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Annual Compilation of Wrestling Research



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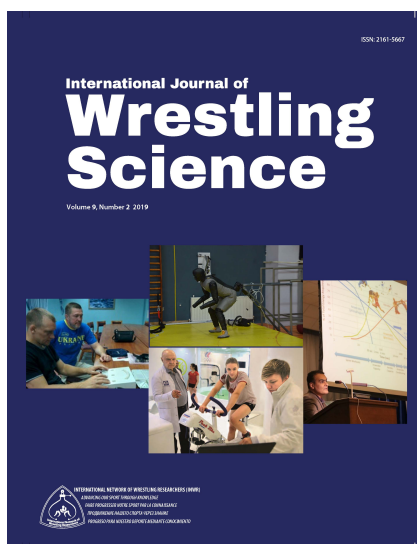
The Annual Compilation of Wrestling Research 2020 is compilation of published wrestling-related research published during 2020 and is provided by the International Network of Wrestling Researchers (INWR). The INWR is the largest scientific support group for a sport in the world! Our group has grown to over 500 academics, scientists, doctors and wrestling professionals, from 82 countries who are involved with the sport of wrestling. (www.inwr-wrestling.com) Our Mission Statement is:

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

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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2020 Annual Compilation of Wrestling Research

Abe, T., Bell, Z., Wong, V., Spitz, R., & Loenneke, J. (2020). Why is low body fat rarely seen in large-sized male athletes? *American journal of human biology*, 32(6), doi:10.1002/ajhb.23399

Objectives: It is unknown why low body fat is rarely seen in large-sized athletes (>100 kg body mass). The aim of this review was to examine the relationship between body mass and body composition (fat mass and fat-free mass) in elite male athletes, and to discuss the possible reasons why low body fat is rarely seen in large-sized male athletes. **Methods:** A search using two electronic databases was conducted. Eighteen studies estimated body composition in elite athletes by dual-energy X-ray absorptiometry, totaling 2249 elite male athlete and 72 data points. **Results:** Our results indicated that low body fat (eg, less than 10% body fat) was rarely seen in large-sized male athletes over 100 kg body mass. The larger the body mass, the higher the fat-free mass, with fat-free mass leveling off when body mass exceeds approximately 120 kg. **Conclusion:** Possible reasons for this are unknown but we provide some ideas for why this might occur. The two different stages to consider with respect to skeletal muscle growth: the amount of growth during development and the amount of growth as a result of long-term resistance training. In certain sporting events, a large body mass may be favored. However, the large-sized athletes have to balance any potential positive influence of body mass on sport performance with the potential negative factors associated with body fat accumulation. Further research is warranted, as there is currently limited evidence on this topic.

Açak, M., Korkmaz, M. F., Taskiran, C., & Demirkan, E. (2020). Investigating the effects of wrestling gear in flatfoot deformity of wrestlers. *Pedagogy of Physical Culture and Sports*, 24. doi:10.15561/26649837.2020.0301

Purpose: In this study, our aim was to determine the effects of wrestling shoes, wrestling mats and wrestling styles on postural deformation of the foot and to elaborate its possible causes. **Material:** Study group comprised of 158 athletes (109 males, 59 females) from 26 different countries who participated in the 12th World University Wrestling Championship. Of the athletes, 102 (59 females, 43 males) performed in freestyle and 56 performed in Greco-Roman style. The age range of the athletes was 19 to 31 years and they have done wrestling for 3 to 18 years. Were evaluated to determine the relationship between flatfoot deformity and gender, age, wrestling style and years in the sport. Footprint parameters were used to determine and evaluate the overall structure of the foot. The Staheli and the Chippaux-Smirak indexes were used in the study. Statistical analyses were performed using the SPSS v.21.0 software, with the significance level set at $\alpha=0.05$. **Results:** No significant relationship was found either between the gender of the wrestlers or their age and their pes planus state. A significant relationship was detected between the wrestling style performed and the wrestlers' pes planus state, and between the years in the sport and their pes planus state. **Conclusions:** The fact that wrestlers wear the wrestling shoes for a long time can be a cause of pes planus. The center of mass of freestyle wrestlers shifts during continuous feet movement, and the surface of their soles extends the contact surface on the mat to maintain balance. This situation can also lead to a higher prevalence of pes planus in wrestlers. In addition, the wrestling shoes wrap around the Achilles tendon and thus the stretching of this tendon is restricted. Such restriction strengthens the opinion that freestyle wrestlers experience pes planus more.

Acar, S., & Koca Ozer, B. (2020). Assessment of the relationships between physical and motor features of young wrestlers from Turkey. *Journal of Anthropology of Sport and Physical Education*, 4(1), 15-24. doi:10.26773/jaspe.200103

Physical development, fitness and motor skills are the most important components in determining the performance and success of wrestlers, with wrestling largely dependent on overall body strength and

relatively short match times. The aim of the present study is to evaluate the relationships between the physical and motor characteristics of young wrestlers in Sivas, Turkey. The study conducted on 86 male freestyle wrestlers aged 10 to 21 years representing urban and rural areas. The sample was analyzed by age groups; 10 to 14 year-olds, 15 to 17 year-olds and 18 to 21 year-olds due to the skill level of the United World Wrestling (UWW) sport categories. Anthropometric measurements (height, weight, skin folds and body composition) as well as motor tests (speed, flexibility and durability) were performed and the data were analyzed using the Statistical Package for Social Science (SPSS) version 23. The results showed that physical properties were correlated significantly with motor features and affected them significantly. According to standardized regression coefficients (β), particularly muscle mass and free fat mass values were presented significant relationships on the anthropometric characters for all of age groups. As a conclusion, wrestlers from all age groups have presented with high level of fat mass, muscle mass and fat free mass where motor and physical properties are highly correlated among the wrestling athletes in accordance with the special training methods.

Aguilar Navarro, M., Salinero, J. J., Muñoz Guerra, J., Plata, M. d. M., & Juan, D. C. (2020). Sport-Specific Use of Doping Substances: Analysis of World Anti-Doping Agency Doping Control Tests between 2014 and 2017. *Substance Use & Misuse*, 55:8, 1361-1369, DOI: 10.1080/10826084.2020.1741640,

Background: In recent years, there has been a solid effort across all sports organizations to reduce the prevalence and incidence of doping in sport. However, the efficacy of current strategies to fight against doping might be improved by using anti-doping polices tailored to the features of doping in each sport. **Objectives:** The aim of this investigation was to analyze the substances more commonly found in doping control tests in individual and team sports. **Material and Methods:** The publicly accessible Testing Figures Reports made available by the World Anti-Doping Agency, were analyzed from 2014 to 2017. **Results:** The most commonly detected groups of banned substances were anabolic agents and stimulants but the distribution of adverse findings per drug class was very different depending on the sports discipline. Weightlifting, athletics, rugby, hockey and volleyball presented abnormally high proportions of anabolic agents ($p = 2.8 \times 10^{-11}$). Cycling, athletics and rugby presented atypically elevated proportions of peptide hormones and growth factors ($p = 1.4 \times 10^{-1}$). Diuretics and masking agents were more commonly found in boxing, wrestling, taekwondo, judo, shooting, and gymnastics than in other sports ($p = 4.0 \times 10^{-68}$). Cycling, rowing, aquatics, tennis, gymnastics and ice hockey presented abnormally high proportions of stimulants ($p = 1.8 \times 10^{-5}$). **Conclusions:** These results indicate that the groups of banned substances more commonly detected in anti-doping control tests were different depending on the sports discipline. These data suggest the prohibited substances used as doping agents might be substantially different depending on the type of sport and thus, sports-specific anti-doping policies should be implemented to enhance the efficacy of anti-doping testing.

Akhlaghi, H., Heydarinezhad, S., Mehdipor, A., & Marashiyan, H. (2020). The effect of moral orientation on the performance of Iranian wrestlers: Explaining the model and providing a strategy. *Annals of Applied Sport Science*, 5(1), 1-8. doi:10.29252/aassjournal.719

Background. Today, the necessity of studying the ethics of sport in the world of sports is obvious in national and international dimensions, especially given that in contemporary sport unfortunately ethical standards is less considered in the sports fields and is going to be weaker every day. **Objectives.** The current study aimed at investigating the effect of moral orientation on the performance of wrestlers in Iran by explaining the model and providing a strategy. **Methods.** The statistical population of the study included wrestlers participating in Iranian national Greco-Roman and freestyle (adults, youth, adolescents), Alich and Grapling (men and women), and Pahlavani (N = 220) wrestling teams. The current field study with descriptive-correlational design was specifically conducted based on structural equation modeling (SEM), relied on covariance. To collect data, questionnaire of moral orientation in

physical education developed by Miltiadis in 2010 and the individual performance scale developed by Koopmans (2014) were used. Results. The results showed that moral orientation had a positive and significant effect ($r = 0.404$, $p = 0.001$) on performance. Also, the components of deontological ethics, Theological ethics, and civil liability had a significant effect on the level of performance. Also, the path analysis model showed a positive and significant relationship between moral orientation ($t\text{-value} = 6.04$, $r = 0.52$). Conclusion. Finally, it is concluded that moral orientation as one of the important criteria in the field of wrestling can have a significant effect on the performance of wrestlers and leads to an increase in their performance. APPLICABLE REMARKS - Considering the positive effects of moral orientation and its components on the level of performance of wrestlers, the following items are suggested: - Managers, officials, and planners in the field of wrestling are recommended to provide a comprehensive training program for the promotion of ethics among wrestlers of different types in order to enhance their moral behaviors under the light of this program and increase their performance more than ever. - The goals in terms of the tasks (i.e., how to set down and combining the tasks, the short- and long-term goals, assign tasks to practice and work, and finally paying attention to individuals' differences in doing task), self-confidence, commitment, and coping stresses Individually in precise planning and in combination with modern teaching methods. Also, introducing the ones with better deontological ethics as a tenet can be useful. - Sports psychologists should be invited to the wrestling camps for training the skills of proper dealing with opponents, control emotions, and empowering the athletes and the way to nurture these skills by psychologists periodically be reviewed to provide the context for increasing the performance of wrestlers. It is also recommended to make an educational video that covers all educational aspects (illustration, concentration, mental practice) using various visual techniques for wrestlers.

Akinci, A. Y. (2020). Historical journey of wrestling from ancient Egypt to today. *International Journal of Applied Exercise Physiology*, 9(7), 63-72.

The journey of wrestling which began approximately 5,000 years ago in a Sumerian temple, continued with a wrestling handbook in an Egyptian wall painting dating from 1850 BC. Later became one of the Ancient Olympic sports event, then completed the ancient journey as Greek type games in Rome. The abundance of resources from the Greek and Roman periods is perhaps due to the fact that Greek sports are pioneers around the Mediterranean. The literary and physical cultural elements are full of evidence that shows the prevalence and application of wrestling from Sumer to the present. The aim of this study is to examine the wrestling that took place in Egypt hundreds of years before Ancient Greece. In ancient Egypt, sports have been closely linked to religion, like all other aspects of culture. Ancient iconographic and literary evidence has been used to explain the popularity of wrestling in Egyptian Civilization in light of ethnographic studies. While creating the theoretical framework, various epigraphic records and source works in the field have been used, information about the past practices of wrestling has been obtained, and the related resources have been scanned and images have been reached. Based on the data obtained, inferences have been made for the purposes of the research. It was concluded that the technical and tactical practices applied in ancient Egyptian wrestling are partially applied in today's wrestling, the referee management continues, but the subject of clothing is different due to the globalization of regional cultural values.

Aksoy, Y., Aslan, H., & Imamoğlu, O. (2020). Performance Development of Wrestlers In Sport Education Centre. *Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi*, 22(1), 104-110. doi:10.15314/tsed.685000

The aim of this study is to determine the changes in the physical and motoric characteristics of wrestlers in wrestling education Centers in the first year. The average age of the wrestling training center wrestlers was 12.05 years in the first measurement and the last measurement was 13.05 years. There was a significant change in age and height of wrestlers in a one-year period ($p < 0.001$). The change in

body weights was found to be insignificant ($p > 0.05$). The changes in squat jump, long jump, hand grip strength, flexibility, shuttle pull, 30-meter speed, aerobic and anaerobic power values of the wrestlers were significant in one-year period ($p < 0.05$ and $p < 0.001$). There was no significant difference in throwing health ball in one-year period ($p > 0.05$). In the present study, the differences between the average max $\dot{V}O_2$, 30-meter sprint, number of shuttles in 30 seconds and sit and reach flexibility values of wrestlers within a year were found to be statistically significant ($p < 0.05$ and $p < 0.001$). Conclusion: Motor performance parameters of speed, abdominal strength, flexibility, anaerobic strength and aerobic endurance values of the wrestlers increased during the one-year period. There was no significant increase in shoulder - arm throw strength. Particular attention should be given to arm traction movements, in addition to pushing from arms and shoulder area exercises during wrestlers' training.

Arakawa, H., Yamashita, D., Arimitsu, T., Kawano, T., Wada, T., & Shimizu, S. (2020). Body Composition and Physical Fitness Profiles of Elite Female Japanese Wrestlers Aged 12 Years until 20 Years. *Sports (Basel)*, 8(6). doi:10.3390/sports8060081

Studies evaluating the physical fitness levels of elite wrestlers during junior high school are limited. This study aimed to examine the body composition and physical fitness profiles of elite Japanese female wrestlers aged <12 years until >20 years. There were 114 elite female wrestlers enrolled. Measurements were conducted in the following age categories: <12 years (U-12), <15 years (U-15), <17 years (U-17: cadet), <20 years (U-20: junior), and >20 years (senior). Body composition variables consisted of body mass index (BMI), percent body fat, fat free mass, and fat free mass index (FFMI). Fitness measurements included grip strength, back strength, sit-up, rope-climbing, and endurance running tests. The wrestlers in this study demonstrated comparable or greater FFMI values (e.g., FFMI: 17.9 ± 0.4 kg/m² for light and 19.8 ± 0.9 kg/m² for heavy weight categories in U-20), when compared with young female wrestlers in previous studies, whereas stature, body mass, and BMI of the wrestlers in our study were unremarkable. Regarding the fitness assessment, a remarkable increase in back strength was observed after late puberty. An outstanding enhancement of muscle strength after late puberty, which is unlikely to occur in ordinary women, would be an important requirement to become the world's top female wrestler.

Argudo Fuentes, C., María López-Gullón, J., Bazaco Belmonte, M. J., Vegara Ferri, J. M., Berenguí, R., & Angosto, S. (2020). Psychological dimension in the formation process of the Spanish Olympic wrestler. *Dimensión psicológica en el proceso de formación del luchador olímpico español*, 36(3), 553-560. doi:10.6018/analesps.398831

The aim of this study was to know how psychological work has been carried out in sports training process of Spanish Olympic wrestlers. From a qualitative perspective, the instrument used was a semi-structured interview, which was applied to 21 Olympic wrestlers. The results show that athletes attach great importance to psychological factors in their discipline, and that they are essential at the high competition stage to achieve excellence. They consider motivation and self-confidence as the most significant psychological variables in sports performance, and predictors of wrestling success. Also, necessary aspects such as a capacity for self-sacrifice, constancy, discipline and perseverance are valued. They estimate that psychological aspects have not been properly trained, and only in recent times has the figure of the sports psychologist been incorporated into their training.

