different exercise modalities on the vascular structure has been the subject of clinical trials but there is not enough data about wrestlers. **OBJECTIVE:** This study aimed to compare the

arterial stiffness parameters in adolescent wrestlers with those of age-matched sedentary controls to show the effects of long and heavy training. METHODS: This study was carried out as a case-control study. Thirty three (N = 33) elite male adolescent wrestlers (12-18 years) and 35 age and sex-matched control subjects (P = 0.438) with a sedentary lifestyle were included the study. The data was obtained by using sonography and a sphygmomanometer. Systolic and diastolic diameters and intima media thickness (IMT) measurements were performed from the carotid arteries of the subjects. The arterial tension was measured in the same session, and arterial stiffness parameters were calculated using specific formulas. RESULTS: The mean age range was 15.9 0.9 years and 16.0 0.8 years for the wrestlers and control subjects, respectively (P = 0.43). Statistically, the Body Mass Index (BMI) was significantly higher in wrestlers (mean = 23.7 4.0 kg/m<sup>2</sup>; P = 0.00). The groups had no difference in height (P = 0.80) and weight (P = 0.05). The systolic blood pressure (SBP) was significantly higher in wrestlers (mean = 120 13.4 mmHg; P = 0.00); the pulse was significantly lower in wrestlers (mean = 69.61 17.2 beats/min; P = 0.00); the IMT was significantly lower in wrestlers (IMT mean = 0.288 0.1 mm; P = 0.01); the diastolic wall stress (DWS) was significantly higher in wrestlers (DWS mean = 933.64 298.0 mmHg; P = 0.03) than controls. No significant differences were found in the elastic modulus (P = 0.11), compliance (P = 0.86), and distensibility (P = 0.86) parameters between the groups. CONCLUSION: Bradycardia is an expected condition for athletes. SBP and DWS were found to be high in wrestlers, suggesting that arterial tissue is more susceptible to stress. The low IMT indicates the protective effect of regular exercise against atherosclerosis. It is known that regular exercise is good for the vascular structure while heavy exercise puts a load on the vascular structure. The fact that the elastic modulus, compliance, and distensibility do not differ between the groups suggests that structural changes in the adolescents have no effect on the vascular wall.

Dogan, Y., Isik, Ö., & Birkök, M. C. (2019). Seeding and gold medal probability in wrestling: a 2016 Rio Olympic Games analysis. *International Journal of Human Sciences*, 16(4), 931-937. doi:10.14687/jhs.v16i4.5819

The United World Wrestling carried out the implementation of seeding athletes for the first time at the 2016 Rio Olympic Games. For this reason, the aim of the current study was to calculate the probability of winning a medal and becoming an Olympic Champion at the 2016 Rio Olympic Games of seeded wrestlers using the Bayesian theorem. The data were obtained from the results book of the Rio Olympic Games. The obtained data were analyzed Bayesian theorem. According to the results, the probabilities of being an Olympic Champion of first seeded wrestlers were 67.0%, 81.0% and 62.0% for males Greco-Roman, freestyle and female freestyle, respectively. As a result, being a seeded athlete had a great advantage to become an Olympic Champion in the wrestling competitions of the Rio Olympic Games. As the Olympic Games are held every four years, the medals in the Grand Prix tournaments, continental, and World Championships must be scored according to difficulty grade and medal colour, and the Olympic ranking should be established for each weight category. Furthermore, it would provide more competitive, challenging and enjoyable Olympic Games for wrestling and spectators.

Dvorkin L. S, & O.I., D. (2019). MODELING THE FORCE CHARACTERISTICS OF LIFTING ACTIONS BASED ON ELECTROMYOGRAPHIC RESEARCH IN HIGHLY QUALIFIED WRESTLERS. *International Journal of Wrestling Science*, 9(2), 9-13.

It is known that fast fibers occupy the bulk in the muscular system of highly qualified athletes. This allows them to achieve high results, especially in speed-strength sports. This is also indicated by physiological studies of individual muscle fibers of representatives of strength sports athletes, who have shown a higher level of contractility and power of work for several years in relation to untrained persons of the same age. The purpose of the study was to substantiate the efficiency of the transfer of the weight-lifting training method in jogging to increase the level of strength preparedness of wrestlers based on the study of the bioelectric activity of muscles. The pedagogical experiment lasted three months and was carried out on the basis of Children's Sport School "Victoria" of the city of Tarko-Sale in the Yamalo-Nenets

Autonomous District. The experiment involved two groups of wrestlers (KMS and MS): experimental group (12 people) and control group (12 people). The experimental group used the model motor action (DMD) in its strength training, which consisted in the fact that the traditional for the heavy weightlifters technique for performing the rod from the platform was modified to take into account the elements of the motor action of the wrestler in the stalls and in the stance during a deflection throw, namely: during the first second the rod was lifted to the knees, for 2-6 seconds the athlete held the weight of the bar in a static position, at the level of the knees, and then, at the 7-th second, the rod was undermined until fully straightened legs and torso. The wrestlers of the control group trained in the preparatory period according to the traditional strength training program, namely, without the use of barbell traction with intensive burdens. Control testing was carried out three months later and only in the barbell pull from the platform. While performing DMD with the help of a myomonitor, the bioelectrical activity of the direct bundle of the quadriceps muscle of the left and right legs, the right and left side of the latissimus muscle of the wrestler's back was carried out continuously. It was found out that the use of intensive power loads (ranging from 60 to 100% of the maximum) when performing rod pull from the platform led after three months to the development of more economical functioning of the neuromuscular system of wrestlers of the experimental group against a background of significantly higher final results of force testing in comparison with the wrestlers of the control group.

Dvorkin, L. S., & Akhmetov, S. M. D. N. I. (2019). Special strength trainings in elite wrestling sports. *Theory and Practice of Physical Culture*(5), 72-74.

The article analyzes the key issues of modern special strength trainings in elite wrestling sports – that are still contradictory for the research community. Clear responses still need to be found, for example, to at least the following questions: can the high-intensity strength trainings meaningfully improve the action speed in wrestling or they rather cause an adverse effect; what are the benefits of the high-intensity short strength trainings versus the low-intensity long ones for wrestling sports; shall we find the best proportions of the special strength trainings and traditional strength trainings in elite wrestling sport; what shall be the optimal proportions of the dynamic to isometric maximal-strength trainings for elite wrestling sports etc. Therefore, at this juncture the modern wrestling sport theory and practice still need to find the core solutions to offer new developments for the elite training systems and pave the ways for the theoretical knowledge being efficiently applied to improve the elite wrestlers' training models and tools.

Fujiyama, K., Yamashita, D., Nishiguchi, S., & Ito, M. (2019). TECHNICAL-TACTICAL ANALYSIS OF MEN'S WRESTLING: A CASE STUDY OF THE 72ND NATIONAL ATHLETIC MEET OF 2017 IN JAPAN. *International Journal of Wrestling Science*, 9(1), 1-6.

The purpose of this research was to reveal the techniques that winners and losers attempted to use in wrestling matches, as well as the number of times these techniques were successful. We filmed and categorized the techniques used in 19 freestyle and 10 Greco-Roman matches in the 72nd National Athletic Meet of 2017 in Japan. When the winner scored points, standing position accounted for a high proportion of the positions in both freestyle and Greco-Roman, at 71.1% and 66.7% respectively. The loser scored all the points in the standing position. These results indicate that wrestling matches play out with a focus on standing positions. In freestyle, single-leg attacks were the most common point-scoring techniques for winners and the second most common for losers. The success rate for single-leg attack by winners was 73.1% but was significantly lower for losers at 25.0%. Therefore, it can be considered that practice on improving the success rate of single-leg attacks should be prioritized for securing victory in freestyle. The technique that scored the most points for winners in Greco-Roman was the gut wrench. Conversely, the gut wrench was not present and therefore failed to score points for the losers. These findings can be helpful to plan effective training for wrestlers.

Gargalianos, D., & Ioannis Barbas ., 24-28. (2019). EDUCATION AND TRAINING OF WRESTLING FEDERATIONS' AND CLUBS' SPORT ADMINISTRATORS. *International Journal of Wrestling Science*, 9(1), 24-28.

The importance of sport has been repeatedly acknowledged by prominent organizations like the United Nations and the European Union. The Canadian Centre for Ethics in Sport (2008, p. vii) eloquently summarizes the significance of sport underlining that "...there is now evidence that sport's benefits go far beyond the positive health effects of physical activity that have long been understood. A growing body of research points to community sport's fundamental role as a primary generator of social capital and related benefits across a broad spectrum of societal goals including education, child and youth development, social inclusion, crime prevention, economic development and environmental sustainability".

Gencay, O. A., Baykara, M., Demirel, A., Berk, E., & Gencay, S. (2019). The Acute Effects of High-Intensity Cycling Exercise on Arterial Stiffness in Adolescent Wrestlers. *J Hum Kinet*, 69, 99-107. doi:10.2478/hukin-2018-0100

The aim of this study was to determine the acute effects of high-intensity cycling exercise on the variables of carotid artery compliance, distensibility and beta stiffness index in elite adolescent wrestlers. The subjects were elite athletes competing in national, European and World Championships, who attended a training camp in the province of Kahramanmaraş organized by the Turkish Centre for Olympic Preparation. The study sample comprised 31 male elite wrestlers with a mean age of 15.90 +/- 0.87 years, body height of 165.97 +/- 9.7 cm and body mass of 66.3 +/- 18.45 kg. The arterial stiffness variables of the wrestlers were measured with high-resolution Doppler ultrasonography before and 5 min after 30 s of high-intensity cycling exercise (the Wingate Anaerobic Cycling test). The results showed a statistically significant correlation between mean power performance and carotid artery compliance at the 5th min after a single cycling sprint exercise ( $p < 0.05$ ). No correlation was determined between peak power and the arterial stiffness variables ( $p > 0.05$ ). The study results indicate that acute changes in arterial stiffness variables are associated with the performance level of high-intensity cycling exercise in a group of elite adolescent wrestlers.

Ghoraba, M. S., & Ghazy, M. F. (2019). Effect of compression modalities for recovery on wrestlers biomarkers in one day tournament.

[https://www.researchgate.net/publication/332767092\\_Effect\\_of\\_compression\\_modalities\\_for\\_recovery\\_on\\_wrestlers\\_biomarkers\\_in\\_one\\_day\\_tournament](https://www.researchgate.net/publication/332767092_Effect_of_compression_modalities_for_recovery_on_wrestlers_biomarkers_in_one_day_tournament).

Aim: investigate the effect of different compression modalities as to recovery enhancement on some biomarkers in wrestlers. Methods: Serum creatinine, lactic acid and glucose level were tested in elite wrestlers before match up, 3minuts post-match up and 19 minutes after applying recovery compression model. Results: showed insignificant differences between pre-post 3min tests, among research groups due to sample equality, 3min and 19min post match up tests showed efficacy of compression technique in enhancing recovery in sake of 160/20 mmHg compression modality with enhancement percentage of 16.614% for serum creatinine, 43.214% for lactic acid and 22.505% for glucose level. Conclusion: compression band with 160/20 mmHg exceeds recovery after match.