Bachman, R. (2020, 05/30/2020). Wrestling Goes to the Mat to Shed 'High Risk' Coronavirus Label. *Wall Street Journal*, p. A14. Retrieved from <http://proxy.uchicago.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsbro&AN=edsbro.A625457287&site=eds-live&scope=site>

Baggish, A., Drezner, J. A., Kim, J., Martinez, M., & Prutkin, J. M. (2020). Resurgence of sport in the wake of COVID-19: cardiac considerations in competitive athletes. *Br J Sports Med*. doi:10.1136/bjsports-2020-102516

Baikoglu, S. (2020). Analyzing the Effect of 25-Hydroxy Vitamin D Level on Strength and Endurance in Male Wrestlers. *Journal of Education and Learning*, 9(1), 237-243.

90-95% of vitamin D which has the supreme function of regulating many metabolisms in tissues and organs, is taken from the sunlight through skin. Since wrestling is performed in sun-protected sports halls, we think that a vitamin D replacement will improve the performance of wrestlers, especially as the limited exposure to sunlight is compared to outdoor sports branches. The aim of our study is to increase the strength and endurance of male wrestlers by applying 25-Hydroxy vitamin D replacement together with general and wrestling-specific trainings for 8 weeks. 36 wrestlers participated in the study and were divided into two groups as subject and control groups. Group A (n: 18) was the exercise-subject group with a 25-hydroxy vitamin D replacement and group B (n: 18) was the exercise-control group without the vitamin D replacement applied. In the subject group, Devit-3 oral ampoule 1 ml (300,000 I.U.) replacement was applied to the wrestlers whose 25-hydroxy vitamin D levels were below 20 ng/mL. Wrestlers were pre-tested one week before the replacement. After 8 weeks, they were post-tested and their vitamin D levels were measured again. Wrestlers in the control group were tested at the beginning and end of the 8-week training program without the vitamin D supplementation. In the analysis of the data, a Wilcoxon test and Mann Whitney test (one of the nonparametric tests) was used in accordance with the distribution width when the averages of the groups were evaluated in terms of significance with each other. The values that were $p < 0.05$ as the significance level of the data were accepted as statistically significant and the evaluations were made accordingly. When the results of the analysis were examined, it was seen that 25-hydroxy vitamin D levels of the wrestlers increased from 13.85 ng/ml to 26.28 ng/ml after the replacement applied to the wrestlers in the subject group. It was observed that while vitamin D levels of the group increased, their aerobic endurance decreased to 132.22 ± 9.69 from 150.33 ± 20.98 ($p < 0.05$). Thus, their aerobic endurance improved statistically significant. No statistically significant value was obtained in the test analysis of the wrestlers in the control group. The analysis results obtained from the study showed that the 25-hydroxy vitamin D levels in athletes increased and their aerobic capacity also increased after vitamin D induction. It is possible to say that vitamin supplementation together with 8 weeks training program is more effective for athletes to improve their strength and endurance.

Banakar, A., & Ghafouri, F. (2020). Assessing the quality of national team's preparation camps for Tokyo 2020 Olympics. *New Trends in Sport Management*, 8(30), 3.

The purpose of this study was to assess the quality of the national team's preparation camps for Tokyo 2020 Olympics in terms of five key factors (hardware, finance, human, management, and information). The population of this study included athletes, coaches and supervisors of national teams of 4 sports (wrestling, shooting, volleyball and basketball) at the training camp for the Tokyo Olympic Event. The sampling method was a total number of 150 people. The instrument was a self-developed questionnaire in the form of a Likert 5-point scale, which was distributed among subjects after determining the formal and content validity and reliability ($\alpha = 0.82$). The Kolmogorov-Smirnov test ($P=0.05$) was used to normalize the distribution of data. One-sample t-test was used to analyze the data of effective factors and Friedman test was used to prioritize the effective factors by using SPSS software. The results showed that the financial factor was the lowest level of quality with the mean (1.44) and then the management, information, hardware and software components averages (2.33), (3.38), (3.71) and the human factor an average (3.94) is at the highest level of quality. Ultimately, by providing adequate budgeting and proper planning with regard to exchange rate and inflation changes, as well as the

constant presence of journalists in camps and the improvement of special hardware in the field of sport, a higher quality of camps is obtained.

Berbecaru, C., Stănescu, M., & Micle, A. (2020). HOW EFFICIENT ARE THE WEB-BASED LEARNING METHODS IN ANTIDOPING EDUCATION OF ROMANIAN ELITE ATHLETES? *eLearning & Software for Education*, 3, 346-354. doi:10.12753/2066-026X-20-216

Providing antidoping education is one of the most important characteristics of the specialized institutions in this field. In the past, they focused on actions aimed at testing athletes in order to detect prohibited substances. Currently, the national antidoping agencies, independently or in partnership with different educational institutions (pre-university, university), or with non-formal education entities, have diversified the methods and means by which antidoping education is carried out. Web-based training methods in antidoping education is one of the new trends in this educational field specific to high-performance sport. The obvious benefits of these methods have prompted antidoping organizations worldwide or nationally to develop and use a number of online tools, such as antidoping e-Learning platforms ADel (Alpha, Coach true, Online Sport Physician Kit, Ado Kick Start, Parents' Guide to Support Clean Sport), edu.anad.ro (platform of the Romanian Antidoping Agency), e-Learning Germany (platform of the German Antidoping Agency), e-Learning England (platform of the Antidoping Agency of England), iLiftClean Education Platform (platform of the International Weightlifting Federation). The paper aims to highlight the level of knowledge of antidoping training programs relying on web-based learning methods, among Romanian athletes. In this regard, a survey (questionnaire) was applied, based on the following: knowledge of online antidoping education tools, the frequency of platform access, and the level of efficiency perceived by the athletes who use them, the advantages and the disadvantages perceived by athletes, etc. The research was carried out on a group of 150 athletes, aged 15-35 years, practicing one of the following sports: athletics, cycling, artistic gymnastics, handball, swimming, judo, wrestling, tennis, volleyball, biathlon, bob, ice hockey, speed skating, sledding, ski jumping, downhill skiing, mountaineering, cross country skiing, snowboarding. The conclusions of the paper highlight a number of particularities of the antidoping education applied to Romanian athletes and allow the formulation of recommendations that will improve the interventions of the NADA educational actions.

Bhatia, R. T., Marwaha, S., Malhotra, A., Iqbal, Z., Hughes, C., Börjesson, M., . . . Sharma, S. (2020). Exercise in the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) era: A Question and Answer session with the experts Endorsed by the section of Sports Cardiology & Exercise of the European Association of Preventive Cardiology (EAPC). *Eur J Prev Cardiol*, 2047487320930596. doi:10.1177/2047487320930596 Regular exercise has multiple benefits for physical and mental health, including the body's ability to combat infections. The current COVID-19 pandemic and the social distancing measures employed to curtail the impact of the infection are likely to reduce the amount of usual physical activity being performed by most individuals, including habitual exercisers. The uncertainties relating to the impact of the SARS-CoV-2 virus on the heart may cause increased anxiety, particularly in athletes who need to sustain a vigorous exercise regime in order to maintain their skills and fitness in preparation for return to competition after a short re-training period. The aim of this document is to provide practical answers to pertinent questions being posed by the sporting community, in an attempt to offer reassurance, promote safe participation in exercise during as well as after the COVID-19 pandemic and provide a framework of management for physicians caring for athletes.

Boulygina, E. A., Borisov, O. V., Valeeva, E. V., Semenova, E. A., Kostryukova, E. S., Kulemin, N. A., . . . Ahmetov, I. I. (2020). Whole genome sequencing of elite athletes. *Biology of Sport*, 37(3), 295-304. doi:10.5114/biolsport.2020.96272

Whole genome sequencing (WGS) has great potential to explore all possible DNA variants associated with physical performance, psychological traits and health conditions of athletes. Here we present, for the first time, annotation of genomic variants of elite athletes, based on the WGS of 20 Tatar male wrestlers. The maximum number of high-quality variants per sample was over 3.8 M for single nucleotide polymorphisms (SNPs) and about 0.64 M for indels. The maximum number of nonsense mutations was 148 single nucleotide variants (SNVs) per individual. Athletes' genomes on average contained 18.9 nonsense SNPs in a homozygous state per sample, while non-athletes' exomes (Tatar controls, n = 19) contained 18 nonsense SNPs. Finally, we applied genomic data for the association analysis and used reaction time (RT) as an example. Out of 1884 known genome-wide significant SNPs related to RT, we identified four SNPs (KIF27 rs10125715, APC rs518013, TMEM229A rs7783359, LRRN3 rs80054135) associated with RT in wrestlers. The cumulative number of favourable alleles (KIF27 A, APC A, TMEM229A T, LRRN3 T) was significantly correlated with RT both in wrestlers (P = 0.0003) and an independent cohort (n = 43) of physically active subjects (P = 0.029). Furthermore, we found that the frequencies of the APC A (53.3 vs 44.0%, P = 0.033) and LRRN3 T (7.5 vs 2.8%, P = 0.009) alleles were significantly higher in elite athletes (n = 107) involved in sports with RT as an essential component of performance (combat sports, table tennis and volleyball) compared to less successful (n = 176) athletes. The LRRN3 T allele was also over-represented in elite athletes (7.5%) in comparison with 189 controls (2.9%, P = 0.009). In conclusion, we present the first WGS study of athletes showing that WGS can be applied in sport and exercise science.

Caloglu, M., & Yüksel, O. (2020). The effect of cross fit training on anaerobic power and dynamic balance of greco-roman and freestyle wrestlers. *International Journal of Applied Exercise Physiology*, 9(1), 122-132.

CrossFit is a sports branch which started as a training model and constituted its discipline by increasing gradually. The present study aims to examine the anaerobic power and dynamic balance changes of freestyle and Greco-Roman wrestlers who perform CrossFit training. Material and Method; The study was conducted with 40 male wrestlers who compete in the Turkish Wrestling Major League in the season of 2015-2016. Data form was distributed in order to determine the demographic characteristics of participants. Specialist physician support was provided during the application of tests and training programs. The values were recorded to the data form by creating measurement parkour and applying 30 seconds of anaerobic power test on Wattbike Pro after the body weight, length and age were recorded respectively. The recorded measurements were organized in MS Excel spreadsheet program. Two-way ANOVA was used for repeated measures in the determination of differences between the pre and post measurement of participants' anaerobic power and balance values. Findings; The average pretest values for anaerobic absolute peak power of wrestlers in the experimental group were determined as 847.40 ± 186.98 watt and average posttest values were determined as 942.55 ± 193.77 watts. While the average pretest values for anaerobic relative peak power were determined as 7.32 ± 0.87 watts/kg and average posttest values were determined as 7.79 ± 0.75 watt/kg, the average pretest values for anaerobic absolute average power were determined as 522.40 ± 94.09 watt and average posttest values were determined as 563.75 ± 91.04 watt. The average pretest values for anaerobic absolute peak power of wrestlers in the control group were determined as 812.35 ± 137.37 watts and the average posttest values were determined as 878.45 ± 129.64 watts. While the average pretest values for anaerobic relative peak power were determined as 6.96 ± 0.7 watts/kg and average posttest values were determined as 7.23 ± 0.87 watt/kg, the average pretest values for anaerobic absolute average power were determined as 525.45 ± 82.8 watt and average posttest values were determined as 553.25 ± 78.1 watt. When dynamic balance values were examined, it was determined that the average pretest values for balance score of wrestlers in the experimental group were 19.82 ± 4.92 and the average posttest values were 14.12 ± 4.15 , the average pretest values for balance score of wrestlers in the control group were 20.60 ± 5.77 and the average posttest values were 17.64 ± 5.07 . Result; In accordance with these findings, it was observed that both the CrossFit and conventional wrestling

training provided positive increases on the anaerobic power values and the dynamic balance of wrestlers. When the group factor was considered, it was observed that there wasn't a significant difference between the relative power, absolute peak power and average anaerobic power parameters of wrestlers in the experimental and control group. When measurement on dynamic balance (pretest-posttest) and group factor were examined, positive decreases were observed which had a significant difference.

Çelebi, M., & Sarikabak, M. (2020). Effects of personality traits on goal commitment of Greco-Roman and freestyle wrestlers. *African Educational Research Journal*, 8(1), 135-140. doi:0.30918/AERJ.8S1.20.021

The purpose of this study is to investigate the effects of Greco-Roman and Free-Style wrestlers' personality traits on goal commitment. The universe of the research is elite Greco-Roman and Free-Style wrestlers who actively participate in wrestling competitions. The sample group consists of 338 wrestlers, who were selected among these wrestlers with the convenience-sampling method. As data collection tools, "Personal information form" created by the researcher; the Turkish Big Five Inventory developed by John et al. (1991) and adapted to Turkish by Evinç (2004); the scale of "Goal Commitment" prepared by Klein et al. (2001) with the validity and reliability performed by Senel and Yildiz (2016) were used in the research. SPSS 20 package program was used in the statistical analysis of the data. Descriptive statistics, Pearson correlation analysis and simple linear regression analysis were used. As a result of the analyses, the goal commitment points; moderately positive for openness to experience ($r = .323$; $p < .05$) and conscientiousness ($r = .323$; $p < .05$); There was a low-level positive relation between goal commitment and extroversion ($r = .295$; $p < .05$) and agreeableness ($r = .271$; $p < .05$). Personality traits scores of Greco-Roman and Free-Style wrestlers versus their goal commitment scores, sub-dimensions of openness to experience and conscientiousness were significant predictors of goal commitment and explained 14% of the total variance which has been identified. Similar results were also found in Greco-Roman (11%) and Free-Style (15%) wrestlers.

Cesur, B., & Sanioglu, A. (2020). The investigation of the weight loss methods and effects on the elite U23 wrestlers. *Progress in Nutrition*, 22, 88-93. doi:10.23751/pn.v22i1-S.9793

Study Objectives: The weight loss in sports is a method that has been implemented so much in several championships for a long time. It is thought that the athletes will be more successful in a lower weight and are considered to be effective, but it is underestimated that the unconscious weight loss causes health problems and negative effects on organisms. In this study, it was aimed to investigate weight loss methods and effects on elite wrestlers and determining the difference between Free-Style and Greco-Roman style. **Methods:** The research consists of a total of 97 wrestlers, who are in the U23 Turkish National Team category and lose weight before the competition. For determining the weight loss methods and effects on a wrestler, "The athlete's weight loss method and effects scale" was used. Mann-Whitney U test was used for comparison of Free-Style and Greco-Roman style wrestlers' weight loss methods and effects scale scores. **Results:** Although there was no significant difference between Greco-Roman and Free-Style wrestlers in the psychological effect, ergogenic aids, diet, and fluid loss sub-dimensions, physiological effect sub-dimension mean were statistically significant between Free-Style and Greco-Roman wrestlers ($p < 0.05$). **Conclusion:** As a result, it was found that wrestlers in both groups (Greco-Roman and Free-Style) had more muscle spasms, respiratory disorders, heart palpitations, and injuries with weight loss. It was also found that both Free-Style and Greco-Roman wrestlers preferred to reduce fat consumption and run with raincoats, as a weight loss method.

Cetin, S., Ece, C., Paksoy, M., & Cetin, H. N. (2020). Comparison of lipid and lipoprotein values of wrestlers and soccer players. *Turkish Journal of Pharmaceutical Sciences*, 17(2), 172-176.

Objectives: The aim of this study was to compare the lipid and lipoprotein values of wrestlers and soccer players. **Materials and Methods:** A total of 35 subjects, 17 male wrestlers who are sporting for 11.5 years and 18 male soccer player students who are sporting for 11.9 years, participated in this study. Triglyceride (TG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) levels were determined by Hitachi 717 autoanalyzer. To determine the differences between the wrestlers and the soccer players the independent t-test was performed. **Results:** There was a significant difference in body weight and body mass index between the wrestlers and the soccer players ($p < 0.05$). Moreover, there were significant differences in plasma TC, LDL-C, and HDL-C values between the wrestlers and soccer players (all, $p < 0.05$). However, there was no significant difference in plasma TG values between the wrestlers and the soccer players ($p > 0.05$). On the other hand, TC and LDL-C values of the wrestlers were significantly higher than soccer players ($p < 0.05$). The HDL-C values of the soccer players were significantly higher the wrestlers ($p < 0.05$). The ratio TC/HDL-C of the wrestlers was markedly higher than soccer players ($p < 0.05$). **Conclusion:** TC, TG, HDL-C, and LDL-C values of the soccer players were in better ranges than wrestlers. This situation can be caused by the effect of different sports branches as well as the training differences. The lipid and lipoprotein values of the wrestlers and soccer players showed that they do not carry a risk of cardiovascular disease. In addition, it can be recommended that wrestlers should do jogging or aerobic training in their daily regular training.

Chernenko, N., Lyzohub, V., Korobeynikov, G., Potop, V., Syvash, I., Korobeynikova, L., . . . Kostuchenko, V. (2020). Relation between typological characteristics of nervous system and high sport achieving of wrestlers. *Journal of Physical Education and Sport*, 20(3), 1621-1627. doi:10.7752/jpes.2020.03221

Purpose: was to clarify the role of individual-typological characteristics of the central nervous system for achieving of high results in the Greco-Roman wrestling. **Material:** The 2 groups of Greco-Roman wrestling were examined. The first group - 27 elite wrestlers (age 18-27), members of the National Team of Ukraine who having sports experience from 5 years and more. The second group 37 young wrestlers age 13-15. The third group (control) contains 13 couples of monozygotic (MH) and 18 - dizygotic (DZ) twins. They were not athletes. **Methods** of genetics, research of typological characteristics of the central nervous system: functional mobility (FMNS), strength (SNP), poise (PNP) of nervous processes and time of central processing of information, video recording and analysis of technical methods of wrestlers and mathematical statistics was used. **Results.** The links between genetically determined typological characteristics of the central nervous system and success of the Greco-Roman wrestling was found. Hereditary dependence of functional mobility and the relative advantage of the genotype - strength, poise of nervous processes and time of central processing of information is proved. Sensorimotor characteristics did not reveal any dependence on genetic factors. The expressed dependence of the indexes of technological skills and the effectiveness of the competitive performance of wrestlers on their individual features that resulting from genetically was established. This index was functional mobility. The wrestlers, who had better indexes of the typological characteristics of the central nervous system, were characterized by higher level assessments of technological skills and conduct of the fight. **Conclusions.** Typological characteristics of the central nervous system - functional mobility, along with technical preparedness, - are recommended as highly genetically determined criteria for assessing the prospects of wrestlers.

Chhipa, I., & Cheesman, Q. (2020). Slipping rib syndrome in an adolescent wrestler. *BMJ case reports*, 13(1). doi:10.1136/bcr-2019-232514

Slipping rib syndrome is a commonly missed diagnosis of upper abdominal pain. It results from hypermobility of the anterior rib due to the disruption of the interchondral ligaments, most likely

secondary to repetitive motions or some inciting event. The hypermobility leads to impingement of the intercostal nerves resulting in significant pain. A 10-year-old adolescent male child was evaluated for 4 months of intermittent, left-sided, upper abdominal pain following a wrestling injury. His paediatrician referred him for further evaluation after a negative workup given the patient was still having intermittent bouts of short-lasting pain that would spontaneously resolve. Physical examination demonstrated a positive hooking manoeuvre with associated swelling and prominence over the lower left ribs. In conclusion, a broad differential diagnosis, thorough clinical examination, and knowledge of slipping rib syndrome are important to appropriately diagnose and treat patients symptoms.

Cieslinski, I. (2020). Anthropometric profiles and body composition of elite Polish senior Greco-Roman wrestlers. *Theory and Practice of Physical Culture*(7), 69-71.

Many findings indicate that anthropometric features and body composition can play an important role in assessing important aspects of competition preparedness in Greco-Roman wrestlers. The purpose of this study was to develop the anthropometric and body composition profiles of elite Greco-Roman wrestlers with respect to their weight category and the level of performance. In studying anthropometric variables, their relationship with other factors (physiological, fitness, and technical) that can determine the athlete's success should be considered most of all.

Çiplak, M. E., Yamaner, E., Imamoglu, O., & Yamaner, F. (2020). Effects of long-term intensive training in teenage male wrestlers aged between 12 to 14 years. *International Journal of Applied Exercise Physiology*, 9(6), 197-209.

The aim of the study was to investigate the effects of long-term intensive training on biochemical blood parameters of teenage male wrestlers. Material and Methods: 32 healthy boys (12.93 ± 0.25) were grouped as athletes (A) and control (C). The athlete group joined an intensive training program with a controlled diet for 8 months, whereas control group did not receive any training or diet. Pre-posttest results were analyzed with Paired sample t test and Mann Whitney U test by SPSS 15.0. Development of athletes and control group were alike in terms of height, weight and BMI. Glucose and insulin serum levels decreased in the athlete group, whereas leptin serum levels did not differ among groups in pretest and posttest results. There were no significant differences between pretest and posttest results in terms of cholesterol, triglyceride, creatine and LDL levels, whereas HDL levels ($p=0.05$) were decreased in the athlete group after 8 months training period. Statistically significant increase was observed in uric acid, phosphorus serum levels and platelets ($p<0.01$) in athlete group. It was concluded that the low-fat diet together with intense training program caused decreased HDL levels and increased uric acid levels in serum which may serve as biomarkers for cardiovascular disease. The intense training program did not cause any muscle damage since creatine levels were not altered but increase in uric acid levels and phosphorus in serum were explained with high oxidative stress as a result of training.

Cordero Rojas, Y., Martínez, L. A. C., & Peguero, M. T. (2020). The development of the balance coordination capacity in Greek wrestling athletes, initial categories. El desarrollo de la capacidad coordinativa equilibrio en atletas de lucha greco, categorías iniciales. *PODIUM - Journal of Science and Technology in Physical Culture*, 15(3).

Considering the importance of coordinating skills in sport, the objective of this study was to assess the development of coordination capacity, balance in Greco wrestling athletes, Pioneer category (11-12 years), of the "Roberto Amarán" Project, in Pinar del Río, Cuba. To this end, it worked with a population of the 12 athletes who practice this modality in this project, as well as six coaches in charge of carrying out the training process in the initial categories. As part of the scientific methods at the empirical level, interviews, static balancing, dynamic balancing and control tests were applied under variable conditions.

The data obtained was processed through the IBM SPSS Statistics Visor 20 statistical package. The results reveal inadequacies in the athletes studied, in the development of this coordination capacity, which manifest themselves in an incorrect position in relation to the location of the center of gravity, in the realization of the different technical actions of sports discipline, derived in turn from inadequacies in the work of the coaches, who do not have sufficient tools for systematic and adequate work with this coordinating capacity in their athletes.

Curby, D. G. (2020). COVID-19: Considerations regarding the return to wrestling training. *International Journal of Wrestling Science*, 10(1), 1-14.

Coronavirus disease 2019 (COVID-19) is an acute respiratory disease caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARSCoV-2). The World Health Organization (WHO) on March 11, 2020, declared the novel coronavirus (COVID-19) outbreak a global pandemic (Cucinotta & Vanelli, 2020). It has wreaked its havoc world-wide and disrupted almost all aspects of our existence. This includes sport. On 24 March 2020, the International Olympic Committee, the International Paralympic Committee and the Japanese Government formally announced a rescheduling of the Tokyo 2020 Olympic and Paralympic Games 'to safeguard the health of the athletes, everybody involved in the Olympic Games and the international community' (International Olympic Committee, 2020). Training has been stopped or curtailed because of required social isolation. The Coronavirus has turned the Olympic world upside down. Countless athletes made plans to compete in qualifiers and the Games only to have the scheduled events cancelled, postponed or tentatively rescheduled. The COVID-19 pandemic in 2020 has resulted in widespread training disruption. Some athletes have had access to facilities and equipment, while others have limited or no access, severely limiting their training practices. No doubt that the prolonged isolation training period due to the COVID-19 outbreak has a profound negative effect on the physical capabilities of athletes. As the world begins the slow return to training and competition, there are many considerations that must be taken into account by sporting organizations, governing bodies, medical providers, athletes, and coaches, to name a few. On return to training, the focus should be on progression of all aspects of training, taking into account the status of individual athletes and must be done with the appropriate physical and psychological preparation. Special attention must be given to athletes who have contracted COVID-19, and will be returning to training.

Dalal, P. J., Purkey, M. R., Price, C. P. E., & Sidle, D. M. (2020). Risk factors for auricular hematoma and recurrence after drainage. *Laryngoscope*, 130(3), 628-631. 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

Dampilova, L. S., Санжибоевна, Дампилова Людмила, & Khabunova, E. E. Э., Хабунова Евдокия. (2020). THE PLOT OF HEROIC BATTLE IN BURYAT VERSIONS OF EPIC ABOUT GESER. СЮЖЕТ О БОГАТЫРСКОМ СРАЖЕНИИ В БУРЯТСКИХ. *НАУЧНЫЙ ДИАЛОГ Nauchnyi dialog*, 7, 241-253. doi:10.24224/2227-1295-2020-7-241-253

To establish the genesis and transformation of motives in different versions of the Buryat epic texts about Geser, for the first time in a comparative typological aspect, a plot about a heroic battle is analyzed. The similarities and differences in the motive fund of one plot in different local traditions are determined. From the perspective of the main goal of the study to identify the initial motive fund characteristic of the epic tradition of the Mongol peoples, it is relevant and significant to highlight the variation of motives in the local tradition. The static nature of the event series in the invariant of the motives of the fight and victory in the Ekhirit- Bulagat version shows the presence of one main variant of the motive for the fight with the enemy: the traditional fight. The use of variants of the motive of traditional types of wrestling and archery and new variants of the motive: battle and group battles, fighting with the “force of the point”, that is, with a dagger, a spear is revealed in the article. A comparative typological analysis of the motive fund in one plot in different versions establishes the preservation and transformation of the epic text, a feature of the regional variants of the national epic. The revealed discrepancies in the development of the plot about the heroic battle and the composition of the motivational fund show different stages in the addition of two versions of the heroic epic.

Daneshmandi, H., Zolghadr, H., & Sedaghati, P. (2020). Comparing the Musculoskeletal Injuries Between the Professional Greco-Roman and Freestyle Wrestlers. *USWR*, 10(1), 15-22. doi:10.32598/ptj.10.1.405.2

Purpose: Wrestling, due to its contact and oppressive training nature, is subject to massive injuries. The present study aimed to compare musculoskeletal injuries between professional Greco-Roman and freestyle wrestlers. Methods: This was a retrospective cross-sectional study. The statistical population consists of male Greco-Roman and freestyle wrestlers (N=86; age: 15-20 years) in Guilan Province, Iran. The study participants had a history of at least two continual years of wrestling training of 3 weekly sessions and participating in national and international competitions. The modified Fuller and Hawkins questionnaire was applied for recording recent two-year injuries. Using the descriptive statistics, the retrieved data were summarized and classified in tables. Besides, the difference between the study variables was determined by the Chi-squared test in SPSS. Results: A statistically significant difference was observed in neck injuries between the investigated Greco-Roman and freestyle wrestlers ($P=0.01$). Additionally, a significant difference was observed in the frequency of training per week ($P=0.01$), techniques ($P=0.001$), and injury mechanisms ($P=0.02$) between the two study groups. Conclusion: The present study findings revealed a significant difference in neck injury between Greco-Roman and freestyle wrestlers. Furthermore, a significant difference was detected in the frequency of training, techniques, mechanism of injury, and the injury rate between the study groups. Designing appropriate training sessions and plans and teaching the principles of warm-up and procedures for preventing additional damage in wrestlers are suggested to coaches.

Deckey, D. G., Makovicka, J. L., Chung, A. S., Hassebrock, J. D., Patel, K. A., Tummala, S. V., . . . Chhabra, A. (2020). Neck and Cervical Spine Injuries in National College Athletic Association Athletes: A 5-Year Epidemiologic Study. *Spine (03622436)*, 45(1), 55-64. doi:10.1097/BRS.0000000000003220

Study Design: Descriptive epidemiology study. Objective: The purpose of this study was to describe the epidemiology of neck and cervical spine injuries in collegiate athletes over a 5-year period. Summary Of Background Data: The incidence and etiology of neck and cervical spine injuries in National Collegiate Athletic Association (NCAA) athletes has not been well defined in recent years. Methods: The incidence and characteristics of neck and cervical spine injuries were identified utilizing the NCAA Injury

Surveillance Program database. Rates of injury were calculated as the number of injuries divided by the total number of athlete-exposures (AEs). AEs were defined as any student participation in one NCAA-sanctioned practice or competition. Results: Nationally, there were an estimated 11,510 neck and cervical spine injuries over the 5-year period. These occurred at a rate of 7.05 per 100,000 athlete-exposures (AEs). The rate of neck and cervical spine injuries in men was 2.66 per 100,000 AEs, while women suffered injuries at a rate of 1.95 per 100,000 AEs. In sex-comparable sports, men were 1.36 times more likely to suffer a neck or cervical spine injury compared with women. Men's football (29.09 per 100,000 AEs) and women's field hockey (11.51 per 100,000 AEs) were the sports with the highest rates of injuries. These injuries were 3.94 times more likely to occur during competition compared with practice. In-season injury rates were the highest, at 8.18 per 100,000 AEs. Conclusion: The vast majority of neck and cervical spine injuries in NCAA athletes are minor and uncommon. Across all sports in both sexes, the majority of injuries were new, and occurred during in-season competitions. Most athletes returned to play within 24 hours of injury. These data can inform players, parents, coaches, athletic trainers, and physicians regarding the prevalence and rates of these injuries and potentially inform decision-making regarding injury prevention, treatment, and rehabilitation. Level of Evidence: 4.

Dehnou, V. V., Azadi, S., Gahreman, D., & Doma, K. (2020). The effect of a 4-week core strengthening program on determinants of wrestling performance in junior Greco-Roman wrestlers: A randomized controlled trial. *Journal of Back & Musculoskeletal Rehabilitation*, 33(3), 423-430. doi:10.3233/BMR-181328

BACKGROUND: Core-strength is vital for Greco-Roman wrestling, although studies have yet to establish the effectiveness of core-specific training in this sport. OBJECTIVE: 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.

Demirhan, B. (2020). The Effect of Two Semester Wrestling Training on University Students' Body Composition and Some Motoric Characteristics. *International Education Studies*, 13(6), 26-31.

The aim of this study was to examine the changes in the body composition and motor characteristics of the students attending the wrestling lesson in one academic year (8 months). The study included 19 male wrestler students with an average age of 21.20 ± 1.61 years. Body weights, body circumference measurements, regional muscle strengths, anaerobic strength skinfold thicknesses and body fat percentages were measured twice before the start of the wrestling training at the beginning of the academic year. SPSS 20.0 package program was used to analyze the data obtained at the beginning and end of the season. In the evaluation of pretest and posttest measurements, wrestler students' body weights, BMI, shoulder circumference, chest circumference, bicep circumference (ext), bicep circumference (flx), hip circumference, upper leg circumference, vertical jump distance, long jump distances, Anaerobic power capacities There was a statistically significant difference between the back force, leg strength, biceps, triceps and abdominal skin folds ($p < 0.05$). As a result, it was determined that wrestling training taken by university students in a training process had a positive effect on muscle

strength and anaerobic power levels and a positive effect on the development of body circumference measurements.