Harty, P. S., Zabriskie, H. A., Stecker, R. A., Currier, B. S., Moon, J. M., Jagim, A. R., & Kerksick, C. M. (2019). Upper and lower thresholds of fat-free mass index in a large cohort of female collegiate athletes. *Journal of Sports Sciences*, 37(20), 2381-2388. doi:10.1080/02640414.2019.1634964

Fat-free mass index (FFMI) is a height-adjusted metric of fat-free mass which has been suggested as a useful method of body composition assessment in athletic populations. The purpose of this study was to determine sport-specific FFMI values and the natural upper threshold of FFMI in female athletes. 372 female collegiate athletes (Mean +/- SD; 20.03 +/- 1.55 years, 167.55 +/- 7.50 cm, 69.46 +/- 13.04 kg, 24.18 +/- 5.48% bodyfat) underwent body composition assessment via dual-energy x-ray absorptiometry. FFMI was adjusted to height via linear regression and sport-specific reference values were determined. Between-sport differences were identified using one-way ANOVA with Tukey post-hoc tests. Average FFMI was 18.82 +/- 2.08 kg/m<sup>2</sup>; height-adjusted values were not significantly different (p<0.05) than unadjusted values. FFMI in rugby athletes (20.09 +/- 2.23 kg/m<sup>2</sup> was found to be significantly higher (p<0.05) than in gymnastics (18.62 +/- 1.12 kg/m<sup>2</sup>), ice hockey (17.96 +/- 1.04 kg/m<sup>2</sup>), lacrosse (18.58 +/- 1.84 kg/m<sup>2</sup>), swim & dive (18.16 +/- 1.67 kg/m<sup>2</sup> and volleyball (18.04 +/- 1.13 kg/m<sup>2</sup>. FFMI in cross country (16.56 +/- 1.14 kg/m<sup>2</sup>) and synchronized swimming (17.27 +/- 1.47 kg/m<sup>2</sup>) was significantly lower (p<0.05) than in Olympic weightlifting (19.69 +/- 1.98 kg/m<sup>2</sup>), wrestling (19.15 +/- 2.47 kg/m<sup>2</sup>, and rugby. The upper threshold for FFMI in female athletes (97.5th percentile) was 23.90 kg/m<sup>2</sup>. These results can be used to guide personnel decisions and assist with long-term body composition, training, and nutritional goals.

Hope, J. M. V., Sane, J. C., Diao, S., & Sy, M. H. (2019). Spinal Cord Injury Due to Cervical Disc Herniation without Bony Involvement Caused by Wrestling - A Case Report. *J Orthop Case Rep*, 9(1), 19-22. doi:10.13107/jocr.2250-0685.1290

Introduction: Many cases of cervical spinal disc herniation caused by sporting injury have been reported. Those cases generally accompanied high-energy trauma such as fractures and/or dislocations. The purpose is to present the case of spinal cord injury (SCI) due to cervical disc herniation without bony involvement caused by wrestling. Case Report: We report a case of a 23-year-old man who sustained a cervical SCI during the wrestling competition. He was quadriplegic with no sensory or motor function preserved in sacral segments S4-S5. Conventional radiographs and computed tomography did not reveal bony abnormalities. Magnetic resonance imaging (MRI) showed a free herniated cervical disc severely compressing the spinal cord from central at C3/4 level. He underwent anterior cervical discectomy and interbody fusion using autologous iliac crest bone graft and fixation with the cervical plate. He made an eventful recovery, and 5 years later, he was playing at high competitive level. Conclusion: Competitive wrestling-related injuries are quite high. Fortunately, the incidence of SCI among wrestlers is extremely low. Although rare, SCI due to cervical disc herniation without bony involvement is a serious debilitating injury that exerts a devastating effect on a wrestler from a physical, psychological, and socioeconomic point of view, and places an immense burden on society from a public health perspective. The MRI is the golden examination in diagnosing such lesion. The management comprises surgical decompression of neural elements, stabilization, and fusion to provide a higher recovery rate from cord damage to return to play. Wrestler who is completely pain free with full range of motion and strength may be eligible for return to play.

Ito, S., Crawshaw, L., & Kanosue, K. (2019). Differences between male and female elite free-style wrestlers in the effects of "set up" on leg attack. *Archives of Budo*, 15, 131-137.

Background and Study Aim: Leg attack is the most basic skill in free-style wrestling. Before executing a leg attack, balance and anticipation of the opponent must be disrupted. We defined this action as the "set up". The aim of this study is knowledge about the effects of "set up" on the success rate of leg attacks, and answer to question: whether or not a gender difference exists in the use and effectiveness of "set ups" in the elite level of the wrestling matches. Material and Methods: We analyzed video recordings of 57 matches of male free-style wrestling seniors, 58 matches of female seniors, 60 matches of male cadets, and 59 matches of female cadets all in international competitions (not necessarily the same). Analyzed were: (1) the use of "set ups" before a leg attack; (2) the result (success or failure) of the leg attack; (3)

the points given to the attacker in relation to the leg attack. To examine the associations between "set up" and success/points, we performed a chi-square test. Results: In male free-style wrestler seniors there was a statistically significant association between the presence of a "set up" and success of the leg attack, as well as between the presence of a set up and the points received for the leg attack. However, in female seniors, and male and female cadets there was no significant relationship for either of the above associations. Conclusions: In men's freestyle wrestling, the "set up" before a leg attack improves the success rate of the leg attack and also increases the points awarded to the attacker. However, senior women and the cadet generation of both males and females did not exhibit either of these relationships.

Keller, K. (2019). Life Expectancy of Olympic Wrestling Champions in Comparison to the General Population. *Journal of Community Health, 44*(1), 61-67. doi:10.1007/s10900-018-0553-6

Although it was presumed that moderate exercise is a healthy practice but long-term high intensity exercise is not, studies observed a life expectancy benefit for both high-intensity endurance and fast power sports athletes, but the data for contact sports are conflicting. Therefore, the author aimed to investigate the life expectancy of Olympic wrestling champions in comparison to the general population. Characteristics, vital status and life-span of the male Olympic wrestling champions was collected (1896-2016). The life expectancy of Olympic champions was compared with matched individuals of the general population (by country, age, and year of birth) obtained from the human mortality database (<http://www.mortality.org>). Overall, 341 male Olympic wrestling champions with median age of 25 (IQR 24-28) years at their Olympic victory were included in this analysis. In total, 142 (41.6%) came of rich countries. The survival was not affected by weight class and country of origin. A significant life expectancy benefit for Olympic champions in comparison to the general population was observed. Male Olympic wrestling champions lived in mean 19.1 +/- 19.1 years longer than the matched individuals of the general population (respectively of their country of origin). A substantially lower mortality in male Olympic wrestling champions, compared with the general male population was observed. However, the results do not allow us to draw conclusions about the causes of this survival benefit.

Kermani, F., Moosazadeh, M., Hosseini, S. A., Bandalizadeh, Z., Barzegari, S., & Shokohi, T. (2019). Tinea Gladiatorum and Dermatophyte Contamination Among Wrestlers and in Wrestling Halls: A Systematic Review and Meta-analysis. *Curr Microbiol.* doi:10.1007/s00284-019-01816-3

To present an overview of the existing epidemiological evidence regarding the occurrence of tinea gladiatorum in wrestlers and dermatophyte contamination in wrestling halls, five electronic databases including "PubMed," "Scopus," "Google Scholar," "Science Direct," and "Web of Science" were searched from inception to 30 December 2018. Studies focusing on epidemiology of dermatophytosis among wrestlers and on the presence of dermatophytes in wrestler hall were included. Data from 13 studies, 4818 wrestlers, and 391 wrestling mat samples from Turkey, Iran, and the USA (including a separate dataset for Alaska) were included. The prevalence of tinea gladiatorum in wrestlers varied from 2.4 to 90.62%, with the overall prevalence of 34.29% (95% CI 20.33-48.25). The prevalence of dermatophytes in wrestling halls varied from 0 to 56%, with the overall prevalence of 5% (95% CI 47). The most frequent causative agent was *Trichophyton tonsurans* (875/951; 92%). The most common clinical feature of dermatophytosis among wrestlers was tinea corporis (62.2%). Meta-analysis indicated significant heterogeneity of all included studies ( $Q = 3204.72$ ,  $P < 0.001$ ,  $I(2) = 99.6\%$ ). The publication bias evaluated using Egger's test was negligible ( $P = 0.033$ ). The current systematic review and meta-analysis are limited by the relatively low number of published studies on tinea gladiatorum and its prevalence among wrestlers. In Conclusion, the analysis revealed a relatively high prevalence of tinea gladiatorum among wrestlers, with a paucity of evidence on dermatophytes in wrestling halls.

Kiener, M. (2019). DOCUMENTING THE EXPERIENCES OF COLLEGIATE WRESTLERS PARTICIPATING IN MENTAL SKILLS TRAINING. *College Student Journal*, 53(3), 351-359.

Mental skills training is becoming increasingly important in athletics as a means enhance performance. Although there is a foundation of research on mental skills training with elite athletes, more research is needed to better understand the development and use of mental skills training with non-elite athletes. This qualitative study examines the effects of a season-long mental skills training program on a midwestern Division II wrestling team. Findings indicate that the training had a two-pronged effect, positively influencing both individual athlete ideology as well as team cohesion. Implications for future use and potential adaptation are explored.

Kivrak, A. O., & Pepe, S. (2019). Investigation of blood lactate levels, hearth rates and technical performance of hearing-impaired elite male Greco-Roman wrestlers. *Journal of Education and Training Studies*, 7(5), 27-31. doi:10.11114/jets.v7i5.4139

This study was conducted with hearing-impaired elite greco-roman wrestlers to determine the relationships and variations in heart rates (HR), blood lactate (La) levels and number of performances during the maximal effort and recovery periods. Voluntary 8 hearing-impaired elite male wrestlers with an average age of  $21,75 \pm 2,05$  years participated into present experiments. Resting heart rates of the athletes were determined before the maximal effort, blood samples were taken for lactate levels, athletes took warm up and stretching exercises for 15 minutes. For maximal effort, athletes performed hip-headlock throw technique for 2 minutes in 3 periods. Proper performances were counted and heart rates were measured in between the periods. To determine recovery characteristics of the athletes after maximal effort, HR and La levels were determined at 3rd, 15th and 30th minutes after maximal effort. Heart rate responds to hip-headlock throws at the end of the 1st period were lower than the heart rates at the end of the 2nd and 3rd periods and heart rates at the end of the 2nd period were lower than the heart rates at the end of the 3rd period ( $p < 0.05$ ). Number of performances in the 1st period was greater than the number of performances in the 2nd and 3rd periods and number of performances in the 2nd period was greater than the number of performances in the 3rd period ( $p < 0.05$ ). HR values increased and number of performances decreased with the progress of periods. There were significant differences in HR and number of performances of the periods ( $p < 0.05$ ).

Koca, F. (2019). Comparison of blood lipid and lipoprotein amounts of wrestlers and skiers. *Journal of Education and Training Studies*, 7(7), 22-29. doi:10.11114/jets.v7i7.4250

In this study it is aimed to compare form blood parameters lipid and lipoprotein values of wrestlers and skiers who have different training levels. In addition, was to examine the risks of cardiovascular diseases for wrestler and skiers. In order to achieve this purpose, 33 male of elite wrestling and ski athletes measured in the study. In this study, Triglyceride (TG), were determined Total Cholesterol (TC), HDL C and LDL C levels (With Hitachi 717 autoanalyser). To determine the differences between groups "independent t" tes ts were performed. In this study, there were significant differences in plasma LDL C, HDL C, and TC values between wrestlers an d skiers ( $p < .05$  and  $p < 0,001$ ). There were no significant differences in plasma TG values between wrestlers and skiers ( $p > .05$ ). In this study, HLC values of skiers were found to be significantly higher than wrestlers ( $p < 0.001$ ). In this study the cardiovascular risk ratios (TC/HDL C) were found to be 3.39 mg/100cc for wrestlers and 2.80 mg/100cc for skiers. Ratios LDL C/HDL C were found 1.76 mg/100cc for wrestlers and 1.45 mg/100cc for skiers. Conclusion: Although the wrestlers' training levels were always found to be difference than the skiers, TG values were not found to be different. But the HDL C, LDL C, and TC levels of skiers were found better than wrestlers. These results show that medium and high level of different exercises did cause little differences in blood plasm a lipid and lipoprotein levels. Plasma Lipid and lipoprotein values of the wrestler and skiers were acceptably good.