Demirhan, B., Günay, M., Canuzakov, K., Kılıç, M., Güzelbektes, H., & Patlar, S. (2020). Seasonal evaluation of skeletal muscle damage and hematological and biochemical parameters of Greco-Roman wrestlers from the Kyrgyzstan National Team before the 2016 Summer Olympic Games. *Journal of Back and Musculoskeletal Rehabilitation*, 33(4), 701-709. doi:10.3233/BMR-181363

Background: Regular exercise activities affect blood cells.; Objective: The purpose of this study was to evaluate the seasonal evaluation of some hematological and biochemical parameters of the Olympic Greco-Roman wrestlers.; Methods: A total of three measurements were performed on wrestlers: immediately before the training period, three months and six months after the training session. Hematological and biochemical parameters were analyzed by taking sufficient blood samples from the athletes before and after exercise.; Results: The total leukocyte, lymphocyte, and neutrophil values were found to be significantly higher ($p < 0.05$) in all three measures (beginning, 3rd and 6th months) in comparison with the values before exercise. When biochemical analyses were examined, blood glucose levels were significantly decreased after exercise in all three measures compared to before exercise. Post-exercise HDL cholesterol concentrations significantly increased ($p < 0.05$) while LDL cholesterol concentrations significantly decreased ($p < 0.05$).; Conclusion: On all three measures fatigue exercise has significantly increased the total leukocyte, lymphocyte and neutrophil values of wrestlers, while other, hematological parameters were not affected evenly. Fatigue exercise also significantly reduced blood glucose levels and LDL cholesterol concentrations, while HDL cholesterol concentrations were increased. The six-month period training did not have a significant effect on both hematologic and biochemical parameters in all three measurements.

Dores, H., & Cardim, N. (2020). Return to play after COVID-19: a sport cardiologist's view. *Br J Sports Med*. doi:10.1136/bjsports-2020-102482

Durkalec–Michalski, K., Zawieja, E. E., Zawieja, B. E., Michałowska, P., & Podgórski, T. (2020). The gender dependent influence of sodium bicarbonate supplementation on anaerobic power and specific performance in female and male wrestlers. *Scientific Reports*, 10(1), 1-12. doi:10.1038/s41598-020-57590-x

The aim of this study was the assessment of progressive low-dose sodium bicarbonate (NaHCO_3) supplementation on the anaerobic indices in two bouts of Wingate tests (WT) separated by wrestling-specific performance test and assessing the gender differences in response. Fifty-one (18 F) wrestlers completed a randomized trial of either a NaHCO_3 (up to 100 mg·kg⁻¹) or a placebo for 10 days. Before and after treatment, athletes completed an exercise protocol that comprised, in sequence, the first WT1, dummy throw test (DT), and second WT2. The number of completed throws increased significantly in males from 19.3 ± 2.6 NaHCO_3 pre to 21.7 ± 2.9 NaHCO_3 post. $\Delta\text{WT2-WT1}$ improved particularly in the midsection of 30-s WT on NaHCO_3 . However, no significant differences were found in peak power (PP), power drop (PD) and average power (AP) (analyzed separately for each WT), and $\Delta\text{WT2-WT1}$ in PP and PD. Interaction with gender was significant for AP, PP and PD, every second of WT1 and WT2, as well as DT test. In conclusion, our study suggests that the response to NaHCO_3 may be gender-specific and progressive low-dose NaHCO_3 supplementation allows the advantageous strengthening of wrestling-specific performance in males. It can also lead to maintenance of high anaerobic power mainly in the midsection of the 30-s Wingate test.

Elliott, N., Martin, R., Heron, N., Elliott, J., Grimstead, D., & Biswas, A. (2020). Infographic. Graduated return to play guidance following COVID-19 infection. *British Journal of Sports Medicine*, 54(19), 1174. doi:10.1136/bjsports-2020-102637

With risk of cardiological, renal, respiratory and haematological complications, 1–5 it is best practice to follow steady resumption of training, paying attention to physical and psychological factors after COVID-19 infection. This guidance takes into account public health guidelines in the UK (although we hope its content is relevant more widely) and available expert opinion at time of publication and is for use by healthcare practitioners. It is applicable to performance athletes who have had mild to moderate illness. Those requiring hospital admission merit further assessment. If an athlete develops an illness with symptoms of COVID-19, they should follow national guidance, speak to their sports medicine doctor.

Fernández, M. M., Brito, C. J., Miarka, B., & Díaz-de-Durana, A. L. (2020). Anxiety and Emotional Intelligence: Comparisons Between Combat Sports, Gender and Levels Using the Trait Meta-Mood Scale and the Inventory of Situations and Anxiety Response. *Frontiers in Psychology*, 11, 130. doi:10.3389/fpsyg.2020.00130

The present study compared emotional intelligence and anxiety between six combat sports of lower, intermediate and high-level female and male athletes. The sample was composed by 444 athletes (age: 24.7 ± 8.8 years, body mass: 72.4 ± 12.1 kg, height: 1.82 ± 0.3 m, and practice time: 13.1 ± 7.4 years) separated by sex (male $n = 273$, female $n = 171$) from different combat sports (jiu-jitsu $n = 142$, judo $n = 137$, karate $n = 57$, kendo $n = 63$, taekwondo $n = 25$, and freestyle wrestling $n = 20$) of three levels (high-level $n = 57$, intermediate $n = 137$ and low-level $n = 142$). Inventory of situations and anxiety response (ISRA) provided an independent evaluation for the three systems: cognitive, motor and physiological, as well as a total with four factors of analysis (anxiety before the evaluation, interpersonal, phobic and before habitual, and daily situations). Trait Meta-Mood Scale (TMMS-24) verified emotional intelligence scales. Descriptive results are demonstrated by percentage or median (first quartile Q1; third quartile Q3), Kruskal-Wallis and Mann-Whitney tests were conducted to compare groups, $p \leq 0.05$. The main results demonstrated 10% more total anxiety for wrestling and judo compared to the other groups ($p \leq 0.05$). Female athletes showed 15% more anxiety than men, while emotional attention demonstrated 10% better results for women. Significant differences were observed between high- versus low-level athletes in the total anxiety with 85 (44; 143) versus 122 (69; 186) of ISRA index and emotional repair with 30 (25; 34) versus 27 (22; 32) of TMMS-24 index. Emotional intelligence seems to be higher in female and in higher level, while anxiety appears to be prevalent in judo and wrestling, low-level and in female athletes. These outcomes provide support for the hypothesis that emotional abilities are an important contributor to emotional intelligence, particularly differentiating high level athletes than other levels. Results can be incorporated into strategies for reducing anxiety and improving emotional intelligence, considering particularities of gender and level groups.

Gahreman, D., Moghadam, M. A., Hoseinnejad, E., Dehnou, V. V., Connor, J. D., Doma, K., & Stone, M. (2020). Postactivation potentiation effect of two lower body resistance exercises on repeated jump performance measures. *Biology of Sport*, 37(2), 105-112. doi:10.5114/biolport.2020.93034

This study examined the postactivation potentiation effects of combining squat and deadlift exercises on subsequent repeated jump performance. Fifteen, resistance-trained youth wrestlers were randomly allocated to either undertake back squats (BSq), deadlift (DL) or BSq and DL as supersets (BSq+DL), with a repeated jump protocol performed 8-minutes post-exercise in each session. Thereafter, a control condition (CON) was completed involving a general warm-up, followed by the repeated jump protocols. Power outputs, flight time, contact time and reactive strength index were recorded from each repeated jump protocol. Measures were compared between the BSq, DL and BSq+DL sessions and between

sessions that generated the best power output (BEST) with CON via inferential statistics and effect size (ES) calculations. The BSq condition exhibited significantly greater power output compared to the CON condition ($p < 0.05$, $ES = 1.07$), although no differences were identified for the other conditioning activities. Furthermore, power output, flight time and reactive strength index were significantly greater for the BEST compared to the CON condition ($p < 0.05$, $ES = 0.97-1.47$). Results indicated that BSq was the optimal conditioning activity to increase power output during a repeated jump protocol. However, greater improvement during the BEST condition suggests that the type of conditioning activity should also be considered on an individual-basis.

Geiselman, J., Gillespie, R., & Miller, A. (2020). Brachialis Strain in a Collegiate Wrestler: A Case Report. *International Journal of Athletic Therapy & Training*, 25(4), 181-184. doi:10.1123/ijatt.2019-0055

A 22-year-old male varsity collegiate wrestler presented for general chiropractic care for an unrelated condition and noted right elbow pain that had progressively increased over the past few weeks. The athlete was diagnosed with a right brachialis strain and advised to follow up with his athletic trainer for co-management of his injury. The patient responded positively to prescribed treatments and rehabilitation to decrease pain and restore functionality (<14 days) while only missing one competitive match. The location of the brachialis muscle and scarcity of literature makes diagnosis and treatment complex. The physical examination and conservative treatment presented in this report demonstrate the need for comprehensive and exploratory examination and co-management of wrestling athletes with a brachialis strain.

Genç, A. (2020). The Effect of Wrestling Education on Some Physical and Motoric Parameters in High School Students. *International Education Studies*, 13(4), 100-105.

The aim of this study is to examine the effect of wrestling education on some physical and motoric parameters in high school students. 42 volunteer men aged 15-17, who received regular wrestling training, participated in the study. In the study, after all, subjects were divided into 3 groups according to age groups, body weight, height, BMI, claw, back, leg strength, 10 and 30 m sprint, flexibility, anaerobic power, fat percentage, and body circumference measurements were taken. SPSS 20.0 program was used in the statistical analysis of the data obtained, the normality distribution of the data was determined by the Shapiro-Wilk test. Descriptive statistics, One Way ANOVA was used for normally distributed data and the level of significance was taken as $p < 0.05$. When the findings were examined, there was a significant difference between the age variable and BMI, 30m sprint, anaerobic power, shoulder and chest circumference ($p < 0.05$), while there were no significant differences in height, weight, claw, back, leg strength, 10m sprint, flexibility, fat percentage, waist, hip and femur values ($p > 0.05$). In conclusion, besides the effect of growth in the adolescent period in different age groups, it can be said that wrestling education has positive effects on BMI, 30m sprint, anaerobic power, and some environmental measurements.

Gencay, O. A., Gencay, S., & Gencay, E. (2020). A comparison of static and dynamic balance performance in adolescent male wrestlers and judoists. *Science & Sports*, 35(3), e57-e63. doi:10.1016/j.scispo.2019.07.004

The purpose of this study was to compare the dominant and non-dominant legs in respect of dynamic and static balance and to examine the effect of sport type, sportive experience and BMI on the static and dynamic balance of adolescent male judoists and wrestlers. The results of the study could be beneficial for the prevention of injury to the athletes and could be applied to training management. The study included 54 healthy, male, adolescent wrestlers and judoists (mean age: 15.81 ± 0.87 years; height: 165.01 ± 8.73 cm; weight: 62.01 ± 11.94 kg). Static and dynamic balance were assessed using the

flamingo balance test (FBT) and the star excursion balance test (SEBT) in an institution-based sports sciences department. No statistically significant differences were determined between the dominant and non-dominant leg in the normalized SEBT reach distances ($P > 0.05$). The static balance performance scores were compared between the groups and the judoists were found to have higher static balance performance than the wrestlers ($P < 0.05$). Both adolescent judoists and wrestlers were found to have higher static and dynamic balance scores compared to other sports branches, and the judoists were determined to have better static and dynamic balance performances than the wrestlers.

Gierczuk, D., Cieslinski, I., Buszta, M., & Sadowski, J. (2020). Physical fitness profiles of elite freestyle male and female wrestlers. *Theory and Practice of Physical Culture*(6), 15-17.

Objective of the study was to determine the physical fitness profiles of elite freestyle wrestlers taking account of their weight classes and performance in tournaments. The study participants were 72 female wrestlers and 66 male wrestlers who had won medals or had placed fifth to eighth at Poland Senior Championships or other major sports events. Subjects' physical fitness profiles were assessed by measuring their explosive strength, strength endurance, suppleness, special endurance and agility. Differences were found between the profiles of male and female wrestlers, and of lightweight and heavyweight wrestlers of the same gender. Female wrestlers had lower scores than men for explosive strength, special endurance, strength endurance and suppleness while being more agile. The analysis of wrestlers' profiles with respect to their body mass showed that both male and female wrestlers in the lightweight classes were more agile and supple than their counterparts in the heavyweight classes, with the lightweight male wrestlers also having higher scores on the strength endurance test. The study demonstrated that the key abilities that both male and female wrestlers need to win medals are strength endurance, special endurance and explosive strength. The performance of lightweight female wrestlers primarily depends on their strength endurance and special endurance. In the case of lightweight male wrestlers, agility is an essential ability.

Giles, S., Fletcher, D., Arnold, R., Ashfield, A., & Harrison, J. (2020). Measuring Well-Being in Sport Performers: Where are We Now and How do we Progress? *Sports Med*, 50(7), 1255-1270. doi:10.1007/s40279-020-01274-z

The importance of optimal well-being and mental health in elite athletes has received increasing attention and debate in both the academic and public discourse. Despite the number of challenges and risk factors for mental health and well-being recognised within the performance lifestyle of elite athletes, the evidence base for intervention is limited by a number of methodological and conceptual issues. Notably, there exists an increasing emphasis on the development of appropriate sport-specific measures of athlete well-being, which are required to underpin strategies targeted at the protection and enhancement of psychosocial functioning. Therefore, the purpose of this article is to review psychometric issues in well-being research and discuss the implications for the measurement of well-being in sport psychology research. Drawing on the broader literature in related disciplines of psychology, the narrative discusses four key areas in the scale development process: conceptual and theoretical issues, item development issues, measurement and scoring issues, and analytical and statistical issues. To conclude, a summary of the key implications for sport psychology researchers seeking to develop a measure of well-being is presented.

Gkrekidis, A., Aggelousis, N., Barbas, I., & Giannakou, E. (2020). Evaluation of a new method for the assessment of reaction times of freestyle wrestling athletes using Barbas "3D Wrestling Dummy". *International Journal of Wrestling Science*, 10(1), 20-26.

Olympic wrestling is a sport that requires a high level of development of all physical abilities (strength, speed, endurance, strength, flexibility, etc.), and good technical and tactical levels. Over the years and with the ever-increasing performances of its athletes, Olympic wrestling has evolved into an even more demanding sport, with many elements influencing high performance, and winning or losing depending on the details. The fast reaction time of athletes is one of the most important factors for performance in the sport of wrestling. The purpose of the research was to study the reliability of a new method of evaluating the reaction time of male and female wrestling athletes, in simulated movements of freestyle wrestling. The study involved 18 athletes, boys and girls, who volunteered. Of the 18 individuals in the sample, 6 were girls with a mean age of 15 ± 1.92 years and 12 boys with a mean age of 21.25 ± 2.39 years. The new method for evaluating the reaction time of freestyle wrestling athletes that was used combined the use of the Barbas 3D Wrestling Dummy, an extensimeter, and two force platforms on which the athletes were standing. The results showed that the reliability of the new method proved to be moderate to high. In conclusion, the reliability of the new method is considered acceptable, but further research is needed to determine the effects of user training on the reliability of this method.

Gorbachev, D. V., Zhidkikh, T. M., & Mineev, V. S. (2020). Biofeedback algorithmization for health of elite wrestlers. *Theory and Practice of Physical Culture* (3).