Wrestling and ski athletes would not be exposed to risk of cardiovascular diseases. Blood parameter values should be examined separately on Cross country skiers and alpine skiers.

Kollias, C. (2019). POSITION OF WRESTLING IN MODERN REALITIES. *International Journal of Wrestling Science*, 9(1), 29-33.

Having been committed to wrestling for more than fifty years, on both practical and theoretical levels. I was a member of the national team, belonged to the national coaching team as well as professor of the chair of wrestling at the University of Athens. From all this long commitment with Olympic wrestling and the perennial tradition found here in the country where it was born, I believe, gives us the special opportunity to contribute to its redevelopment, so that it can acquire the position which it used to have in Ancient Greece, and that it deserves today as the crown of sports.

Kondo, E., Shiose, K., Yamada, Y., Osawa, T., Sagayama, H., Motonaga, K., . . . Okamura, K. (2019). Effect of Thoracic Gas Volume Changes on Body Composition Assessed by Air Displacement Plethysmography after Rapid Weight Loss and Regain in Elite Collegiate Wrestlers. *Sports (Basel)*, 7(2). doi:10.3390/sports7020048

We investigated the effect of rapid weight loss (RWL) and weight regain (WR) on thoracic gas volume (VTG) and body composition assessment using air displacement plethysmography (ADP) in male wrestlers. Eight male elite collegiate wrestlers completed a RWL regimen (6% of body mass) over a 53-h period, which was followed by a 13-h WR period. ADP was used at three time points (baseline (T1), post-RWL (T2) and post-WR (T3)) according to the manufacturer's testing recommendations. The total body water and bone mineral content were estimated using the stable isotope dilution method and dual energy X-ray absorptiometry, respectively, at the same time points. Body composition was assessed with two-component (2C) or four-component (4C) models using either the measured VTG (mVTG) or predicted VTG (pVTG). Measured VTG increased from T1 to T2 (0.36 +/- 0.31 L,  $p < 0.05$ ) and decreased from T2 to T3 (-0.29 +/- 0.15 L,  $p < 0.01$ ). However, the changes in fat mass and fat free mass, which were calculated by both 2C and 4C models, were not significantly different when compared between calculations using mVTG and those using pVTG. Our results indicate that VTG significantly changes during RWL and WR, but both measured and predicted VTG can be used to assess changes in body composition during RWL and WR.

Konovalov, I. E., Nurmukhametov, A. A., Boltikov, Y. V., & Solomahin, O. B. (2019). CLASSIFICATION OF "KORESH" FIGHTING METHODS FOR STUDYING IN BEGINNERS AND CRITERIA FOR ASSESSING THEIR PERFORMANCE. *Human Sport Medicine*, 19(1), 65-71. doi:10.14529/hsm190109

Aim. The article deals with classifying the methods of "Koresh" fighting and developing the criteria for assessing their performance for studying in the groups of beginners. Materials and methods. Two groups of 1st-year wrestlers participated in the study. To assess the performance of a back-arch throw to be acquired on this stage of preparation, we tested the technical preparedness of young wrestlers with the method of expert assessment. Results. During the study, we established the classification of "Koresh" fighting methods and revealed that there was a necessity to study a back-arch throw in two variants in the groups of young wrestlers. We developed the criteria for assessing the back-arch throw performed by young wrestlers. Conclusions. As a result of the study, we developed the classification of "Koresh" fighting methods, which are necessary for studying in 1st-year wrestlers. To control the quality of fighting methods acquiring and to assess their performance, we developed the criteria, which allowed us to assess these methods stage-by-stage and in general.

Korobeynikov, G., Cynarski, W. J., Mytskan, B., Dutchak, M., Korobeynikova, L., Nikonorov, D., . . . Korobeinikova, I. (2019). The Psychophysiological State of Athletes with Different Levels of Aggression. *Ido Movement for Culture-Journal of Martial Arts Anthropology*, 19, 62-66. doi:10.14589/ido.19.15.10

Purpose. Study of the link between psychophysiological state and levels of aggression in elite wrestlers. Methods. 27 elite wrestlers aged between 18 and 30, all members of the Ukraine National Greco-Roman Wrestling Team were examined. The scale of aggression by Buss & Darkee [1957] was used. The following parameters were estimated: subjective comfort / discomfort and balance of process of excitation / inhibition. Results. The athletes were separated into two groups by level of aggression: group 1 with low levels of aggression (15 wrestlers); and group 2 with high levels of aggression (12 wrestlers). The first group is characterized by low significant levels of physical and verbal aggression compared to the second group ( $p < 0,01$ ). The results of subjective psychical state assessment indicate the prevalence of discomfort in athletes in group 2 compared to the first group ( $p < 0,05$ ). The study of the balance of nervous processes revealed the presence of excitation of the nervous system in group 2 athletes with high levels of aggression. Conclusions. Aggression is a non-optimal emotion which influences an increase in subjective psychical discomfort and processes excitation of the nervous system in elite athletes.

Kouklidis, C. (2019). GYMNASIARCHY: REGULATING AN ANCIENT GREEK GYMNASIUM AND PALAESTRA, DIFFERENCES AND SIMILARITIES WITH OUR MODERN TIMES. *International Journal of Wrestling Science*, 9(1), 40-47.

The Gymnasiarchal Law of Beroia, a two-sided marble stele of 175 cm and 40 cm wide with a horizontal crest, is a unique specimen about the functioning of the ancient Greek gymnasium and palaestra during Hellenistic times. It was discovered by accident in 1949 at Palaiophoros, Beroia (now days Veria, Macedonia, Greece), in a position identified as the area where the ancient gymnasium of the city was located. The inscription dates between 200 and 165 B.C. before the fall of the Hellenistic world to the Romans. It consists of 216 densely written verses and was found in second use as a cover of an early Christian tomb. The text of the front side due to damage is partially readable, while the rear face is more readable as it has suffered fewer wear. It is an exhibit of the Archaeological Museum of Veria. This paper seeks to find similarities and differences in operating and administrating an ancient Greek gymnasium and palaestra as well as the social standards during the Hellenistic era and today's educational institutions in Greece and internationally.

Krist, S. (2019). Shamanic Sports: Buryat Wrestling, Archery, and Horse Racing. *Religions*, 10(5), 21. doi:10.3390/rel10050306

This paper presents the religious aspects of the historical and present forms of the traditional sports competitions of the Buryats Mongolian ethnic group settled in Southern Siberia, Northern Mongolia, and North-Eastern China. Both historically and in our time, their traditional sports have been closely linked to shamanic rituals. This paper provides insights into the functions of these sports competitions for Buryat shamanic rituals why they have been, and still are, an inevitable part of these rituals. They are believed to play an important role in these rituals, which aim to trick and/or please the Buryats' spirits and gods in order to get from them what is needed for survival. The major historical changes in the Buryats' constructions of their relationship to their imagined spiritual entities and the corresponding changes in their sports competitions are described. The effects of both economic changes from predominantly hunting to primarily livestock breeding and of changes in religious beliefs and world views from shamanism to Buddhism and from Soviet Communist ersatz religion to the post-Soviet revival of shamanism and Buddhism are described. Special attention is given to the recent revival of these sports' prominent role for Buddhist and shamanist rituals.

Kurashova, N. A., Yureva, A. A., Dolgikh, M. I., Gutnik, I. N., & Kolesnikov, L. I. (2019). ETHNIC FEATURES OF LIPID PROFILE AND LIPID PEROXIDATION IN FREESTYLE WRESTLERS. *Human Sport Medicine*, 19(2), 37-44. doi:10.14529/hsm190205

**Aim.** The article deals with the assessment of the lipid profile, lipid peroxidation, and antioxidant protection in freestyle wrestlers belonging to different ethnic groups. **Materials and methods.** The study involved freestyle male wrestlers aged 18-22 with the rank of the Candidate for Master of Sport and Master of Sport regularly practicing freestyle wrestling. We studied a serum consisting of blood plasma and erythrocyte hemolysate. Lipid exchange was studied with the help of the BTS-350 analyzer (Spain) and BioSystems (Spain) reagents. To establish aminotransferase in blood serum, we used Vital (Russia) reagents. The components of lipid peroxidation and antioxidant protection were established with the help of spectrophotometric and fluorometric methods. **Results.** Freestyle athletes of the Russian ethnic group are characterized by a significantly lower TG concentrations compared to Buryat athletes. In the system of lipid peroxidation and antioxidant protection, in athletes of the Russian ethnic group, we revealed a significant AOA, reduced glutathione and retinol compared to Buryat athletes. **Conclusion.** The data obtained prove a different degree of metabolic activity in athletes from various ethnic groups. The balance between lipid oxidation and antioxidant protection mostly determines metabolic intensity as well as adaptation capacities of the body. The study of metabolic changes in highly-skilled athletes from different ethnic groups can contribute to the deepening of knowledge about the physiological basis and pathogenetic effects of stress on the human body. This will be one of the factors for optimizing training and providing the search for the ways of increasing physical activity as a mean of preserving the nation and sports development.

Li, N. Y., Goodman, A. D., Lemme, N. J., & Owens, B. D. (2019). Epidemiology of Elbow Ulnar Collateral Ligament Injuries in Throwing Versus Contact Athletes of the National Collegiate Athletic Association: Analysis of the 2009-2010 to 2013-2014 Seasons. *Orthopaedic Journal of Sports Medicine*, 7(4), 6. doi:10.1177/2325967119836428

**Background:** The management and outcomes of elbow ulnar collateral ligament (UCL) injuries in throwing athletes have been well investigated. However, less is known regarding the management, severity, and outcomes of such injuries in contact athletes. **Purpose:** To compare the incidence, severity, and outcomes of elbow UCL injuries between throwing and contact athletes in collegiate sports. **Study Design:** Descriptive epidemiology study. **Methods:** Elbow UCL injuries were queried from the National Collegiate Athletic Association (NCAA) Injury Surveillance Program between the seasons of 2009-2010 and 2013-2014 in 25 varsity sports. The rates and distribution of injuries by mechanism, participation restriction time, and outcomes (eg, season-ending injury, surgery) were examined. A severe injury was defined as loss of  $\geq 21$  days from participation, a season-ending injury, or requiring a surgical intervention. The injury frequency, incidence per 10,000 athlete-exposures (AEs), and injury proportion ratio comparing throwing and contact athletes were calculated with 95% CIs. **Results:** Over the course of 5 seasons, 109 UCL injuries were recorded, for an overall injury rate of 0.29 per 10,000 AEs. Of these injuries, 83 (76.1%) were a result of contact and 26 (23.9%) from throwing. Men's wrestling (1.78 per 10,000 AEs) and men's baseball (1.12 per 10,000 AEs) sustained the highest injury rates. A larger proportion of throwing ( $n = 8$ ; 36.4%) compared with contact ( $n = 7$ ; 9.1%) ( $P < 0.01$ ) injuries results in  $>21$  days of time loss. Additionally, more throwing-related UCL injuries required surgery ( $n = 2$ ; 11.1%) compared with contact-related injuries ( $n = 1$ ; 1.3%) ( $P < 0.01$ ). As a result, throwing athletes demonstrated a significantly higher proportion of severe injuries than contact athletes (injury proportion ratio, 4.62 [95% CI, 1.72-12.40]). **Conclusion:** The evaluation of athletes in 25 collegiate varsity sports across 5 seasons found over 3 times more elbow UCL injuries in contact versus throwing athletes. However, the number of severe injuries in throwing athletes was significantly higher than in contact athletes. These findings demonstrate that although elbow UCL injuries are prone to occur in both contact and throwing athletes, their prevention, management, and outcomes must be framed on a sport-by-sport basis.

Mala, L., Maly, T., Cabell, L., Cech, P., Hank, M., Coufalova, K., & Zahalka, F. (2019). Body Composition and Morphological Limb Asymmetry in Competitors in Six Martial Arts. *International Journal of Morphology*, 37(2), 568-575. doi:10.4067/s0717-95022019000200568

The aim of this study was to compare body composition (BC) and morphological symmetry differences among elite athletes (n = 132) in six martial arts (judo, karate, fencing, wrestling, taekwondo, kickboxing). Multivariate analysis of variances (MANOVA) was used to compare the following variables: absolute (FFM) and relative (FFMrel) value of fat free mass, percentage of fat mass (FMp), bone mass, protein mass, basal metabolic rate, absolute (TBW) and percentual (TBWp) value of total body water, segmental proportion of muscle mass, phase angle, and percent-age differences between the upper and lower limbs. MANOVA revealed significant differences in BC among the groups ( $\lambda = 0.01$ , F-104, F-256= 10.01,  $p < 0.01$ ,  $\eta^2 p(2) = 0.67$ ). No significant differences were observed for FMp, FFMrel, and TBWp ( $p > 0.05$ ). In all other BC variables, significant differences were detected ( $p < 0.05$ ). The comparison of paired differences between limbs revealed significantly greater fluid volume in the preferred arm compared to the non-preferred arm in karate and fencing athletes. Significant differences ( $p < 0.05$ ) in favour of the preferred leg in all combat athletes were detected. This study revealed morphological differences among practitioners of different martial arts and between paired limbs.

Malkov, O. B., Rakhmatov, A. I., & Dementiev, V. L. (2019). Attack mimicking impulses in opponent twitching tactics applied in greco-roman wrestling and arm wrestling. *Theory and Practice of Physical Culture*(5), 70-71.

It may be beneficial for the theory of modern martial arts and wrestling sports to analyze how the attack mimicking impulses work in the opponent twitching tactics for success. The attack mimicking impulses (threats) are common nowadays in the wrestling, kicking and punching sports – and intended to provoke defense responses of the opponent to use the passive response time for an unexpected real attack. Such tactics are commonly referred to as the opponent twitching in a few sport disciplines including Greco-Roman wrestling and arm wrestling. The article analyzes the modern range of twitching tactics applied in Greco-Roman wrestling and arm wrestling. Bout video replays were analyzed for the study purposes to track the twitching tactics, opponent responses to twitching and how they are used by the highly-skilled competitors to effectively neutralize the defenses. It was found, among other things, that the twitching tactics in the turn-over with body-hold in Greco-Roman wrestling are much the same as in the arm wrestling where the attacker “swings” the opponent’s hand before pressing it down. It was found that the swing action should be fast enough for success. Therefore, modern training systems are recommended giving a special priority to the swing action speed to effectively form the necessary motor skills with the perfectly timed response to the opponent’s passive reaction to twitching. On the whole, the twitching tactics are intended to capitalize on the opponent’s primary instinctive response to the attack mimicking impulse, with the attack being immediately redirected in an unexpected way.

Manninen, I. K., Blomgren, K., Elokiuru, R., Lehto, M., Makinen, L. K., & Klockars, T. (2019). Cauliflower ear among Finnish high-level male wrestlers and judokas is prevalent and symptomatic deformity. *Scandinavian Journal of Medicine & Science in Sports*, 29(12), 1952-1956. doi:10.1111/sms.13530

Our research aimed to study the prevalence, concerns, and treatment practices related to cauliflower ear among Finnish wrestlers and judokas. In total, 32 Finnish wrestlers and 31 judokas completed a questionnaire at training sessions or at a competition. All participants were adults competing at the national or international levels. We also took lateral digital photographs of participants' ears. A senior author graded the overall appearance of the auricles on a scale from 0 to 5 (0 = normal auricle, 5 = extreme cauliflower ear). Cauliflower ear was more prevalent among male athletes (84%, 46/55) than female athletes (0%, 0/8,  $P < .001$ ). Almost all (96%) had sought treatment for an auricular hematoma. The most prevalent treatment modality was needle aspiration (96%). Most (76%) had received treatment

from individuals not representing the healthcare profession. Only one athlete reported receiving successful treatment. No complications from treatment were reported. Almost all participants (96%) reported some symptom from the cauliflower ear, typically pain. None regretted their cauliflower ear(s), and 41% of athletes with cauliflower ear considered it desirable. Cauliflower ear is a common and symptomatic deformity among high-level Finnish wrestlers and judokas. Despite the symptoms, it is accepted and sometimes even desired among the athletes.

Marques, V., Coswig, V., Viana, R., Leal, A., Alves, F., Alves, A., . . . Gentil, P. (2019). Physical Fitness and Anthropometric Measures of Young Brazilian Judo and Wrestling Athletes and Its Relations to Cardiorespiratory Fitness. *Sports*, 7(2), 10. doi:10.3390/sports7020038

This study aimed to compare the anthropometric profile and physical fitness of young judo and wrestling athletes. Twenty-four young athletes (judo (n = 13) and wrestling (n = 11)) participated in this study. The first visit involved anthropometric and flexibility evaluation, abdominal endurance test, upper limbs resistance and cardiorespiratory test. After 48 h, horizontal jump test (HJT), vertical jump test (VJT), medicine ball throw test (MBT), chin-up test (CUT), chin-up isometric test (CUIT) and the anaerobic resistance test were performed. Judo athletes presented greater values for body mass (p = 0.020), height (p = 0.010), and body mass index (p = 0.026) than wrestlers. Judo athletes also performed better for abdominal endurance (p = 0.044), upper limb resistance tests (p < 0.001), VJT (p = 0.022) and MBT (p = 0.023) than wrestling athletes. These results suggest that young judo athletes presented a higher performance in abdominal endurance, upper limbs resistance, HJT, VJT and MBT than wrestling athletes, suggesting that strength and conditioning are related to modality specificity.

Matthews, J. J., Stanhope, E. N., Godwin, M. S., Holmes, M. E. J., & Artioli, G. G. (2019). The Magnitude of Rapid Weight Loss and Rapid Weight Gain in Combat Sport Athletes Preparing for Competition: A Systematic Review. *International Journal of Sport Nutrition and Exercise Metabolism*, 29(4), 441-452. doi:10.1123/ijsnem.2018-0165

Combat sport athletes typically engage in a process called making weight, characterized by rapid weight loss (RWL) and subsequent rapid weight gain (RWG) in the days preceding competition. These practices differ across each sport, but no systematic comparison of the size of the changes in body mass exists. The aim was to determine the magnitude of RWL and RWG in combat sport athletes preparing for competition. The review protocol was preregistered with PROSPERO (CRD42017055279). In eligible studies, athletes prepared habitually with a RWL period  $\leq 7$  days preceding competition. An electronic search of EBSCOhost (CINAHL Plus, MEDLINE, and SPORTDiscus) and PubMed Central was performed up to July 2018. Sixteen full-text studies (total 4,432 participants; 156 females and 4,276 males) were included, providing data from five combat sports (boxing, judo, mixed martial arts, taekwondo, and wrestling). Three studies reported RWL and 14 studies reported RWG. Duration permitted for RWG ranged 3-32 hr. The largest changes in body mass occurred in two separate mixed martial arts cohorts (RWL: 7.4 +/- 1.1 kg [similar to 10%] and RWG: 7.4 +/- 2.8 kg [11.7% +/- 4.7%]). The magnitude of RWG appears to be influenced by the type of sport, competition structure, and recovery duration permitted. A cause for concern is the lack of objective data quantifying the magnitude of RWL. There is insufficient evidence to substantiate the use of RWG as a proxy for RWL, and little data are available in females. By engaging in RWG, athletes are able to exploit the rules to compete up to three weight categories higher than at the official weigh-in.

McDonald, C., Deitch, J., & Bush, C. (2019). Early Sports Specialization in Elite Wrestlers. *Sports Health-a Multidisciplinary Approach*, 11(5), 397-401. doi:10.1177/1941738119835180

Background: Sports specialization is becoming an increasingly common training strategy in young athletes. Very little research currently exists examining the occurrence of serious injury (>3 months off sport or loss of season) in elite-level wrestlers who specialize early (before age 12 years). Hypothesis: Wrestlers who specialize early will sustain more serious injuries than wrestlers who specialize at age 12 years or older. Study Design: Descriptive epidemiological study. Methods: We sent an anonymous online survey to a total of 312 elite-level wrestlers (National Collegiate Athletic Association Division I athletes and World/Olympic Team members) containing questions documenting age of specialization and number of serious injuries sustained. The number of serious injuries both before and after starting college were compared between wrestlers specializing at Results: A total of 143 wrestlers completed the survey for a total response rate of 46%. Thirty-six (25%) wrestlers specialized at <12 years old. The early specialization group sustained significantly more serious injuries than the late specialization group (1.14 vs 0.60,  $P = 0.035$ ). Sixty-two (43%) believed early specialization was necessary to achieve elite-level status. The decision to specialize was encouraged primarily by the athlete (78 of 143, 55%), parents (37 of 143, 26%), and coaches (22 of 143, 15%). Conclusion: Elite wrestlers who specialize prior to age 12 years sustain a higher number of serious injuries before starting college than those who specialize at or after the age of 12 years. Clinical Relevance: Athletes, coaches, and parents should consider the risk of injury before adopting a wrestling-specialized training strategy at a young age.

Melki, H. (2019). Correlation between morphological and functional variables during a specific wrestling test for Tunisian cadet Greco-roman wrestlers. *Journal of Physical Education and Sport*, 19, 1282-1287. doi:10.7752/jpes.2019.s4186

The aim of this study was to determine the anthropometric characteristics and functional characteristics of Tunisian wrestlers from the cadet Greco-Roman national team. The present research was conducted on a sample of 20 male young wrestlers (10 of national team "A" and 10 of national team "B") aged 16-17 years. A variety of anthropometric surveys have been conducted. Maximal strength tests, wrestling specific test and Wingate test was conducted to identify anaerobic power and potency for both leg and arm. A one-way analysis of covariance was performed to compare the two groups. Correlation among the variables was calculated by the Pearson correlation coefficient. The main significant correlations observed were between the following variables: VO<sub>2</sub>max and number of throws in the WST, percent body fat and estimated VO<sub>2</sub>max and number of throws in the WST Chest circumference and bench press 1RM and row and Thigh and squat circumference 1RM. There was no correlation between the circumferences and 1 RM/kg body mass. These results were used to establish the elite wrestlers' profiles to be used as training targets for developing athletes. Based on these results, there is a profile of high performance wrestlers available to be used as training objects for developing athletes. It can also inform training and tactical planning.

Midorikawa, T., Sakamoto, S., & Kondo, M. (2019). *Sumo Wrestling: An Overview*. London: Academic Press Ltd-Elsevier Science Ltd.

Mitusova, E. D., Andrianov, M. V., & Chitaykina, N. B. (2019). Greco-Roman wrestling as olympic sport discipline: situation and prospects. *Theory and Practice of Physical Culture*(6), 82-83. The study analyzes the modern competitive performance of the national Greco-Roman wrestling elite in the context of the recent (2018) changes in the rules of competitions. The competitive performance records of the 2010-18 Russian Championships in every weight class (398 bouts with videos on the whole) was rated and analyzed using the relevant qualitative and quantitative criteria for the purposes of the study. The 2010 Russian Championship was run under the straight elimination rules with consolation

prizes for the losers. The new rules effective since 2018 were found to notably spur up the competitive performance, with the bouts becoming more intensive and active. However, since the past rules prioritized a variety of standard positions critical for the performance scoring, the technical toolkits of the wrestlers were found limited enough that could not but tells on the techniques quality, quantity and success rates. The popular training systems applied by the national Greco-Roman wrestling elite are recommended to be updated as soon as possible to effectively adapt to the new rules of competitions.