Objective of the study was to develop and test benefits of a new biofeedback-assisted progress/ health controls (dysfunction prevention) training system. Methods and structure of research. Sampled for the study were the 17-22 year-old Greco-Roman and freestyle wrestlers. The subjects were divided into the Control (CG) and Experimental (EG) Groups. At the first stage of the experiment, we evaluated the wrestlers' heart rate, systolic blood pressure, diastolic blood pressure rates, and adaptive potential. At the second stage, the athletes of the EG were subjected to various types of biofeedback procedures. At the third stage, the EG subjects were involved in the biofeedback trainings of the biceps brachii of both arms based on the EMG envelope rates. Results of the study. In terms of the heart rate, systolic blood pressure and diastolic blood pressure rates, the differences were significant at $p < 0.01$. In terms of adaptive potential, the differences were significant at $p < 0.05$. The set of conducted studies made it possible to develop a program of psychophysiological training of athletes based on the biofeedback method. Conclusion. The study found the new biofeedback-assisted psycho-physiological control training system being beneficial for the wrestling sport elite, with the acquired biofeedback-assisted controls of the key bodily functions clearly facilitating athletic progress at no detriment for the trainees' health standards.

Greisberg, M. (2020). Assessment of Disinfection Techniques for Decontaminating Athletic Mats. *The Sport Journal*, 21.

Skin infections are a hazard in close contact sports. Disinfection of wrestling mats is widely recommended to reduce the incidence of infection, but there is little to no evidence how best to clean the mats. In this study, microorganism levels from the wrestling mats of two schools were quantified to determine if disinfection reduces the bacterial load from the surface of the mats and in the seams between mat sections; and to determine if using a flat mop is more effective than a string mop. This study found that both techniques were effective in reducing the bacterial load of the mats. However, neither method was effective at reducing bacterial counts in the grooves between mat sections. There was a trend favoring the use of a flat mop over a traditional string mop, but the trend did not meet statistical significance. Future research may focus on whether widespread adoption of these techniques leads to a lower incidence of skin infection in athletes.

Guder, F. (2020). Monitoring change of urine specific gravity levels of the wrestlers in an official wrestling tournament. *Progress in Nutrition*, 22, 189-193. doi:10.23751/pn.v22i1-S.9824

Study Objectives: Wrestling is a weight sport with a weight classification and wrestlers is performed weight loss frequently before the wrestling competitions and they exposed dehydration. In this context, the aim of this study was to monitor the change in the urine specific gravity (USG) of wrestlers in an official wrestling tournament. Thirty-six wrestlers competing in an official wrestling tournament were included in the study. **Methods:** Bioelectric impedance analyzer and refractometer were used to determine the change of body weights and the USG levels of the wrestlers between the weigh-in and the competition times. Shapiro-Wilk test was used for the normality test of the obtained data. Wilcoxon Signed-Rank test was used to analyze non-normally distributed data. **Results:** According to the results of this study, it was determined that there was no difference in the body weights of the wrestlers between the weigh-in and the competition times, whereas there was a difference in the USG levels. Accordingly, although USG levels decreased, it could not be reduced to the reference range between the weigh-in and the competition times. **Conclusion:** These results indicate that the lose body weight before the competition is regained between the weigh-in and the competition times, whereas dehydration in the USG levels continues in the wrestlers.

Hammer, E., Brooks, M. A., Hetzel, S., Arakkal, A., & Comstock, R. D. (2020). Epidemiology of Injuries Sustained in Boys' High School Contact and Collision Sports, 2008-2009 Through 2012-2013. *Orthopaedic Journal of Sports Medicine*, 8(2), 1-8. doi:10.1177/2325967120903699

Background: Injury epidemiology for boys' high school contact and collision sport has been described in several overlapping but fragmented studies. Comprehensive comparisons of injuries sustained in boys' soccer, wrestling, football, ice hockey, and lacrosse are lacking. **Purpose:** To describe patterns of injury by severity, body site, and diagnosis among high school boys' contact and collision sports in the United States. **Study Design:** Descriptive epidemiology study. **Methods:** Injury rates and rate ratios (RRs) were calculated for injuries sustained in boys' high school soccer, wrestling, football, ice hockey, and lacrosse through use of the High School RIO (Reporting Information Online) surveillance data from 2008-2009 through 2012-2013. Injury patterns were described by site, diagnosis, time loss, and severity. Severe injury was defined as an injury that resulted in 21 days or more of time loss from sport participation. Risk of sustaining a concussion was compared between sports. **Results:** The risk of sustaining an injury was higher in competition compared with practice overall (RR, 4.01; 95% CI, 3.90-4.12); the same pattern was true for severe injuries (RR, 4.61; 95% CI, 4.34-4.90). Football players experienced the highest injury rate (3.87 per 1000 athlete-exposures [AEs]) and the highest severe injury rate (0.80 per 1000 AEs). Overall, the most commonly injured body site was the head/face (22.5%), and the most prevalent injury diagnosis was ligament sprain not requiring surgery (23.5%). The most frequently injured body site from severe injury was the knee (24.6%), and fracture or avulsion was the most prevalent severe injury diagnosis (37.0%). Football players had a significantly higher risk of sustaining a concussion compared with other contact or collision sport athletes ($P < .05$). **Conclusion:** Injuries rates were higher in competition than those in practice for boys' high school contact and collision athletes. Football players sustained the highest injury rate, the highest severe injury rate, and the highest concussion rate among the sports included in this analysis. Understanding these patterns of injury can generate policy and rule changes to make sports safer and maintain high levels of participation.

Harmon, K. G., Pottinger, P. S., Baggish, A. L., Drezner, J. A., Luks, A. M., Thompson, A. A., & Swaminathan, S. (2020). Comorbid Medical Conditions in Young Athletes: Considerations for Preparticipation Guidance During the COVID-19 Pandemic. *Sports Health*, 1941738120939079. doi:10.1177/1941738120939079

Young athletes, generally speaking, represent one of the healthiest and fittest groups in society. The resumption of sport and exercise will ultimately bring athletes into closer proximity than is recommended by current physical distancing practices, potentially increasing one's risk of infection.

Data are emerging that high-intensity exercise may increase aerosolization and transmissibility of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) from presymptomatic and mildly symptomatic individuals.⁹ It is in this setting that medical providers have wondered how to best counsel athletes with medical conditions that may be associated with increased risk of severe coronavirus disease (COVID-19), specifically, diabetes, asthma, sickle cell trait (SCT), hypertension, and obesity. The Centers for Disease Control and Prevention (CDC) guidance does not explicitly address young athletes returning to sport but recommends that high-risk individuals of any age take extra precautions, including those with chronic lung disease or moderate to severe asthma, chronic kidney disease being treated with dialysis, diabetes mellitus, hemoglobin disorders, liver disease, serious heart conditions, severe obesity (body mass index [BMI] ≥ 40 kg/m²), or who are immunocompromised.² There is limited epidemiologic evidence to inform guidance for such individuals, especially in the high school and college age groups; however, young people in general are at low risk for poor outcomes including death, hospitalization, and severe disease. Here, we offer our appraisal of the situation and provide information that may help frame discussions with athletes.

Hasani, M., Behpour, N., Karimi, M., & Darabi, F. (2020). The Effect of Silybummarianum Consumption along with a Period of Increasing Exercises on the Oxidative Response to an Acute Exercise Session in Young Wrestlers. *Qom University of Medical Sciences Journal*, 13(12), 34-44. doi:10.29252/qums.13.11.34

Background and Objectives: Intense exercise results in the production of free radicals and damage caused by oxidative stress. In this regard, the present study aimed to investigate the effect of Silybummarianum consumption along with a period of increasing exercises on the oxidative response to an acute exercise session in young wrestlers. **Methods:** A total of 20 well-exercised wrestlers, were randomly divided into two groups of exercise along with Silybummarianum consumption and exercise along with placebo consumption after obtaining written consent. The Silybummarianum supplement group was supplemented at a dose of 300 mg, three times a day for four weeks. Blood samples were taken before and immediately after an equal training session before supplementation and after one month of supplementation. In order to analyze the data, repeated measures analysis of variance and independent t-test were used. **Results:** In terms of between group differences, there was a significant increase in superoxide dismutase levels before exercising and after supplementation ($p = 0.032$) and immediately after exercise and after supplementation ($p = 0.002$) in the Silybummarianum group. There was also a significant decrease in malondialdehyde levels before exercise and after supplementation ($p = 0.001$) and immediately after supplementation ($p = 0.001$) in the Silybummarianum group. Moreover, there was a significant increase in total antioxidant values before exercise after supplementation ($p = 0.001$) and immediately after exercise and after supplementation ($p = 0.008$) in the Silybummarianum group. According to the repeated measures ANOVA, the mean level of malondialdehyde in the Silybummarianum group was lower than the control group. **Conclusion:** Therefore, it can be concluded that the consumption of Silybummarianum in increasing exercises leads to the decrease of oxidant indexes and increase in antioxidant indexes.

Herrera-Valenzuela, T., Valdés Badilla, P., & Franchini, E. (2020). High-intensity interval training recommendations for combat sports athletes during the COVID-19 pandemic. *Recomendaciones de entrenamiento intervalado para atletas de deportes de combate olímpicos durante la pandemia del COVID-19. Revista de Artes Marciales Asiáticas Volume 15(1), 1-3 ~ January-June 2020 DOI: 10.18002/rama. v15i1.6230, 15(1). doi:10.18002/rama. v15i1.6230*

The COVID-19 pandemic has caused governments to establish quarantine and social distancing for the population in order to decrease the contamination peak, factors that have affected the athletes' preparation. In this context, we developed some high-intensity interval training (HIIT) recommendations for Olympic combat sports athletes that can be performed at home. The HIIT protocols should be added

by body mass-based muscle strengthening exercises (similar to technical exercises), with the goal to preserve athletes' muscle mass and physical fitness. Finally, emergency situations require contingency plans for sport.

Hilgarth, M. N. (2020). *Better wear red? The influence of the color of sportswear on the outcome of Olympic sport competitions*. (combat sports), Linz. Masters Thesis. Retrieved from <https://epub.jku.at/obvulihs/content/titleinfo/5633489/full.pdf>

The existence of biological and psychological effects of colors has been well documented in animals and humans. Based on these findings, various researchers postulated that the color of the sportswear does affect the outcome of sporting competitions. If this is true, this would have enormous consequences for tournaments. The aim of this thesis was to expand previous research to test this claim. In order to do so, data for three different sports (boxing, taekwondo and wrestling) was gathered for the five Olympic tournaments between 2000 and 2016. This thesis does not find any evidence supporting the claim that red sportswear is a competitive advantage in competitions. The results are consistent over different sports, sexes and geographical distinctions. While this conclusion is reassuring for the design of existing tournaments, it also highlights the need for replications in the scientific process.

Hsi-Po, L., Yu-Lin, N., & Qin-Fang, W. (2020). Discussions on the Consecutive Techniques Training for Freestyle Wrestling / 自由式角力連貫技術訓練之探討 *運動研究 / Journal of Sports Research*, 29(1), 69-77. doi:10.6167/JSR.202006_29(1).0005

International wrestling contests are male and female freestyle wrestling, and male Greco-Roman wrestling. The contemporary wrestling match is between two wrestlers and the goal is to throw and pin the opponent with techniques such as grabs, hold, and rolls to win the match. The match of freestyle wrestling is more intense than before. The demands on the wrestlers' techniques, physical, and psychological qualities also increased accordingly. The techniques of freestyle wrestling is wider, more flexible, and changeable than Greco-Roman wrestling. Therefore, wrestlers need to more experienced and be familiar with the consecutive techniques of freestyle wrestling to be able to apply them in the matches at will. This study analyzed the basis of consecutive techniques training for freestyle wrestling based on related literatures and proposed the adequate training methods. The technical, physical, and psychological trainings were elaborated in this study in order to help the wrestlers master and utilize the consecutive techniques more effectively hence to have the advantages during the competition and win.

Jafarloo, H. R. S., Naserou, A. J., & Ghorbani, M. H. (2020). Koshti/Wrestling: A Victory Key for Heroes in Shahnameh. *Sport, Ethics and Philosophy*, 1-24. doi:10.1080/17511321.2020.1818279

Shahnameh, Book of Kings, is one of the greatest epics in the world, beautifully put into verse by Abolqsem Ferdowsi. It is the great Persian epic which makes the Persian language proud. One of the words repeated many times in Shahnameh is "Koshti" which, in new Persian, means Wrestling as a sport. The authors have attempted to examine the philosophy of Koshti/wrestling in this great feat. The findings of the study show that, often, the great heroes (pahlavan) in battle, having tried various combat tools and having failed to gain victory over one another, inevitably resort to wrestling which determines the ultimate winner of the fight. In Shahnameh, there are two types of wrestling either on foot or on horseback. The heroes often use wrestling techniques to defeat the opponent. It is also worth noting that the hero's prayer to God and seeking His help are repeated in important cases of wrestling. The place of most of the wrestling is mythological and unknown, often driven by revenge, vengeance or an attempt to safeguard a homeland. Shahnameh narrates heroic values in historical myths. Throughout history, these values have led to the social and educational development of Iranian society and neighboring countries. It should be concluded that heroic values can be extended to the modern world

of sports, and play an important role in improving and strengthening the philosophy, moral atmosphere and behavior of today's sports.

Jomand, G., Épron, A., & Liotard, P. (2020). The Feminization of Wrestling: The Origins of Female's Wrestling in Nord-Pas-de-Calais, 1971–1987. *The International Journal of the History of Sport*, 1-17. doi:10.1080/09523367.2020.1722647

Wrestling is widely regarded as a masculine activity, yet a feminization of the sport over the last decades has given rise to a unique style termed female wrestling. The Nord-Pas-de-Calais region in France is the main birthplace of female wrestling, not only nationally but in the world. Women wrestlers in this region made their emergence in this traditionally male world, first gaining acceptance as practitioners, and then as competitors on a national and international level. Female wrestling developed and institutionalized in France before it expanded internationally. The first club ever to open a female wrestling section was in Calonne-Ricouart in Pas-de-Calais in 1971, showing a desire for equal access that dates back 50 years. Later, the establishment of the Tourcoing Wrestling Club, in the same region, demonstrates some of the difficulties encountered in developing the sport, yet also the successes in pushing the French Wrestling Federation to consider female wrestling as an official sport. By 1975, female wrestlers could get a license, but they could not participate in official competitions until the 1980s, when the international governing body for amateur wrestling, United World Wrestling, finally recognized this new sport.

Jontony, N., Hill, E. B., Taylor, C. A., Boucher, L. C., O'Brien, V., Weiss, R., & Spees, C. K. (2020). Diet Quality, Carotenoid Status, and Body Composition in NCAA Division I Athletes. *American Journal of Health Behavior*, 44(4), 432-443. doi:10.5993/AJHB.44.4.6

In this paper, we examined diet quality and associations between changes in skin carotenoids and body composition among selected NCAA Division I athletes. Methods: Athletes from women's (rowing, swimming, gymnastics) and men's (swimming, wrestling) teams at a large Midwest university (N = 129) completed one online food frequency questionnaire and 2 in-person visits, once in-season and once out-of-season, to assess skin carotenoids and body composition. Diet quality was assessed via Healthy Eating Index-2015 (HEI). Carotenoids were measured via resonance Raman spectroscopy and body composition via dual-energy x-ray absorptiometry. ANOVA and Pearson correlations were used to test differences between teams and determine association between changes from in-season to out-of-season. Results: Mean HEI score for all athletes was 71.0. Women's rowing reported the highest diet quality (73.5), men's wrestling lowest (56.5). Skin carotenoids decreased for all teams, except men's wrestling, from in-season to out-of-season. Body fat percentage increased for women and decreased for men. There was a moderate inverse association between changes in skin carotenoids and body fat percentage ($r = -.334$, $p = .001$). Conclusions: Suboptimal diet quality coupled with decreases in skin carotenoids and increases in body fat percentage from in-season to out-of-season may justify dietitian-led interventions year-round to improve dietary patterns in collegiate athletes.