Moufti, H., & Arfaoui, A. (2019). Kinematic analysis of the "attack to the legs" from wrestling: impact of prior judo expertise. *Pedagogics Psychology Medical-Biological Problems of Physical Training and Sports*, 23(1), 19-23. doi:10.15561/18189172.2019.0103

Purpose: In the framework of motor skill learning and transfer, the objective of the present work is to highlight the kinematics during the technical execution of an "attack to the legs" in wrestling and compare expert wrestlers with wrestlers having a prior judo expertise. Moreover, this study aims to evaluate the effects of training on these characteristics. Material: 10 male subjects were divided in two groups of five: the first group contains wrestlers with at least 7 years of wrestling practice. The second group contains two-year practice wrestlers with 5-year prior judo experience. Subjects had to perform a movement of attack towards the opponent's legs (free style wrestling). A three-dimensional analysis was carried, the displacement of seven passive markers placed over anatomical points was quantified (3-D motion analyzer, sampling rate 25Hz). The following parameters were calculated: angulation of the hip and of the knee, velocity and acceleration of the shoulder and of the wrist. The experiment was conducted twice: at the beginning of the wrestling training schedule and ten weeks later. Results: Results showed marked differences between the two groups in the kinematics of the movement. These results suggest interference between prior automatisms and learning new skill. The prior experience in judo would have influenced posture in this group. In the framework of skill transfer and dexterity, this study appears promising to investigate the processes involved in this motor control. Conclusions: Although wrestling and judo are two sport disciplines that belong to the same group of combat sport, this work underlines the specificity of learning and indicates that acquisition of motor abilities in a speciality is not transferred inevitably in a positive way in another speciality of the same group.

Nagovitsyn, R. S., Osipov, A. Y., Kapustin, A. G., Anfilatova, O. V., & Senator, S. Y. (2019). Determination of the dependence of competitive results on the procedure of sports selection among Greco-Roman wrestling athletes. *Pedagogics Psychology Medical-Biological Problems of Physical Training and Sports*, 23(4), 182-188. doi:10.15561/18189172.2019.0404

Purpose: the problems of sports selection and selection of prospective children in martial arts schools are quite relevant in the sports practice. It was revealed the use of various selection techniques in the practice of martial arts. There is no unified methodological system for selection in martial arts schools. The purpose of the study: to determine the dependence of the dynamics of sports results of elite athletes on the procedure of sports selection (for example, the Greco-Roman wrestling). Material: elite athletes (n = 114) practicing Greco-Roman wrestling took part in the research. Age of athletes: 25-45 years. Qualification: International masters of sport (n = 8), masters of sport (n = 49), candidates in masters of sport (n = 57). Athletes filled out a diagnostic card with data on the procedure of sports selection. It was indicated the dynamics of competitive results during the sports career. Indicators of performance and stability of athletes were calculated applying the mathematical statistics methods ( $\bar{x}$  over bar). The reliability of the results was determined by Student's t-test. Results: Data analysis showed that a significant part of athletes did not pass the selection procedure (n = 23). Many athletes passed only a partial selection procedure (n = 39). Some athletes did not pass the selection procedure. These athletes are not inferior in terms of stability to athletes who passed the selection at the 1st and 2nd levels of competitive results. In subsequent competitions, these athletes demonstrated the reliable ( $P < 0.05$ ) decrease in indicators of stability in comparison with other athletes. It was revealed a significant ( $P < 0.05$ )

advantage in indicators of stability among athletes who passed a partial selection procedure at the 4th level of competitive results. Conclusions: It was found the dependence of stability indicators at high levels of competitive results on the selection procedure of athletes. The athletes who passed the selection procedure demonstrate higher stability at high levels of competitive results. It was revealed a formal attitude to the selection procedure in some coaches and specialists. The trainers do not pay due attention to the indicators of maintaining body balance and coordination abilities during the selection of candidates. It has been revealed that the motor tests applied in the selection procedure do not allow an objective assessment of the potential of athletes' competitive achievements.

Negaresh, R., Del Coso, J., Mokhtarzade, M., Lima-Silva, A. E., Baker, J. S., Willems, M. E. T., . . . Farhani, F. (2019). Effects of different dosages of caffeine administration on wrestling performance during a simulated tournament. *European journal of sport science*, 19(4), 499-507. doi:10.1080/17461391.2018.1534990

The aim of the present study was to investigate the effects of different forms of caffeine administration on physical performance during a simulated wrestling tournament. In a double-blind and randomized experiment, twelve male freestyle wrestlers competed in a simulated wrestling tournament (5 wrestling matches consisting of 2 x 3-min wrestling rounds) following the ingestion of: a placebo, a high-dose of caffeine (10 mg/kg), a moderate-dose caffeine (4 mg/kg), a repeated-dose caffeine (2 mg/kg before each match to a total of 10 mg/kg) or a selective caffeine administration based on performance decrement previously measured (6.16 +/- 1.58 mg/kg). The Pittsburgh Wrestling Performance Test (PWPT) was measured before each match to assess physical performance. In comparison to the placebo, the high dose of caffeine only reduced PWPT time before the first match (56.8 +/- 2.0 vs. 52.9 +/- 1.8 s;  $p < .05$ ). The moderate dose of caffeine did not affect PWPT performance during the tournament. Both, the repeated dose and the selective administration of caffeine reduced PWPT time with respect to the placebo in the third (66.7 +/- 1.8 vs. 63.1 +/- 1.4 s;  $p < .05$ ) and fourth matches (72.3 +/- 2.4 vs. 65.9 +/- 1.3 s;  $p < .05$ ). However, only the selective dose of caffeine reduced PWPT time before the fifth match (62.7 +/- 3.0 vs. 56.3 +/- 2.0;  $p < .05$ ). The dosage and administration of caffeine affect the ergogenic effects obtained following the ingestion of this substance. An individualized protocol to provide caffeine when physical performance is expected to be reduced might improve wrestling performance during the latter stages of a tournament.

Oza, R. (2019). Wrestling women: Caste and neoliberalism in rural Haryana. *Gender Place and Culture*, 26(4), 468-488. doi:10.1080/0966369x.2018.1502162

In the 2016 blockbuster film *Dangal*, a young wrestler by the name of Geeta Phogat is taken by her father to Rohtak, in the western Indian state of Haryana, to participate in her first wrestling match. He is ridiculed for attempting to enroll his daughter into the hyper male domain and sent on his way. But the organizers soon relent when they see the potential for a salacious scandal of a girl fighting a boy. The scene establishes rural Haryana as a space of hyper misogyny and public space dominated by men who enjoy crude entertainment. But when the young Geeta takes on the toughest of contestants and defeats him, the victory symbolizes something larger - vindication against routine humiliation girls are made to feel. The year 2016 brought unprecedented publicity to women wrestlers in India. Sakshi Malik won the Bronze medal in wrestling for India at the Rio Olympics, and film audiences were treated to two blockbuster films on women wrestlers from Haryana. In this essay, I suggest that the celebratory story of wrestling women both elides and is made possible by Haryana's, and the larger Indian state's, neoliberal agenda. I argue that neoliberalism is able to accommodate the contradictions of Haryana's skewed sex ratio while at the same time produce and celebrate successful women athletes. Second, the story of wrestling women cannot be understood without caste as a fundamentally structuring dimension of success. I make these arguments at three different scales - body and household, village and district, the state.

Park, K. J., Lee, J. H., & Kim, H. C. (2019). Injuries in male and female elite Korean wrestling athletes: a 10-year epidemiological study. *British Journal of Sports Medicine*, 53(7), 430-+. doi:10.1136/bjsports-2018-099644

**Objectives** To report injury patterns associated with the training activities of elite male and female South Korean wrestling athletes preparing for the Olympic Games. **Methods** From 2008 to 2017, we prospectively collected data on elite wrestling athletes at the Korea National Training Center. Athletes were assessed by two sports medicine doctors, and data were stratified according to sex, wrestling style, weight class, injury location and injury severity. T tests were used to compare groups. Injury risk was expressed in relative ratios with 95% confidence intervals (RR, 95% CI). **Results** There were 238 male and 75 female elite wrestlers. Training time totaled 382 800 hours. We recorded 1779 injuries in 313 athletes aged > 18 years (annual average, 4.04 injuries/athlete); 59% of these were mild injuries. When all athletes were considered, most injuries occurred in the lower extremities (37.5%), followed by the upper extremities (27.4%), trunk (25.4%) and the head and neck area (9.7%). Weight class significantly influenced injury severity for both wrestling styles among male athletes (Greco-Roman, P=0.031; freestyle, P=0.028), as well as among female freestyle wrestling athletes (P=0.013). The relative ratio of injury incidence for the lightweight class compared with the heavyweight class was high for Greco-Roman style compared with freestyle (RR 1.13, 95% CI 1.03 to 1.27; P=0.011). **Conclusions** Among male and female South Korean elite wrestling athletes training for the Olympic Games, most injuries were mild and occurred in the lower extremities. Weight class influenced injury severity in both wrestling styles, and lightweight athletes had higher injury rates.

Peterson, A. R., Nash, E., & Anderson, B. J. (2019). Infectious Disease in Contact Sports. *Sports Health-a Multidisciplinary Approach*, 11(1), 47-58. doi:10.1177/1941738118789954

**Context:** Infections are common in contact sports. This review aims to describe the epidemiology, presenting signs and symptoms, treatment guidelines, and regulations for several common infections seen in contact sport athletes. The conditions discussed include bacterial skin infections, herpes simplex virus, molluscum contagiosum, common warts, tinea, scabies, head lice, conjunctivitis, human immunodeficiency virus, hepatitis C virus, and vaccine-preventable illnesses. **Evidence Acquisition:** Searches were performed across PubMed and MEDLINE research databases. In addition, general internet search engine results and reviews of reference lists of relevant papers were used to identify additional sources of evidence. **Study Design:** Clinical review. **Level of Evidence:** Level 4. **Results:** The most common infections seen in contact sport athletes include bacterial skin infections, herpes simplex virus, molluscum contagiosum, common warts, tinea, scabies, head lice, conjunctivitis, and vaccine-preventable illnesses. Other infections, including human immunodeficiency virus and hepatitis C, are uncommon but potentially life threatening. **Conclusion:** Infections are common in contact sport athletes. The provider who cares for these athletes should be aware of the most common infections and their appropriate management. Early diagnosis and appropriate clinical management are important for treating the infected athlete, minimizing risk of transmission, minimizing time lost from competition, and preventing large outbreaks.