Karatrantou, K., Katsoula, C., Tsiakaras, N., Ioakimidis, P., & Gerodimos, V. (2020). Strength Training Induces Greater Increase in Handgrip Strength than Wrestling Training per se. *International Journal of Sports Medicine*, 41(8), 533-538. doi:10.1055/a-1128-7166

This study investigated the effectiveness of a specialized strength training program on maximal handgrip strength in young wrestlers. 72 young wrestlers (36 children: 8–10 years-old and 36 adolescents: 13–15 years-old) participated in the present study. Both age-categories were assigned into a training group (18 children and 18 adolescents) and a control group (18 children and 18 adolescents). The training groups, in conjunction with the wrestling training performed a 4-month (2 sessions/week) specialized handgrip

training program. Maximal handgrip strength was evaluated pre, at the intermediate (2 months) and at the completion of the program (4 months). Maximal handgrip strength values increased during the intermediate and post-training measurements compared to pre-training measurement in training and control groups ($p < 0.001$). No significant differences were observed on pre-training and intermediate measurements between groups, while significant differences were observed during the post-training measurement. Training group exhibited significantly ($p < 0.01$) greater maximal handgrip strength values than the control group irrespective of age-category and hand-preference. A 4-month handgrip strength training program, incorporated into the conventional wrestling training, provokes greater adaptations in maximal handgrip strength than the wrestling training per se. For greater handgrip training adaptations are required more than 14 specialized handgrip training-sessions.

Karimi, J., & Mohammadi, M. (2020). The Relationship Between Spiritual Intelligence and Aggression Among Elite Wrestlers in Hamadan Province of IRAN. *Journal of religion and health*, 59(1), 614-622. doi:10.1007/s10943-017-0525-7

The purpose of this study was to investigate the relationship between spiritual intelligence and aggression among elite wrestlers of adolescent age group. The present study was descriptive of correlation type in terms of method and applied in terms of purpose. The population of this research was the elite wrestlers of adolescents age group aged 14-17 (mean and SD of 15.27 ± 1.33) using the convenient sampling method for adolescent wrestling teams of Hamedan clubs selected as samples. To measure variables, King's spiritual intelligence scale and Bass and Perry aggression questionnaire were used. Pearson correlation coefficient and simple regression method were used for data analysis. Results showed a significant negative relationship between spiritual intelligence and aggression. The spiritual intelligence scores also have a significant effect on aggression. The findings show that the higher the spiritual intelligence, the less likely the aggression of the elite wrestlers in different competitions and they can have a better performance than others.

Kasperska, A., & Zembron-Lacny, A. (2020). The effect of intermittent hypoxic exposure on erythropoietic response and hematological variables in elite athletes. *Physiological research*, 69(2), 283-290.

This study aimed to evaluate the changes in the erythropoietin level and hematological variables in wrestlers after intermittent hypoxic exposure (IHE). Twelve wrestlers were assigned into two groups: hypoxia (sports training combined with IHE, $n=6$) and control (sports training, $n=6$). An IHE was performed for 10 days, with one day off after 6 days, once a day for about an hour. The concentrations of hydrogen peroxide (H_2O_2), nitric oxide (NO), vascular endothelial growth factor (VEGF) and erythropoietin (EPO), as well as total creatine kinase activity (CK) were measured. Also, the hematological markers (Hb - hemoglobin, Ht - hematocrit, RBC - red blood cell, WBC - white blood cell, Ret - reticulocytes) were analyzed. The 6-day IHE caused an increase in the levels of (H_2O_2), NO and VEGF. Similarly, the EPO level and WBC count reached the highest value after 6 days of IHE. The total Ret number increase constantly during 10 days of IHE. The hypoxia group showed a higher CK activity compared to the control. In conclusion, 10-day IHE in combination with wrestling training elevates levels of H_2O_2 , NO and VEGF, and improves the oxygen transport capacity by the release of EPO and Ret in circulation.

Kermani, F., Moosazadeh, M., Hosseini, S. A., Bandalizadeh, Z., Barzegari, S., & Shokohi, T. (2020). Tinea Gladiatorum and Dermatophyte Contamination Among Wrestlers and in Wrestling Halls: A Systematic Review and Meta-analysis. *Curr Microbiol*, 77(4), 602-611. 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 4–7). 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.

Kim, J. C., & Park, K. J. (2020). Injuries and rapid weight loss in elite Korean wrestlers: an epidemiological study. *The Physician and sportsmedicine*, 1-8. doi:10.1080/00913847.2020.1824536

Objectives: The purpose of this study was to reveal the relationship between rapid weight loss and injury patterns during the training of elite wrestlers, expected to represent South Korea.; **Methods:** Since 2019, data for elite wrestlers have been collected prospectively by the Korean Training Center. The data were stratified by sex, wrestling style, weight class, injury location, injuries during the weight-loss period, and weight loss method. The χ^2 test was used to compare groups. The risk of injury was indicated by the Poisson rate with a 95% confidence interval (95% CI).; **Results:** There were 120 male Greco-Roman, 120 male freestyle, and 100 female freestyle wrestling. The mean weight loss among wrestlers was 5.52 (± 1.44) kg, and the mean duration of weight loss was 7.96 (± 3.31) days. In general, all wrestlers used similar weight loss methods. We recorded 914 injuries in 340 athletes. Wrestlers had significantly higher injury rates during weight loss periods than during other periods of training (23.18 VS 11.93; $p < 0.001$). Most injuries occurred in the lower extremities (38.0%), followed by the upper extremities (25.9%), trunk (24.8%), and the head and neck area (11.3%). The injury severity was significantly influenced by sex, wrestling style, and weight class.; **Conclusion:** Rapid weight loss is related to the incidence of sports injuries in wrestlers. Most injuries occur during rapid weight loss periods in South Korean elite wrestlers. Moreover, the injury site and injury severity depend on sex, wrestling style, and weight class.

Kondo, E., Nishimaki, M., Yamashita, D., & Nakajima, K. (2020). The link between the range of rapid weight loss and physical conditions of elite wrestlers during competition under the morning weigh-in rule. *The Journal of sports medicine and physical fitness*. doi:10.23736/S0022-4707.20.11221-0

Background: Amateur wrestlers have often undergone rapid weight loss (RWL) to win their matches. On January 1, 2018, the rule of weigh-in was changed and weight category increased. The study aimed to determine the prevalence of wrestlers undergoing RWL under the new rule of morning weigh-in before the tournament and examine the relationship between the range of RWL and physical conditions.; **Methods:** Male ($n = 204$) and female ($n = 50$) wrestlers participating in the National Wrestling Championship completed a questionnaire about weight reduction methods and their physical condition.; **Results:** Among 159 participants exceeding their weight class one-week before competition, 36% of males and 44% of females exceeded their weight class by 0.0-4.9% (requiring small RWL); 30% of males and 6% of females exceeded by 5.0-10.0% (requiring large RWL), but neither the males nor females were over 10.0% above required weight. In the males, there was a moderate negative correlation between excess rates of body mass one-week before competition and their physical

condition ($r = -0.330$ to -0.467 , $P < 0.05$) on the first day of the competition; however, no significant correlation was found in the females. Comparing physical condition according to the range of RWL, there were significantly lower scores in the large RWL group ($\geq 4.9\%$) than the small RWL group ($< 4.9\%$) in males.; Conclusions: We found that $RWL \leq 5\%$ is most appropriate to ensure better physical condition of wrestlers on competition day.

Kons, R. L., Orssatto, L. B. R., & Detanico, D. (2020). Acute performance responses during repeated matches in combat sports: A systematic review. *Journal of Science and Medicine in Sport*, 23(5), 512-518. doi:10.1016/j.jsams.2019.12.004

Objective: Investigate the acute effects of repeated combat sports matches on vertical jump and handgrip strength performance in grappling and striking modalities.; Design: Systematic review.; Methods: PubMed, Scopus, and Web of Science databases were searched. The following eligibility criteria for selecting studies were adopted: Population: Combat sports athletes; Intervention: Official or simulated matches; Comparator: Baseline versus after-matches performance; Outcome: Vertical jump and/or handgrip strength performance.; Prospero: CRD42019129264 RESULTS: The systematic search resulted in 13 studies, including Brazilian jiu-jitsu, Greco-Roman, judo, taekwondo, and wrestling (freestyle and Greco-Roman) modalities, and a diverse number of repeated matches (i.e. 1-5). None of the studies adopted a randomized and controlled design and, consequently, none of them was classified as high quality. Brazilian jiu-jitsu and freestyle wrestling athletes presented an earlier onset of fatigue in upper and lower limbs, while judo and Greco Roman wrestling presented a later onset, from the third match. In taekwondo athletes, no fatigue was observed in the lower limbs, while handgrip strength decreased. However, studies have reported unclear data regarding the time-course of lower and upper limbs' fatigue following repeated matches in taekwondo.; Conclusion: Both upper and lower limbs performance were affected after repeated matches in grappling combat sports when assessed by handgrip strength and vertical jump performance. In taekwondo, the studies have shown unclear results concerning the effects of repeated matches on upper and lower limb performance. There is a lack of studies classified as high-quality and investigations into the neuromuscular mechanisms underpinning fatigue after the repeated matches.

Konstantinova, L. I., Semenova, E. I., Efremova, A. V., Mironova, G. E., Okhlopkova, E. D., Olesova, L. D., . . . Grigoreva, A. A. (2020). Analysis of actual nutrition of freestyle wrestlers in Yakutia conditions. *Yakut Medical Journal*(1), 68-73. doi:10.25789/ymj.2020.69.16

The authors analyzed dietary intake of freestyle wrestlers depending on the season, taking into account the daily energy expenditure. The obtained data conclude that the daily food ration calorie does not reimburse the daily energy consumption of athletes. The chemical composition of nutrients in the daily diet of athletes quantitatively and qualitatively does not correspond to the standards recommended for freestyle wrestlers.

Korobeinikov, G. V., Korobeynikova, L. G., Vorontsov, A. V., Korobeinikova, I. G., & Kirichenko, V. M. (2020). Peculiarities of Heart Rate Variability in Professional Wrestlers with Different Dominance of the Cerebral Hemispheres. *Ukrainian Journal of Medicine, Biology and Sport JMBS*, 5(2), 229-234.

The purpose of the work was to study the variability of heart rhythm in professional wrestlers with different brain hemisphere dominance. Material and methods. Assessment of heart rhythm variability was performed using the system of information diagnostics of the cardiovascular system "Fazagraf" (Ukraine). The system allows recording ECG parameters, statistical and spectral analysis of heart rate variability. Functional hemispheric asymmetry of the brain was studied by test «Color & Word Test». According to the results of testing, semi-circular dominance was determined. Statistical analysis was

performed using the software package «Statistica 7.0». Nonparametric statistics methods were used. The criterion for the significant Wilcoxon rank sums was used to assess the significance of the differences. We surveyed twenty professional wrestlers, members of the Kazakhstan national team in Greco-Roman wrestling at the age of 22-32 years. All athletes signed written consent to conduct the research, as recommended by ethics committees on biomedical research. Results and discussion. Research conducted on the «Color & Word Test» revealed the dominance of cerebral hemispheres in athletes. According to the results of the functional asymmetry of the brain, all fighters were divided into two typological groups: with the predominance of left-hemispheric dominance (8 people) and right-hemispheric dominance (12 people). The results established the presence of significantly lower values of SDNN and CV in fighters with right hemisphere domination compared with the group of athletes with dominance of the left hemisphere of the brain. This fact indicates that there is a more intense regulation of heart rhythm in athletes with right-handed dominance. This is also confirmed by the values of the triangular index. The SDNN and CV indexes reflect the state of overall heart rhythm variability, the total effect of the sympathetic and parasympathetic parts of the autonomic nervous system on the sinus-atrial node of the heart. Conclusion. Professional wrestlers with dominance of the right hemisphere of the brain had more intense regulation of heart rhythm compared to wrestlers with dominance of the left hemisphere of the brain. The increase in tension in the system of autonomous regulation of the heart rhythm in fighters with dominance of the right hemisphere of the brain is associated with the activation of the humoral and sympathetic regulation link. For a more efficient training process and the development of individual training programs for professional fighters, it is necessary to determine the dominance of the cerebral hemisphere.

Korobeinikova, L., Korobeynikov, G., Cynarski, W. J., Borysova, O., Kovalchuk, V., Matveev, S., . . . Novak, V. (2020). Tactical styles of fighting and functional asymmetry of the brain among elite wrestlers. *Ido Movement for Culture. Journal of Martial Arts Anthropology*, 20(4), 24-30. doi:10.14589/ido.20.4.4

Purpose - to investigate the relationship between functional brain asymmetry and tactical competition strategies among elite level wrestlers. Methods. Examination of thirty elite athletes (Ukrainian Greco-Roman National Team members), aged between 20 and 28. In order to determine the dominance of cerebral hemisphere, the dependence assessment test was used (test version «Color & Word Test»; J.R. Stroop, 1935). Level of psycho-emotional stability (stress resistance) and functional mobility of nerve processes was determined in accordance with the results of the psycho diagnostic complex «Multipsychometr-05». Statistical analysis of data was conducted by using the «Statistica 6» software package using methods of non-parametric statistics. Results. The results found that an offensive style of wrestling among elite level wrestlers is related to the presence of brain hemisphere symmetry ($p < 0,05$), field independence from external stimuli ($p < 0,05$), high stress resistance ($p < 0,05$) and high speeds of perception and of processing information ($p < 0,05$). A defensive style of wrestling among elite level wrestlers is characterized by functional brain asymmetry with dominance of the right hemisphere ($p < 0,05$), field dependence from external stimuli and high throughput neurodynamic processes capacity ($p < 0,05$). The combined style of wrestling among elite level athletes is characterized by functional brain symmetry and field independence from external stimuli ($p < 0,05$). At the same time, the combined style indicates lower level of stress resistance ($p < 0,05$), combined with emotional stability and optimal lability of nervous system ($p < 0,05$). Conclusions. Interconnection between styles of fighting among elite level wrestlers and characteristics of functional brain asymmetry was identified.

Kruszewski, A. (2020). Directions of changes in match structure in female wrestling based on World Wrestling Championships 2014 and The Olympic Games 2016 observations. *Archives of Budo Science of Martial Arts and Extreme Sports*, 15, 45-52.

In all sport disciplines, the simplest and the most commonly used method of the athlete level evaluation, or their progress in sport competition is observation. The aim of study was knowledge about current trends of changes in structure of matches in female wrestling, through similarities and differences identification of technical activities performed during World Wrestling Championships (Tashkent, Uzbekistan 2014) and the Olympic Games (Rio De Janeiro 2016). Material and Methods: Study included the course of sport competition during World Wrestling Championships 2014, where 92 competitors have participated, and 167 matches were played, and the Olympic Games 2016, where 115 competitors have participated and 112 matches were played. The source material comprised digital records of matches, which enabled secondary and direct analysis with multiplied repetition and stoppage of recording. Results: In both tournaments, points score decided about the result of majority of matches. The most commonly technical activities used were takedowns. On this basis, no significant differences were identified in structure of duel's settling, and the most dominant way of victory was winning in regular match time. Conclusions: The results of our analyses (a small number of fights won before the end of regular time) confirm the principle that endurance preparation is one of important factors determining sport success in women's wrestling. Another crucial determinant of victory is ability of fast reaction to opponent's activities (counterattack), that confirms the high number of takedowns performed by competitors in lower weight categories.

Lamberts, R., & Gomez-Ezeiza, J. (2020). The confinement of athletes by COVID-19: effects on training, wellbeing and the challenges when returning to competition. *European Journal of Human Movement*, 44(1), 1-4. doi:10.21134/eurjhm.2020.44.559

The current COVID-19 pandemic has resulted in a global health emergency of unprecedented magnitude. Most governments around the world have enforced isolation strategies in an effort to curb the spread of the virus and, in so doing, they have hopefully afforded hospitals much needed time to prepare for the high patient influx (Sarto et al., 2020). These confinement strategies have also had a profound impact on the majority of athletes, restricting their movement and limiting, or prohibiting, their access to training facilities. Suddenly, athletes are no longer able to follow their normal training schedules and major sport events have been cancelled or postponed. Although the decreased training load during the initial weeks of lockdown may have had a positive super-compensation and recovery effect, the long-term effects of detraining are detrimental to the training status of elite athletes (Coyle et al., 1984). Mujika and Padilla (2000), for example, reported a decrease of 4 to 14% on the VO₂max within 4 weeks of training cessation. This reduction is explained by a substantial drop of 5 to 12% in blood volume (Coyle et al., 1986; Houmard et al., 1992) which results in an increase of 5 to 10% in the submaximal heart rate (Mujika & Padilla, 2000). At a functional level, a reduction of 9 to 25% is observed on time to exhaustion in elite athletes (Houmard et al., 1992; Houston et al., 1979). Additionally, detraining has a negative impact on muscle activity and the motion range of joints (Houmard et al., 1992; Mujika & Padilla, 2000) and athletes, which can result loss efficiency and fine motor tuning which can lead to small decrements in technique. Last, but certainly not least, isolation and the absence of normal training habits, along with the cancellation or postponement of major events and competitions could adversely affect mental health and well-being (Mann et al., 2020). Most athletes focus their energy on peaking at a specific major event, such as the Olympics. The sudden enforcement of training restrictions, together with the re-scheduling of competitions and countries' dyssynchronous return to sport could jeopardise athletes' mental well-being. In this uncertain climate the coach and sports psychologist play an important role - new training goals need to be set, even if there is no clear indication as to when sport events will commence. These new circumstances have resulted in athletes employing technology and online platforms to maintain some training fitness levels stimulus. Although it is impossible to replicate normal training sessions for a full 100% , however, some athletes have profited from indoor cycling, the use of a treadmill, body weight routines, exercise videos or simulators. In addition, these online platforms have also enabled athletes to besides racing and competing against

each other also socialise with team-mates and colleagues. Government policies regulating the duration of isolation periods and how strictly these are enforced differ substantially. In Europe, for example, the implementation of lockdown policies have varied from: very strict (Spain and Italy), to less strict (Netherlands), to almost non-existent (Sweden). This situation has resulted in unequal training opportunities with some athletes using training facilities as per usual whilst others are not even allowed to leave their homes. Furthermore, different timing restrictions have exacerbated these training inequalities. China, for instance, has lifted almost all restrictions and Europe is slowly easing up on its lockdown measures. Africa and South America, on the other hand, have yet to reach the peak of the COVID-19 pandemic. These differences in timing and training opportunities have seriously affected athletes' preparation for international events such as the Vuelta a España, athletics Diamond league and swimming world championships. The pandemic is more or less under control in Europe and 'normal' training and professional sport events are slowly commencing. Certain sports have already restarted (e.g. several soccer leagues including the Bundesliga and La Liga) and other federations (e.g. cycling and Formula 1) are in the process of, or have already, announced adapted racing calendars for the remainder of the 2020 season. The limited time available and multitude organisers who still wanting to host races have resulted in racing calendars becoming very full and cluttered. This situation, combined with athletes' poor preparation and eagerness to prove themselves for the 2021 season, might increase the risk of a second epidemic for athletes and coaches as well as an elevated injury rate and highly fatigued athletes. In our opinion, coaches and sports scientists should therefore: 1) closely monitor athletes, especially when they start competing again; 2) assess and evaluate the injury risk of each athlete before he/she returns to play or train; 3) design comprehensive training programmes which include endurance and strength components as well as technical and tactical skills training; 4) be selective in choosing events from the competitive calendar; and 5) adopt a flexible training and preparation approach, because as long as a vaccine has been found and administered to most of us, the future will remain unpredictable. However, and besides all these challenges and uncertainties, we are happy to see the world of elite sports starting up again.

Latyshev, M., Latyshev, S., Korobeynikov, G., Kvasnytsya, O., Shandrygos, V., & Dutchak, Y. (2020). The analysis of the results of the Olympic free-style wrestling champions. *Journal of Human Sport and Exercise*, 15(2), 400-410. doi:10.14198/jhse.2020.152.14

The successful and effective management of sports training is impossible without the justified forecasting. The retrospective analysis of the sport career of elite sportsmen allows to identify interconnections of the competitions – results on various stages of the sporting career. Analysis of papers showed, there are no researches which would analyse the highest-level sportsmen in wrestling – Olympic champions. Aim of the research – to analyse results of the Olympic champions in wrestling from 1996 to the present day and to discover the main trends and regularities. The analysis included 41 sport careers of winners in freestyle wrestling of the six Olympic Games from 1996 to 2016. The results of wrestlers on international competitions into the four age stages are analysed: the pre-junior age, junior age, senior until the victory at the Olympic Games and a time period after the victory. The majority of the sportsmen (90.3 %) win only once and participate in the OG only once or twice (90.2 %). The retrospective analysis has shown that 48.8 % of wrestlers-champions have performed at the international stage at the cadets age, and 85.4 % of sportsmen at the junior age, over 90 % of them have taken the winning places. Prior to the victory at the Olympic Games 87.8 % of the sportsmen take part at the continental championships, all of them have won medals. And 82.9 % have participated at the world championships, and 91.2 % of them have taken places from 1 to 3.

Lee, Y.-J., Bang, I.-J., & Jeoung, J.-H. (2020). Comparison of Body Composition and Anaerobic Power of Combat Players. *한국스포츠학회지*, 18(1), 799-809.

The purpose of this study was to investigate the characteristics of anaerobic metabolic ability of upper and lower body of wrestling, taekwondo and judo elite athletes. The subjects of this study were 7 Taekwondo, 8 Judo and 8 wrestling. Measured items were body composition, grip strength, upper and lower extremity anaerobic metabolic ability. SPSS Version 24.0 was used for the data processing. One-way ANOVA was used to verify the differences among the groups, and Sheffe was performed after the test. The significance level was set at $\alpha=.05$. The results of this study are as follows. First, as a result of comparing and analyzing the differences in body composition, there was no statistically significant difference. Second, as a result of comparing and analyzing the difference in grip power, there was a significant difference ($p<.001$), and as a result of Sheffe's test, the judo group was higher than the wrestling and Taekwondo group. Third, as a result of comparing the difference in the anaerobic metabolic capacity of the lower limbs, there was no significant difference in all measurement variables. On the other hand, as a result of comparing the difference of upper extremity anaerobic metabolic ability, there was a significant difference in MP, PP, MP / BM, PP / BM ($p<.05$), Sheffe showed that the induction group was higher than Taekwondo. As a result, Combat players had a lot in common, but there were differences according to the characteristics of each sport. Therefore, it is necessary to understand the characteristic fitness required for each sport and to apply the training program.

Li, W., Chang, C., Liang, S., & Bigler, E. D. (2020). Radiographic and neurobehavioral profile of sports-related concussion associated with scholastic wrestling: A case report. *Neurocase*, 26(3), 147-155. doi:10.1080/13554794.2020.1764977

Sports-related concussions (SRCs) are typically characterized by transient neurologic deficits due to physiologic and metabolic brain injury. However, following an SRC, subsequent insults may lead to severe and permanent injury in the affected brain cells. We present the case of a 15-year-old female scholastic wrestler who developed acute encephalopathy, macroscopic white matter injury on imaging, and chronic behavioral changes from inadequate neuro-recovery after a documented SRC. We also compare her case with established SRC data, demonstrating that wrestling-related concussions and repetitive head impacts can produce similar degrees of diffuse neuroinflammation, myelinated axonopathy, blood-brain barrier disruption, and post-concussive symptoms.

Lorenzetti, S., Oberhofer, K., Löhner, M., & Lüthy, F. (2020). *Biomechanical analysis of schwingen (swiss wrestling) to gain insights into head, neck and knee injury risks*. Paper presented at the ISBS Proceedings Archive (XXXV-), Liverpool.

This research project aims to reduce incidences of injuries to the head, neck and knee in schwingen (Swiss wrestling) by means of biomechanical analysis. In this pilot study, kinematic and kinetic data were acquired during key manoeuvres in schwingen for the first time. Two professional athletes at Swiss national level in schwingen were performing the so-called Kurz, the Hüfter and the bridge in a simulated competitive setting. The peak vertical ground reaction force, acting on the back as the opponent was hitting the ground during the Hüfter, was measured to be 11500 N; while the peak vertical ground reaction force on the head during the bridge was 2360N, respectively. The knee flexion angle of the leading leg during the Kurz was 55°, with the total knee joint forces being 410N in the anterior-posterior direction and 400N in the medio-lateral direction, respectively. In comparison with reported cervical spine injury risks in American football and sumo wrestling, injury mechanisms at the level of the head, neck and knee in schwingen are likely a result of the applied forces from dynamic throws, in combination with extreme joint ranges of motion during fixed grips and defensive manoeuvres such as the bridge. An extended biomechanical analysis of the applied forces, moments and joint kinematics during schwingen is recommended to develop targeted injury prevention guidelines.

Lüdemann, R., Nowoisky, C., & Löw, M. O. (2020). Kraftdiagnostik und Ableitung trainingsmethodischer Empfehlungen im Ringen. *Kräftiger, schneller, ausdauernder - Entwicklung der muskulären Leistung im Hochleistungstraining: Tagungsband zum gleichnamigen Spitzensport-Symposium am 21./22. Mai 2019 in Leipzig*, 193-199. (German)

Since strength training programs lead to stress-related stresses that ultimately lead to adjustments in different directions, effects in the direction of maximum strength, speed strength, strength endurance and / or specific performance can occur at the same time. How big these effects are in the most varied of training programs and how shifts in the requirements with regard to load, number of repetitions, frequency of movement, number of sets or intra- and interserial pause duration, has not been sufficiently investigated in wrestling. However, empirically based knowledge is an important prerequisite for objective training recommendations. Support in the implementation of appropriate training interventions should be in the self-interest of sports practice. From a training science point of view, the documentation of all relevant stress factors as well as a complex test battery for determining the various training effects is an important prerequisite for training effects analyzes. So should z. B. as part of a maximum strength-oriented training intervention in addition to the detection of the above. Stress factors also a wide variety of pre- and post-tests to record quick strength and strength endurance components can be carried out.

Lystad, R. P., Alevras, A., Rudy, I., Soligard, T., & Engebretsen, L. (2020). Injury incidence, severity and profile in Olympic combat sports: a comparative analysis of 7712 athlete exposures from three consecutive Olympic Games. *British Journal of Sports Medicine*, 54(Published online: 2020-11-20). doi:10.1136/bjsports-2020-102958

Objectives: To describe and compare the epidemiology of competition injuries in unarmed combat sports (ie, boxing, judo, taekwondo and wrestling) in three consecutive Olympic Games. Methods: Prospective cohort study using injury data from the IOC injury surveillance system and exposure data from official tournament records at three consecutive Olympic Games (i.e., Beijing 2008, London 2012 and Rio de Janeiro 2016). Competition injury incidence rates per 1000 min of exposure (IIRME) were calculated with 95% CIs using standard formulae for Poisson rates. Results: The overall IIRME was 7.8 (95% CI 7.0 to 8.7). The IIRME in judo (9.6 (95% CI 7.8 to 11.7)), boxing (9.2 (95% CI 7.6 to 10.9)) and taekwondo (7.7 (95% CI 5.6 to 10.5)) were significantly higher than in wrestling (4.8 (95% CI 3.6 to 6.2)). The proportion of injuries resulting in >7 days absence from competition or training was higher in wrestling (39.6%), judo (35.9%) and taekwondo (32.5%) than in boxing (21.0%). There was no difference in injury risk by sex, weight category or tournament round, but athletes that lost had significantly higher IIRME compared with their winning opponents (rate ratio 3.59 (95% CI 2.68 to 4.79)). Conclusion: Olympic combat sport athletes sustained, on average, one injury every 2.1 hours of competition. The risk of injury was significantly higher in boxing, judo and taekwondo than in wrestling. About 30% of injuries sustained during competition resulted in >7 days absence from competition or training. There is a need for identifying modifiable risk factors for injury in Olympic combat sports, which in turn can be targeted by injury prevention initiatives to reduce the burden of injury among combat sport athletes.

Maksutova, G. I., Popova, T. V., Romanov, Y. N., Surina-Marysheva, E. F., & Kourova, O. G. (2020). PSYCHOPHYSIOLOGICAL STATUS OF MEN AND WOMEN IN COMBAT SPORTS. ПСИХОФИЗИОЛОГИЧЕСКИЙ СТАТУС МУЖЧИН И ЖЕНЩИН, ЗАНИМАЮЩИХСЯ СПОРТИВНЫМИ ЕДИНОБОРСТВАМИ. *Human. Sport. Medicine*, 20(2), 63-70. doi:10.14529/hsm200208

Aim. The article aims to assess the psychophysiological characteristics of skilled athletes in combat sports (boxing, freestyle wrestling, judo). Materials and methods. 18-23-year-old skilled combat athletes

were examined. All athletes were divided into the following groups: the first group - female athletes ($n = 15$); the second group - male athletes ($n = 17$); the third and fourth groups - control groups consisted of males and females of the same age and not involved in sports (15 people each). The following methods were used: a pulse measurement, psychological tests, self-assessment of the psychoemotional status, electroencephalography, cardiointervalography with the calculation of statistical indicators of heart rate. Examinations were performed before and after the relaxation exercise, which was a three-minute concentration of attention at a specific point on the body. Results. The results revealed that female athletes had lower indicators of psychoemotional status than males but higher than untrained females. The indicators of psychoemotional stress were lower in female athletes than in male athletes and untrained women. For example, the indicator of personal anxiety in female athletes was 41.0 ± 1.8 versus 47.2 ± 2.5 in untrained women ($P < 0.05$). In female athletes, heart rate, the amplitude of the mode and voltage index (77.15 ± 2.05) in the structure of heart rate were slightly higher than in males (73.10 ± 1.07), which indicated greater functional stress of the heart. Relaxation led to favorable changes in EEG indicators and decreased functional stress of the heart in all subjects. Conclusion. It is recommended to extend the terms of sports training in female combat athletes to ensure a smooth transition to sports specialization and reduce injuries.

Markovic, M., Kukic, F., Zaric, I., Toskic, L., Kasum, G., & Dopsaj, M. (2020). Development trend of freestyle wrestling: influence of the rule changes on competitive activity. *International Journal of Wrestling Science*, 10(1), 31-38.