Pineau, J. C., & Bouslah, M. (2019). Prediction of body fat in male athletes from ultrasound and anthropometric measurements versus DXA. *J Sports Med Phys Fitness*. doi:10.23736/s0022-4707.19.09985-7

**BACKGROUND:** To compare the accuracy of body fat percentage (BF%) measured by an ultrasound portable device and anthropometric measurements with a Dual Energy X-ray Absorptiometry (DXA) as the reference technique in male athletes. **METHODS:** A total of 100 athletes: 16 boxers, 4 rowers, 5 gymnasts, 6 baseball players, 19 judo players, 10 taekwondo players, 7 basket-ball players, 21 wrestlers, 6 cyclists on track and 6 karate experts aged from 18 to 30 years participated. All athletes were selected from the French National Institute of Sports and Physical Education. Ultrasound measurements were made with a sonographic US BOX at the mid-thigh level. We developed a multi-linear model of body fat estimation

from ultrasound and anthropometric dimensions (height, weight, waist circumference) using the DXA reference method. A cross-validation study was then performed with this linear regression on 62 male athletes proportionally stratified across the sports. RESULTS: The best accuracy of BF was obtained using a multi-linear model from ultrasonic and anthropometric measurements with a concordance correlation  $\rho_c = 0.941$ . This model was then used to estimate BF on the 62 male athletes. The concordance correlation  $\rho_c = 0.931$  and  $SEE = 1.60$ . The 95% limits of agreement for individual BF% were  $[-4.1; 3.6\%]$  with symmetrically distributed deviations. CONCLUSIONS: Comparing to DXA, ultrasonic and anthropometric measurements are both accurate techniques to estimate BF%. Our results suggest that this regression

Podlivaev, B. A., Ogurtsova, M. A., Klimov, K. V., & Sharakin, S. A. (2019). A MODEL FOR THE FUNCTIONAL CONDITION OF WOMEN'S WRESTLERS. *International Journal of Wrestling Science*, 9(1), 19-23.

The model of the athlete's state presented in this work provides for the possibility of controlling the training process and correcting the content of the training process. This model includes aerobic performance (endurance), body composition (muscle mass), explosive strength, anaerobic performance, reaction speed, vertical stability, attention and anticipation (anticipation) as the main characteristics ("rays"). The process of comparing the current state of the athlete with the desired model characteristics occurs as a result of a comprehensive monitoring of the condition of athletes at various stages of training. This model allows you to compare athletes with each other, highlight the system features of the team, track the dynamics of each athlete's performance after correcting the training plan, identify changes after competitions, home fees. The report considers possible options ("cases") of the application of this model in coaching model is practical to apply to different sports.

Podrigalo, L., Cynarski, W. J., Rovnaya, O., Volodchenko, O., Halashko, O., & Volodchenko, J. (2019). Studying of physical development features of elite athletes of combat sports by means of special indexes. *Ido Movement for Culture-Journal of Martial Arts Anthropology*, 19(1), 51-57. doi:10.14589/ido.19.1.5

Purpose. The analysis of body build features of elite athletes of combat sports with the application of special indexes. Methods. 22 anthropometrical indicators were defined, 13 indexes of physical development were calculated on their basis. 29 elite athletes (Candidates Master of Sports and Masters of Sports) were divided into groups. 1- 7 athletes (judo, sambo, Greco-Roman wrestling, and freestyle wrestling), (18,43 +/- 0,43 years). 2 - 9 kickboxing athletes, (18,22 +/- 0,52 years). 3 - 13 combat sports athletes (karate, taekwondo, hand-to-hand fight), (18,00 +/- 0,28 years). Results. Higher body mass index in athletes demonstrates the prevalence of muscular component of somatotype. The Erismann and Pignier indexes, shoulders width index illustrates the best development of muscles in athletes and kickboxing athletes in comparison with karate athletes, and taekwondo. Increase in a relative body surface of athletes demonstrates the growth of their aerobic opportunities. Increase in the power index confirms the importance of grip strength for success in combat. Indexes of a ratio of segments of extremities reflect features of the technique of combat sports. Conclusions. The existence of the features caused by combat sports is confirmed. The competency of special indexes application which is especially illustrated ratios of extremities segments in the monitoring of athletes' functional condition is also proved.

Podrigalo, L., Iermakov, S., Romanenko, V., Rovnaya, O., Tropin, Y., Goloha, V., & Halashko, O. (2019). Psychophysiological features of athletes practicing different styles of martial arts - the comparative analysis. *International Journal of Applied Exercise Physiology*, 8(1), 84-91. doi:10.30472/ijaep.v8i1.299

Study aim. The aim of the research is a comparative analysis of psychophysiological features of athletes of practicing different martial arts. Methods. 46 elite wrestlers participated in a research were divided into three groups: Greco-Roman wrestlers, freestyle wrestlers, judo athletes and sambo athletes. It was applied computer complex of 10 psychophysiological tests. The applied tests allow to give the complex

analysis to psychophysiological features of athletes, to evaluate the speed of reaction to different signals, coordination, concentration, sense of space. Results. It was determined specific influence of a type of martial arts on the studied indicators. Athletes of technical martial arts (judo, sambo) demonstrated the best results in the following tests: simple visual-motor reaction, tapping-test, choice reaction, reproduction of line and coincidence of shape. The worst results of athletes practicing strength sport (Greco-Roman wrestling and freestyle wrestling) witnesses that speed of reaction to different irritators is not the leading predictor of their success. Results of reaction to moving object, the reaction of recognition, the choice reaction of half of the screen and temp reproduction were better in Greco-Roman wrestlers. Conclusions. These data show the high level of athletes' training, confirm the specificity of these tests for single combats. The applied tests are informative for estimation of the functional condition of athletes. Dynamics of their results gives necessary information for the prediction of athletes' success and can be used in the monitoring of their condition.

Polmann, H., Melo, G., Reus, J. C., Domingos, F. L., de Souza, B. D. M., Padilha, A. C., . . . Canto, G. D. (2019). Prevalence of dentofacial injuries among combat sports practitioners: A systematic review and meta-analysis. *Dental Traumatology*, 2019(00:1–17), 17. doi:10.1111/edt.12508

Background/Aim Combat sports might result in injuries to the face and teeth. However, it is unclear how often they occur and which sports presents the highest rates. The aim of this study was to investigate the prevalence of dentofacial injuries in combat sports participants. Material and Methods A systematic review was performed. Six main electronic databases and three grey literature databases were searched. Studies were blindly selected by two reviewers based on pre-defined eligibility criteria. Studies that evaluated the prevalence of dentofacial injuries (teeth, alveolar bone, jaw, lips, and/or cheekbones) among combat sports participants were considered eligible. Risk of bias was assessed using the Joanna Briggs Institute Critical Appraisal Checklist. The software r statistics version was used to perform all meta-analyses. Cumulative evidence of the included articles was evaluated using GRADE criteria (Grading of Recommendations Assessment, Development and Evaluation). Results From 1104 articles found on all databases, 27 were finally included. Eighteen studies were judged at low, seven at moderate, and two at high risk of bias. The following sports were investigated: boxing, capoeira, fencing, jiu-jitsu, judo, karate, kendo, kickboxing, kung fu, muay thai, sumo, taekwondo, wrestling, and wushu. Results from the meta-analysis suggested a dental pooled prevalence of 25.2% (12.3%-40.8%,  $i^2 = 100\%$ ) and dentofacial pooled prevalence of 30.3 (18.1%-44.1%,  $i^2 = 100\%$ ). Considering the sports' categories individually, jiu-jitsu had the highest pooled prevalence of dentofacial injuries (52.9% [37.9%-67.8%,  $i^2 = 92\%$ ]), while judo was the sport with the lowest pooled prevalence (25.0% [7.6%-48.2%,  $i^2 = 98\%$ ]). Among Panamerican sports, boxing had the highest prevalence of dental injuries (73.7% [58.7%-86.3%,  $i^2 = 0\%$ ]). For dentofacial injuries, the GRADE criteria were considered low. Conclusions Overall pooled prevalence of dentofacial injuries in combat sports was approximately 30%. Raising awareness regarding the frequency of these injuries might encourage the use of protective devices and reduce complications related to these incidents.

Popovic, B., Popovic, D., Macut, D., Antic, I. B., Isailovic, T., Ognjanovic, S., . . . Damjanovic, S. (2019). Acute Response to Endurance Exercise Stress: Focus on Catabolic/anabolic Interplay Between Cortisol, Testosterone, and Sex Hormone Binding Globulin in Professional Athletes. *J Med Biochem*, 38(1), 6-12. doi:10.2478/jomb-2018-0016

Background: Endocrine system plays a major role in both permissive and regulatory activities in order to adequately respond to physical stress of exercise. But level and direction of activation depend on many factors and are not easily interpreted. Methods: We tested a group of male professional athletes (21 water polo players and 15 wrestlers), together with 20 sedentary controls matched by age. All participants took a continuous progressive exercise stress test on a treadmill until exhaustion and plateau of oxygen consumption ( $VO_2$ ). Blood samples for cortisol, sex hormone binding globulin (SHBG) and testosterone

were drawn in four time points: baseline (B), start of the test (S), point of maximal strain (MAX) and in the 3(rd) minute of recovery period (R). Results: Cortisol levels significantly increased in both groups, but the response between S and MAX was more pronounced in controls ( $p=0.036$ ). The athletes had significantly higher levels of cortisol in all points in test, except during R ( $p=0.118$ ), when their cortisol levels gradually started to decline. Significant increase in total testosterone was in great deal a consequence of increase in SHBG level ( $p<0.01$  for both). Consequently, calculated free testosterone significantly decreased during test ( $p=0.008$ ), and the drop was more pronounced in athletes. This was in concordance with significant correlation between SHBG and cortisol level demonstrated in athletes, but not in controls. Conclusions: It seems that high intensity endurance exercise favors catabolic response, but the level of response highly depends on a previous level of training.

Qaxramonovich, A. S. (2019). Technology of increase in efficiency of development of coordination abilities and technical and tactical actions of athletes in free-style wrestling. *European Journal of Research and Reflection in Educational Sciences*, 7(10), 19-23.

In work the technology of increase in efficiency of development of coordination abilities and technical and tactical actions of athletes in free-style wrestling with use of the tool technique is developed and experimentally proved.

Rahmani, F., Mirzaei, B., & Farajdzadeh Mevaloo, S. (2019). Anthropometric profile of elite Azerbaijani senior Greco-Roman wrestlers. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 23(4), 196-201. doi:10.15561/18189172.2019.0406

Purpose: The aim of this study was to describe the anthropometric profile of elite Azerbaijani senior Greco-Roman wrestlers. Material: Twenty-three elite level wrestlers in the preparation camp of national team of Azerbaijan (age  $27.21 \pm 2.71$  years, weight  $81.36 \pm 19.30$  kg and training experience  $8.5 \pm 3$  years) participated in this study as subjects. Body composition features including body mass, body mass index (BMI), lean body mass (LBM) and body fat and anthropometric indices: girth, breadth, SUM of skinfolds in 8 points based on the international society for the advancement of kinanthropometry (ISAK) protocol, basic variables including stretch stature and somatotype have been measured. Results: The mean and standard deviations of the measurements of elite Azerbaijani senior Greco-Roman wrestlers were: stretch stature ( $172.85 \pm 8.37$  cm), body mass index ( $26.76 \pm 3.79$ ), lean body mass ( $73.66 \pm 14.41$ ), body fat ( $8.69 \pm 4.46$ ), waist girth ( $81.76 \pm 8.85$ ), gluteal girth ( $98.2 \pm 8.39$ ), arm girth relaxed ( $34.19 \pm 3.82$ ), arm girth flexed and tensed ( $36.39 \pm 3.66$ ), calf girth ( $38.64 \pm 4.13$ ), humerus breadth ( $7.24 \pm 0.61$ ), femur breadth ( $10.09 \pm 0.75$ ), SUM of skinfold at 8 points ( $58.19 \pm 32.44$ ), somatotype: endomorphy ( $2.01 \pm 1.05$ ), mesomorphy ( $6.94 \pm 1/23$ ), ectomorphy ( $1/19 \pm 0/66$ ). Conclusions: Access to the anthropometric profile of elite wrestlers helps coaches to identify talented athletes and then assist them to lead their wrestlers to achieve superiority and elation by principled and scientific planning.

Reale, R., Burke, L. M., Cox, G. R., & Slater, G. (2019). Body composition of elite Olympic combat sport athletes. *European journal of sport science*, 2019(May), 10. doi:10.1080/17461391.2019.1616826

Physique traits of a range of elite athletes have been identified; however, few detailed investigations of Olympic combat sports (judo, wrestling, taekwondo and boxing) exist. This is surprising given the importance of body composition in weight category sports. We sought to develop a descriptive database of Olympic combat sport athletes, compare variables relative to weight division and examine differences within and between sports. Additionally, we investigated the appropriateness of athletes' self-selected weight classes compared to an internationally recognised classification system (the NCAA minimum wrestling weight scheme used to identify minimum 'safe' weight). Olympic combat sport athletes (56 males, 38 females) had body mass (BM), stretch stature and dual-energy X-ray absorptiometry derived

body composition assessed within 7-21 days of competition. Most athletes were heavier than their weight division. Sport had an effect ( $p < .05$ ) on several physique traits, including; lean mass, lean mass distribution, stretch stature and BMI. BM was strongly positively correlated ( $r > 0.6$ ) with; fat free mass, fat mass and body fat percentage, however, was not predictive of total mass/weight division. The Olympic combat sports differ in competitive format and physiological requirements, which is partly reflected in athletes' physique traits. We provide reference ranges for lean and fat mass across a range of BM. Lighter athletes likely must utilise acute weight loss in order to make weight, whereas heavier athletes can potentially reduce fat mass.

Robles, P. R. (2019). Women's Wrestling: A 'Fight' for the Transformation of Cultural Schemas in Relation to Gender. *Societies*, 9(1), 25. doi:10.3390/soc9010008

This article reports on the findings from a social anthropological ethnographic study conducted within the area of women's freestyle wrestling in Barcelona. The study focused on exploring female wrestlers' experiences of the connection between their participation and visibility in this sport and the hegemonic gendered cultural schemas established within our society in relation to gender. The ethnography comprised participant interviews and observations which enabled an exploratory thematic analysis of the relevant experiences of female wrestlers and situates these in the context of gender relations in the sport and in society. The preliminary findings are that freestyle wrestling in this context remains a sexist environment and wrestling shows still include stereotyped discourses when it comes to the staging of women's matches. While there has been some development in terms of female participation in this environment, male dominated discourses, practices and infrastructures still represent a significant barrier for the development of women's wrestling in Spain.

Roth, J., Szczygiel, T., Moore, M., O'Connor, P., Edwards, J., Sharma, N., . . . Zuhl, M. (2019). Profiling Inflammatory Markers During the Competitive Season and Post Season in Collegiate Wrestlers. *Journal of Strength & Conditioning Research*, 33(8), 2153–2161.

The purpose of this study was to determine if biological markers of muscle damage and inflammation coincide with subjective measures of muscle fatigue and sleep quality among Division I collegiate wrestlers. The goal was to provide practitioners with noninvasive techniques to evaluate a wrestler's inflammatory state. Methods. Subjects from the Central Michigan University Division I collegiate wrestling team ( $n=6$ ) were analyzed on six separate occasions throughout the course of the competitive season and post season. Biological measurements (creatinine kinase, IL-6, TNF-[alpha], IL-1[beta], IL-10) and subjective measurements (fatigue, muscle soreness, sleep quality) were performed. Results. The self-reported level of muscle soreness and fatigue was significantly higher from pre-season through mid-season, but leveled off late into the season. Creatinine kinase followed a similar pattern early into the season compared to pre-season, and decreased at the end of season. Plasma TNF-[alpha] and IL-8 levels increased modestly late into season compared to pre-season. Sleep quality correlated with plasma levels of IL-8 ( $r^2=0.120$ ,  $p<0.05$ ). Conclusions. Subjects experienced muscle soreness and fatigue early in the competitive season, along with an increase in markers of muscle damage. This may indicate an adaptive response to the training load. Low grade systemic inflammation increased late into the season, and correlated with poor sleep quality. Based on these data, wrestlers may benefit by additional recovery time early into the season to prevent muscle fatigue and damage. As the season progresses, low-grade inflammation may be prevented or monitored by tracking the quality of sleep.

Sanfilippo, J., Krueger, D., Heiderscheit, B., & Binkley, N. (2019). Dual-Energy X-Ray Absorptiometry Body Composition in NCAA Division I Athletes: Exploration of Mass Distribution. *Sports Health-a Multidisciplinary Approach*, 11(5), 453-460. doi:10.1177/1941738119861572

Background: Body composition assessment is frequently used in sports medicine and athletic performance environments to assess change in response to strength training and nutrition programs. However, to effectively do so requires knowledge regarding expected body composition values relative to sport and sex. Dual-energy x-ray absorptiometry (DXA) is widely used to evaluate body composition, although its utility in relationship to specific sports, performance, or rehabilitation is not clearly defined. Hypothesis: Body composition metrics and distribution of National Collegiate Athletic Association Division I collegiate athletes will vary based on sport and sex. Study Design: Cross-sectional. Methods: A convenience sample of 337 athletes (229 men and 108 women) participating in football, wrestling, soccer, hockey, basketball, golf, softball, or volleyball was evaluated. DXA-measured total body composition, including bone mineral density (BMD), % lean, % fat, and regional distribution were compared by sex, sport, and an age-matched National Health and Nutrition Examination Survey (NHANES) population. Results: Men had higher BMD, lower % fat (16.4% vs 25.2%) and higher % lean (79.2% vs 70.6%) ( $P < 0.001$ ). Regional composition varied by sport and sex, with women having a greater proportion of lean mass at the trunk and men in their arms ( $P < 0.0001$ ). Leg lean mass was distributed similarly between sexes (35%). Overall, the normative group (NHANES) had lower BMD and higher percentage fat. Conclusion: DXA-measured body composition and lean mass distribution varies by sport and sex in Division I athletes. The observed difference to NHANES emphasizes challenges in identifying appropriate comparison populations, reinforcing the need to compare athletes with their own baseline.

Santos, M. A. R., & Brandao, P. P. S. (2019). PRODUCTION OF KNOWLEDGE ABOUT WRESTLING IN THE SCHOOL CURRICULUM OF PHYSICAL EDUCATION. *Movimento*, 25, 13. doi:10.22456/1982-8918.78143

This article analyzes the academic production on the content Wrestling in the curriculum of School Physical Education. presents an overview of research in the area and investigates didactic-methodological processes in teaching Wrestling in School Physical Education. We looked into the current status of production on the subject. We pointed out that Wrestling is an emerging field of research in the school context. Several factors restrict its application in schools. Although there are several proposals to systematize knowledge about Wrestling in Physical Education, they are not linked to pedagogical approaches in PE, and there is no proper teaching methodology for such knowledge as Sports Pedagogy is the main basis of the proposals. Therefore, knowledge production in the area has to be expanded to support teachers' practice at school.

Sen, M., Çetin, S., Ece, C., Aydoğan, A., & Çetin, H. N. (2019). Comparison of quadriceps Q-angle values of soccer players and wrestlers. *Journal of Education and Training Studies*, 7(7), 95-101. doi:10.11114/jets.v7i7.4248

The aim of this study is to compare according to different positions the mean right and left knee Q angle of footballers and wrestlers. In this study, found the female soccer and wrestlers mean age  $20.51 \pm 3.47$  years, height  $165.43 \pm 4.82$  cm, weight  $58.23 \pm 5.18$  kg. Male soccer and wrestlers has with mean age  $21.30 \pm 3.45$  years, height  $173.28 \pm 5.45$  cm, weight  $65.66 \pm 5.73$  kg. One-way ANOVA, Student t, and Duncan post hoc test were used for statistical analysis. In this study, found that the mean right and left knee Q angles of male athletes were  $15.08 \pm 1.79^\circ$  and  $14.49 \pm 1.82^\circ$  for the standing position,  $14.26 \pm 1.84^\circ$  and  $13.29 \pm 1.82^\circ$  for the supine position. The mean right and left knee Q angles of Female athletes were  $18.11 \pm 1.32^\circ$  and  $17.90 \pm 1.35^\circ$  for the standing position,  $17.52 \pm 1.36^\circ$  and  $16.82 \pm 1.29^\circ$  for the supine position. In this study, were found abnormal results. The difference between the Q angle values of footballers and wrestlers was found to be statistically significant ( $p < 0.001$ ). The Q angle values for male soccer players were found 15.35 for standing right Q angle and 15.12 degrees for standing left Q angle and same values 14.80 and 13.86 degrees in the male wrestlers. Q angle values for women footballers were found 17.32 decrees for standing right Q angle and 17.22 degrees for standing left Q angle, and same values 18.90 and 18.58 degrees in the women wrestlers. Standing and supine Q angle values of Wrestlers in both men and women were found to be wider than the Q angle values of soccer athletes

( $p < 0.001$ ). The right Q-angle values of the athletes in the standing and supine position were found higher than the left Q-angle values ( $p < 0.05$ ). Conclusion: The Q angles were within the normal range for footballers and wrestlers. In standing positions Q angle is higher than from supine positions Q angle. Athlete's sex, pelvic width, tibia and femur length and dominant foot may increase the quadriceps Q angle.

Shaheen, S. P., Bytomski, J., & Demyanovich, D. (2019). Historical comparison of soft-tissue infections in a division 1 wrestling team after adoption of a novel pH barrier product. *Journal of Sports Medicine and Physical Fitness*, 59(2), 340-341. doi:10.23736/s0022-4707.18.08461-x

Cutaneous infections in wrestling offer unique problems not seen in other sports due to close continuous contact and minimum disqualification times required during the treatment course. In 2016, the National Wrestling Coaches Association (NWCA) officially announced Theraworx® Technology barrier products (AvadimTechnologies, Inc., Asheville, NC, USA) as their partner to assess if they could reproduce decreased cutaneous infections rates seen anecdotally at member institutions. Our center was one of the early adopting institutions to evaluate the product for decreased infection rates, ease of use, and safety profile. At this time, no significant studies exist with regard to similar barrier products. This research attempts to begin the discussion.

Shiyan, V. V. (2019). SPECIFIC FEATURES OF PLANNING TRAINING LOADS IN THE MACROCYCLE OF PRECOMPETITION TRAINING OF HIGHLY QUALIFIED WRESTLERS. *International Journal of Wrestling Science*, 9(1), 7-18.

The results of the performances of wrestlers in major competitions are largely determined by the quality of the construction of the final stage of preparation, providing for the achievement of the peak of fitness by the time of participation in major competitions. This condition is largely determined by the dynamics of the level of special endurance possessed by the wrestlers. As a result of the research, it was found that the main limiting factor determining the level of special endurance of wrestlers are the anaerobic abilities of athletes. In sports practice, the proportion of training loads that purposefully develop the anaerobic abilities of wrestlers is negligible. The rational distribution of training loads, ensuring the predominant improvement of anaerobic performance, will significantly increase the level of special endurance of wrestlers and create a solid foundation for the full implementation of the technical and tactical capabilities of athletes in competitive fights.

Soygüden, A., & Taşkıran, C. (2019). TURKISH NATIONAL WRESTLERS AND HALAL FOOD-RELATED PROBLEMS IN THE ORGANIZATION OF INTERNATIONAL SPORT *International Journal of Wrestling Science*, 9(2), 1-8.

The study was carried out in order to determine the halal food problems that the members of the Turkish national wrestling team have experienced at the international sports organizations held abroad. In international sports organized abroad, national wrestlers are affected psychologically and motivationally in sports performances due to the absence of halal food. This study aims to draw attention to halal food in international the organization of sports. Materials and Methods; a questionnaire form was prepared by the researchers and used in the study. There are 12 questions in the questionnaire including 8 halal food questions and 4 socio-demographic questions. The questions in the questionnaire were prepared in consultation with academicians working at different universities. The study of the different age groups ( $n = 40$ ) were applied to the old and the new Turkish national wrestling team members. As a result of the questionnaire survey, the data were entered into the SPSS program and statistical percentages were obtained. Results; in the study 100% of the national wrestlers participating in the study were male athletes and 45% of the athletes participating in the study were ages between 21-25 years old. In the study, 85% of the participants were university graduates. In the survey, 70% of the national wrestlers who

participated to the study were stated that they participated in international sport organizations between 1-5 times and 22.5% between 6-10 times. In the study, 95% of the national wrestlers who participated in the survey responded "No" to the Question of the "Q: Can you easily consume the food at the accommodation place in the sports competitions held abroad?". In the study, 100% of the athletes participating in the study answered "yes" to the question of the " Q: Are you paying attention to the halal food when going on in sports competitions abroad?". In the study, 80% of the athletes responded "yes" to the question of the " Q: Does it affect the sport performance because there is no halal food abroad?". In the study 92.5% of the athletes answered "yes" to the question "Are you bringing halal food with you in sports competitions made abroad?". In the study, participant's food consumption was declared by the athletes, 90% vegetable, 87.5% fruit, 85% pilaf (rice), 65% chicken, 60% fish, 32.5% pasta and nuts only 2.5% red meat. Conclusion; we see that athlete's sports performance, psychological and motivational is effected among national wrestlers abroad due to the absence of halal food or lack of halal food preparation process. It is recommended that international sports federations conduct studies on halal food in sport organizations held abroad. Competition on equal terms for all athletes will contribute to better levels of world sport.

Tkachuk, M. G., Levitskii, A. G., & Sobolev, A. A. (2019). MORPHOGENETIC MARKERS OF FAST TRAINABILITY IN WRESTLING. *Human Sport Medicine*, 19(1), 130-134. doi:10.14529/hsm190118

Aim. The article deals with identifying the informative morphological criteria of selection in judo at the stage of athletic performance improvement. Materials and methods. We measured 42 athletes engaged in judo (body weight 66-73 kg, 18-25 years old, Candidate of Master of Sport or Master of Sport) by using complex anthropometric and somatometric techniques. For quickly trained athletes it took not more than 6 years for achieving the rank of Candidate of Master of Sport and not more than 8 years for achieving the rank of Master of Sport. Slowly trained athletes obtained the same rank of Candidate of Master of Sport for 7-9 years and that of Master of Sport for 9-11 years. Results. In both quickly and slowly trained athletes we revealed significant differences in partial, circumference, and transverse body size, body composition, and somatotype. We found out that the morphogenetic markers of fast trainability in judo include the following parameters: high values of humerus lengths (34.4 +/- 0.23 cm) and thorax circumference (98.2 +/- 1.68 cm), low content of adipose tissue (8.1 +/- 0.3 %), and a high value of mesomorphy (5.8 +/- 0.25 points). Conclusion. The results obtained allowed us to most effectively carry out the selection at the stage of athletic performance improvement and to predict the success of competitive activities in judo.

Volkov, L., & Zakharkiv, S. (2019). Relationship of special and functional preparedness of freestyle wrestlers at different stages of sports training. *Slobozhanskyi herald of science and sport*, 7(3), 56-61.

The presented experimental data indicate that at all stages of the long-term training of freestyle wrestlers between the ages of 11&12 years old and 17&18 years old there are reliable relationships between the indicators of special and functional readiness. The greatest numbers of reliable relationships have tests on special preparedness - rushing on the wrestler's bridge in 1 minute, coups on the wrestler's bridge in 1 minute. The conducted studies confirm the reliably high interconnection of the components of special and functional preparedness when training adolescents and young men in wrestling. Separate components of these types of training change the information content depending on the stages of preparation, require changes in the total and selective amounts of training loads. Purpose: explore the relationship of the main components of the special and functional preparedness of adolescents and young men engaged in freestyle wrestling at different stages of many years of sports training. Material & Methods: the study is organized on the basis of the Olympic College of Ivan Poddubny with the participation of 90 athletes aged 11 to 18 years. In the course of the experiment, the following methods were used: theoretical analysis, synthesis of practical experience, pedagogical testing, pulsometry, reflexometry, heat measurement, mathematical statistics, correlation analysis. Results: the interrelation of special and functional

preparedness of freestyle wrestlers from 11 to 18 years old, studying at different stages of sports training, is established. Conclusions: the study of the problem of the relationship of special and functional preparedness of freestyle wrestlers requires the development of an integrated methodology using the idea of a systems approach. At all stages of athletic training for teenagers and young men aged 11&12 years old to 17&18 years old engaged in freestyle wrestling, there are reliable relationships between the components of special and functional preparedness. According to the informativeness of these indicators vary from the stage of preparation; it requires changes in the volume of training loads of selective and general orientation.

Waltzman, D., & Sarmiento, K. (2019). What the research says about concussion risk factors and prevention strategies for youth sports: A scoping review of six commonly played sports. *Journal of Safety Research*, 68, 157-172. doi:10.1016/j.jsr.2018.11.005

Introduction: Given the growing research on potential adverse outcomes related to concussion and other serious brain injuries and the increased susceptibility for concussion among youth athletes, primary prevention is vital to protect the health and safety of this population. The purpose of this study is to summarize the current research on risk factors and primary concussion prevention strategies focused on specific youth sports, and to identify research gaps. Methods: A literature search was conducted using six electronic databases. A scoping review method was used to identify studies that addressed risk factors or primary concussion prevention strategies focused on youth athletes (ages 5-18 years) in six sports (football, ice hockey, soccer, lacrosse, basketball, and wrestling). Results: Of the 18 publications identified, the publications focused on risk factors (N = 11), policy (N = 1), rule changes (N = 3), education (N = 2), equipment (N = 2), and playing technique (N = 0). Some articles had information related to multiple topics. Conclusions: Current research on concussion prevention has primarily been focused on risk factors. There is a dearth of studies that examine primary concussion prevention in sports. When studies do exist, most focus on football and ice hockey. Only a small number of studies focus solely on risk factors or primary prevention in soccer, lacrosse, basketball, and wrestling all sports in which concussions are common. Practical applications: This scoping review summarizes current research on concussion risk factors and primary prevention strategies in specific sports focused on youth athletes and identifies research gaps to help inform future efforts. Published by Elsevier Ltd.

Yamaner, F. (2019). The effect of overtraining on serum leptin levels in women national wrestlers. *Pedagogics Psychology Medical-Biological Problems of Physical Training and Sports*, 23(4), 209-213. doi:10.15561/18189172.2019.0408

Purpose: Weight control and weight loss during the periods of wrestling competitions are attached great importance -in order to be successful in wrestling. Leptin hormone level is known to play an important role in the control of body weight. For this reason, the purpose of this study was to investigate the effect of substantial weight loss on serum leptin levels of women wrestlers during competition periods. Material: Twenty-five women wrestlers who trained for 2015 European Championship from Turkish National Wrestling Team and 26 sedentary women were recruited voluntarily for this study. Serum leptin levels of wrestlers in the experimental group and sedentary women in the control group were measured after overnight fasting before and after 21 days training camp of 2015 European Championship. Results: Statistically significant difference was found in the direction of decrease in body weight, body mass index (BMI), glucose, insulin, cholesterol, triglyceride, LD, VLDL and leptin parameters and increase in HDL parameters before and after training camp in the experimental group ( $p < .05$ ). There was a statistically significant difference in leptin levels between the control group and women wrestlers ( $p < .05$ ). There was also a statistically significant difference in leptin levels of wrestlers before and after training camp ( $p < .05$ ). Conclusions: As a result, the data obtained in the study indicate that intense wrestling trainings in camping period brought about weight loss and decreased leptin levels.

Zouita, A. B. M., Zouita, S., Dziri, C., Brughelli, M., Behm, D. G., & Chaouachi, A. (2019). Differences in Trunk Strength Between Weightlifters and Wrestlers. *J Hum Kinet*, 67, 5-15. doi:10.2478/hukin-2019-0007

Investigations of trunk strength with high-level athletes are limited. The purpose of this study was to compare maximal concentric isokinetic trunk extension and flexion torque, power, and strength ratios between high-level weightlifters (n = 20), wrestlers (n = 20) and a control (n = 25) population. Isokinetic dynamometry was used to evaluate peak torque, power and strength ratios during seated trunk extension/flexion actions at 60 degrees /s and 180 degrees /s. There were no significant anthropometric differences between groups. Overall, trunk isokinetic force variables as a function of the increase in angular velocity, showed a decrease in peak torque, but an increase in power (athletes and controls). Compared to the control group, athletes demonstrated significantly higher trunk extension torque (+67.05 N.m, ES = 0.81) and power (+49.28 N.m, ES = 0.82) at 60 degrees /s and 180 degrees /s, respectively. Athletes produced significantly greater trunk flexion-extension ratios at 60 degrees /s and 180 degrees /s (ES = 0.80-0.47) than controls. Weightlifters and wrestlers exhibited significantly higher extensor than flexor torque at all angular velocities. Weightlifters demonstrated greater torque (ES = 0.79) than wrestlers at 60 degrees /s. The wrestlers' average power was significantly higher (ES = 0.43) than weightlifters at 180 degrees /s. There were no significant ratio differences between wrestlers (66.23%) and weightlifters (72.06%). Weightlifters had stronger extensor muscles at 60 degrees /s, whereas wrestlers had higher power at 180 degrees /s for extensor muscles. It was postulated that the extensor muscles were stronger than the flexors to ensure trunk stabilisation, and for prevention of injuries. These differences seem to be associated to the movements that occur in each sport in terms of both muscle actions and contractile forces.

Zubac, D., Paravlic, A., Reale, R., Jelaska, I., Morrison, S. A., & Ivancev, V. (2019). Fluid balance and hydration status in combat sport Olympic athletes: a systematic review with meta-analysis of controlled and uncontrolled studies. *European Journal of Nutrition*, 58(2), 497-514. doi:10.1007/s00394-019-01937-2

Purpose: Athletes in Olympic combat sports experience body water fluctuations resulting from training and intentional dehydration when making weight. Despite the popularity of urine specific gravity (U-SG) and urine osmolality (U-OSM) measurement in characterizing fluid fluctuations, their utility remains questioned. This systematic review/meta-analysis examined the utility of urinary hydration indices in laboratory and field settings in Olympic combat sport athletes. Methods: 27 articles met the inclusion criteria for systematic review, 15 studies were included in the meta-analysis; with U-SG and U-OSM the main outcome variables. Meta-regression analyses evaluated the interrelationship among body mass (B-M), fluid intake, and urine measures. Results: Significant U-SG alterations were observed following different sampling time frames: dehydration (ES0.59; 95% CI 0.46-0.72; p=0.001), follow-up period (ES0.31; 95% CI 0.11-0.50; p=0.002) and rehydration (ES -0.34; 95% CI -0.56 to -0.12; p=0.003). Direct comparison of laboratory (ES0.20; 95% CI -0.19 to 0.59; p=0.324) and field (ES0.35; 95% CI 0.14-0.56; p=0.001) sampling showed marginally trivial and small effects. Small effects on U-OSM were observed following dehydration (ES0.31; 95% CI 0.12-0.74, p=0.15), follow-up period (ES0.39; 95% CI 0.08-0.70, p=0.015) and rehydration (ES -0.45; 95% CI -0.60to0.30, p=0.001). Meta-regression analysis suggests only fluid intake predicts U-SG alterations (p=0.044) during rehydration protocols. Conclusions: There were likely small changes in both U-SG and U-OSM readings across all experimental conditions, with moderate-to-large heterogeneity in all studies, except for U-SG readings during dehydration protocols. The meta-regression failed to provide conclusive evidence concerning the interrelationship among urine measures, B-M fluctuations, and fluid intake.