This paper deals with wrestling combat performance and how new rule changes have affected competitive activity. Official reports and video material of fights from the European Championships in 2013 (EC2013), before the introduction of the new rules and from the European Championships 2014 (EC2014), First European Olympic Games 2015 (FEOG2015), and European Championships 2020 (EC2020) after the introduction of new rules were analyzed for this study. Fourteen variables were used for evaluation of the competitive activity of wrestlers. Average fight time and points per action increased after EC2013, while a lower number of passivities and total points occurred at EC2013 compared to EC2014, FEOG2015 and EC2020. The number of 1-point actions was significantly higher, while the number of 2-point actions was significantly lower at EC2013 than afterwards. The number of actions worth 3-5 points was lower only when EC2013 was compared to EC2020. The number of actions per match remained unchanged. Average action value was lower at EC2013 than afterwards, intensity of scored points was lower at EC2013 than at the EC2014, while intensity of performed actions was higher at EC2013 than afterwards. A greater sum of points was noticed after EC2013, while the number of actions per match remained the same. The number of actions remaining unchanged despite the duration of matches increasing would indicate that the changes in rules may negatively affect attractiveness.

Miarka, B., Soto, D., Aedo-Muñoz, E., Fernandes, J., Brabec, L., & Brito, C. (2020). Effects of Competitive Wrestling Bouts on Physiological Measures: A Systematic Review and Meta-analysis. *Sports Orthopaedics and Traumatology*. doi:10.1016/j.orthtr.2020.01.005

Present article provides a critical overview of the current literature on the effects of competitive wrestling on neurophysiological parameters. Electronic databases were used to locate relevant studies up to July 2018. Peer reviewed studies using experimental research designs, measurements during wrestling tournaments, neural and physiological parameters (i.e. heart rate -HR, lactate concentration – [LA], bearhug and handgrip strength tests) were addressed. The main results demonstrated a large

effect pre vs. post bouts measures of all physiological parameters, highlighting HR (range: 69.8 ± 1.9 bpm to 112 ± 15 bpm vs. 112 ± 15 bpm to 192 ± 9 bpm), [LA] (1.1 ± 0.4 mmol/L to 15.7 ± 2.8 mmol/L vs. 6.7 ± 1.8 mmol/L to 20.0 ± 0.7 mmol/L), Bearhug (101.8 ± 3.5 kg to 120.8 ± 5.0 kg vs. 85.7 ± 2.9 kg to 117.1 ± 3.4 kg) and handgrip (45.1 ± 1.6 kg to 55.1 ± 2.6 kg vs. 35.3 ± 2.0 kg to 47.7 ± 2.4 kg) tests. An improved understanding of the effects of competitive wrestling on physiological parameters is valuable for coaches and practitioners, developing the relationship between the prescribed contextual training and the expected neurophysiological responses.

Miranda, K. A., Gheller, R. G., Da Silva, I. M., Picanço, L. A., & Libardoni Dos Santos, J. O. (2020). Effects of gradual weight loss on strength levels and body composition in wrestling athletes. *The Journal of sports medicine and physical fitness*. doi:10.23736/S0022-4707.20.11254-4

Background: Few investigations have evaluated isokinetic torque after a period of weight loss in Wrestlers. Thus, the current study sought to investigate the effects of gradual weight loss in the pre-competitive period on isokinetic peak torque in the upper and lower limbs and body composition in wrestling athletes.; Methods: Eight elite athletes participated in the study (mean age 20.8 ± 3.1 years). The athletes visited the laboratory on 2 occasions: during the period of weight maintenance (Baseline) and during weight loss, in the pre-competitive period (Post). The variables analyzed were body composition through air displacement plethysmography (BOD POD) and peak torque (PT) of knee flexion and extension movements, and internal and external shoulder rotation in concentric action, at speeds of $60^\circ/\text{s}$ and $180^\circ/\text{s}$, determined using an isokinetic dynamometer (BIODEX).; Results: A significant decrease was observed in body composition values, except lean mass. No significant differences were observed in the PT of the movements analyzed: Shoulder internal rotation ($60^\circ/\text{s}$ $p=0.825$; $180^\circ/\text{s}$ $p=0.245$) and external rotation ($60^\circ/\text{s}$ $p=0.149$; $180^\circ/\text{s}$ $p=0.163$) and knee extension ($60^\circ/\text{s}$ $p=0.086$; $180^\circ/\text{s}$ $p=0.630$) and flexion ($60^\circ/\text{s}$ $p=0.310$; $180^\circ/\text{s}$ $p=0.239$).; Conclusions: Gradual weight loss did not affect the production of torque in the wrestlers before a competition. In addition, gradual weight loss contributed to a reduction in body fat, associated with an increase in percentage lean body mass.

Molnár, S., Hunya, Z., Pavlik, A., Bozsik, A., Shadgan, B., & Maffulli, N. (2020). SLAP Lesion and Injury of the Proximal Portion of Long Head of Biceps Tendon in Elite Amateur Wrestlers. *Indian Journal of Orthopaedics*, 54(3), 310-316. doi:10.1007/s43465-020-00041-6

Background: Injuries to the proximal portion of the tendon of the long head of the biceps are challenging, and often only diagnosed at arthroscopy. However, it is important to be able to formulate a preoperative plan based on physical examination and imaging studies, so as to inform patients correctly, plan the likely procedure, and give indication to length and modalities of rehabilitation. Materials and Methods: Eleven elite wrestlers who suffered their injury between 2008 and 2018 were investigated retrospectively. We aimed to identify an association between the mechanism and the symptoms of the biceps-labral complex injury. Results: The injury was sustained at a mean age of 20.63 years, and most wrestlers were middle or light weight. All injuries occurred during shoulder movements in closed kinetic chain with the elbow extended, the forearm pronated and the shoulder slightly elevated. The surgical procedures performed were tenodesis in three wrestlers, reinsertion in seven wrestlers, and one tenotomy of the tendon of the long head of the biceps. The postoperative rehabilitation was shorter (1–3 month) in case of tenodesis or tenotomy, and markedly longer after reinsertion (6–9 months). Conclusions: Injuries to the proximal part of long head of biceps tendon are relatively frequent in elite wrestlers, reflecting the high functional demands imposed on the upper limb. Though necessitating surgery, in these athletes, such injuries are not career ending, and most of our elite athletes returned to high performance levels after surgery.

Mottaghi, A., Soryani, M., & Seifi, H. (2020). Action recognition in freestyle wrestling using silhouette-skeleton features. *Engineering Science and Technology, an International Journal*, 23(4), 921-930. doi:10.1016/j.jestch.2019.10.008

Despite many advances made in Human Action Recognition (HAR), there are still challenges encouraging researchers to explore new methods. In this study, a new feature descriptor based on the silhouette skeleton called Histogram of Graph Nodes (HGN) is proposed. Unlike similar methods, which are strictly based on the articulated human body model, we extracted discriminative features solely using the foreground silhouettes. To this purpose, first, the skeletons of the silhouettes are converted into a graph, representing approximately articulated human body skeleton. By partitioning the region of the graph, the HGN is calculated in each frame. After that, we obtain the final feature vector by combining the HGNs in time. On the other hand, the recognition of two-person sports techniques is one of the areas that has not received adequate attention. To this end, we investigate the recognition of techniques in wrestling as a new computer vision application. In this regard, a dataset of the Freestyle Wrestling techniques (FSW) is introduced. We conducted extensive experiments using the proposed method on the provided dataset. In addition, we examined the proposed feature descriptor on the SBU and THETIS datasets, and the MHI-based features on the FSW dataset. We achieved 84.9% accuracy on FSW dataset while the results are 90.8% for SBU and 44% for THETIS datasets. The fact that experimental results are superior or comparable to other similar methods indicates the effectiveness of the proposed approach.

Mudry, A., & Jackler, R. K. (2020). Tracing the Origins of "Cauliflower Ear" and Its Earlier Names over Two Millennia. *The Laryngoscope*. doi:10.1002/lary.29055

Objectives: The post-traumatic ear deformity, known today as cauliflower ear, has been described since antiquity. It has long been associated with pugilistic sports (wrestling, boxing) as well as among the mentally ill. The aim of this study is to present the various terms used since antiquity to describe these traumatic deformations of the auricle and to trace the origin of the modern moniker "cauliflower ear."; Methods: Historical study, only based on original documentation accessed through personal libraries and universities repositories, completed with online sources and etymological dictionaries.; Results: We were able to identify no fewer than 39 names for the deformity. The term cauliflower ear is of relatively recent origin. It was coined in the first decade of the 20th century, initially in the popular press and subsequently adopted by the medical profession.; Conclusion: Ironically, the deformity has only superficial resemblance to a cauliflower. The vegetable, which is part of the cabbage family, has a symmetrical and highly ordered fractal geometry with well-circumscribed excrescences. Cauliflower ear, by contrast, notably lacks symmetry and its rounded protuberances flow into one another. Although somewhat a misnomer, the term is deeply rooted in both popular and medical culture.

Nakhodkin, V. V., Kolodeznikova, M. G., & Semenov, A. N. (2020). Ideomotor trainings for competitive success in wrestling. *Theory and Practice of Physical Culture*(10), 27-28.

Competitive success of the sport elite is known to heavily depend on the competitive fitness with its components including the individual mental control and conditioning skills, healthy lifestyles, diets etc., with the mental controls playing the key role in the precompetitive trainings. Objective of the study was to analyze benefits of an ideomotor training model for precompetitive conditioning, fight planning and inspiration in the elite wrestling sport. We used interactive discussions, training process surveys, and adapted Competitive Behaviors Test method for the study purposes, with 20 freestyle wrestlers sampled

for the survey. The survey included three questions to rate the following: individual versatility in the wrestling techniques; favored actions within a 15s certain timeframe in extreme competitive situations; and mental control skills and stress tolerance in the extreme competitive situations. The study data gives the grounds to conclude that mental conditioning tools are highly beneficial when the trainings mimic as close as possible the real upcoming bouts, with the fight plans recommended being drafted for every bout albeit reasonably limited in details, with only the key points being specified and trained.

Ñancuvil-Suazo, C., Carrillo-Mora, C., Valdés-Badilla, P. A., Franchini, E., Pardo-Tamayo, C., Zapata-Huenullán, C., . . . Herrera-Valenzuela, T. (2020). Rapid weight gain in wrestling athletes during the Panamerican Championship, Lima, 2018. *Nutricion hospitalaria*, 34(3), 584-588. doi:10.20960/nh.02882

Introduction: Introduction: To avoid rapid bodyweight fluctuations and the associated effects on health and performance, some combat sports federations have made changes to regulations. Objective: the objective of this study was to analyze the impact of the Rapid Weight Gain on sporting success in elite Olympic Wrestling athletes under the new weighing modality. Methods: the bodyweight of 75 athletes was recorded during the Pan-American Olympic Wrestling Championship (Lima, 2018), corresponding to 29 % of the total universe of competitors (n = 255). Of these, 29 were Greco-Roman style, eight Freestyle, and 38 Women's Wrestling. The official weighing was carried out between 8:00 and 8:30 hours. As for the second weighing, this was done with the same official weighing scale, immediately before the first match (between 10:00 and 11:00 hours). Rapid Weight Gain after weigh-in was compared between medalist and non-medalist athletes. Results: when analyzing the difference between medalists and non-medalists, no significant differences were found in Greco-Roman athletes ($t = 0.114$; $p = 0.910$; $r = 0.022$), in Freestyle (Mann-Whitney U = 5,500; $p = 0.486$; $r = 0.000$), in Women's Wrestling (Mann-Whitney U = 163.0; $p = 0.774$; $r = 0.124$), and in all competitors (Mann-Whitney U = 641.5; $p = 0.855$; $r = 0.037$). Conclusions: no significant differences were found between medalist and non-medalist athletes in any of the Olympic Wrestling styles.

Nikolaev, N. D., Torgovkin, V. G., & Krivoshapkin, P. I. (2020). Technical/ tactical excellence training model for Sakha (Yakutia) Republic wrestlers. *Theory and Practice of Physical Culture* (10), 9-11.

Modern sport practices give a special priority to the technical/ tactical excellence tools based mostly on the A.A. Novikov's training system supplemented (as traditional for the Yakut teams) by the D.P. Korkin's training technologies. Objective of the study was to improve the academic wrestlers' training systems by the phased 'kinetic energy prioritizing' model by M.G. Okroshidze and A.A. Novikov. The training process was phased into micro-cycles under the study with account the aerobic, anaerobic and special workloads. We sampled academic wrestlers for the new model testing experiment with contributions from coaches and a Hapsagay wrestling expert. Their progress in the speed-strength building and aerobic and anaerobic performance aspects was tested by a set of standard tests. The new model offers a phased technical/ technical excellence program with the progress goals in the distance control, timing and other fight control aspects. The training process was designed based on the sport-specific movement coordination and muscular group development exercises to improve the attack and defense mastery. The progress of the sample was tested by practical wrestling bouts of two 3-minute periods each. The new technical/ tactical phased excellence model was found beneficial as verified by the progress test data

Nishimaki, M., Kondo, E., Teo, C., Nakajima, K., & Yamashita, D. (2020). Prevalence, methods of rapid weight loss amongst elite Japanese wrestlers: a questionnaire-based study of the 2016 Japanese Wrestling Championship. *Journal of High Performance Sport*, 6, 12-27. doi:10.32155/jissjhs.6.0_12

This study aims to investigate weight loss practices of elite Japanese wrestlers who participated at the 2016 Japanese Wrestling Championship. In this study, we defined rapid weight loss (RWL) as losing 5% or more of their weight relative to their intended weight class, one week before weigh-in. 241 wrestlers completed a questionnaire on their weight loss practices. 109 wrestlers reported RWL and were used for analysis. We found that wrestlers who cut weight over a longer duration utilized a greater variety of weight loss methods than those who cut weight over a shorter duration. Reduced carbohydrate intake was commonly used by wrestlers who cut weight over a longer duration utilized a greater variety of weight loss methods than those who cut weight over a shorter duration. Dehydration was commonly done by all wrestlers. We also identified that the use of low carbohydrate and low salt diets are not optimized for RWL, and suggest for wrestlers to be educated to improve the effectiveness of these methods. Studies to investigate the revision of the weigh-in rules are recommended to better understand the implications of these changes on RWL and recovery practices in wrestlers.

Noriega Gomez, J. C., Lanza Bravo, A. d. I. C., & Gonzalez Duarte, L. A. (2020). METHODOLOGICAL TREATMENT TO PLAN FOR STRENGTH TRAINING IN WRESTLERS OF 16-18 YEARS: A DIAGNOSTIC STUDY. *Revista Conrado*, 16(76), 207-214.

The research recognizes the need in Olympic Wrestling coaches to modify the organization of special force preparation. For this, several research methods and techniques were used during the diagnostic stage, among them, the analysis of the training plans of the 16-18-year-old Olympic Wrestling team of Villa Clara, a survey of the selected specialists was conducted. They made observations to training units and competitions; detecting the insufficiency in the planning, development and control of the special force, based on an adequate general force. The search for updated scientific information was taken as a reference, where studies appear that address the subject, the survey itself carried out in the diagnostic stage and the consultation of specialists. The need to organize the preparation of the force from the models of stressed loads is determined for youth fighters.

Orhan, I., & Ugurlu, A. (2020). State and trait anxiety levels of adolescent wrestlers. *International Journal of Applied Exercise Physiology*, 9(6), 256-.

Wrestling is a complex sport requiring several high level motoric performance demands such as strength, endurance, flexibility, speed, balance. The performance demands, psychological state is a strong determinant of success in wrestling as in many other sports. Thus, this study aimed to investigate the state and trait anxiety levels of adolescent wrestlers according to several variables like region, housing, doing traditional oil wrestling and achievement to reach the podium. A total of 101 competitive adolescent wrestlers aged 12 to 18 participated in this study. State and trait anxiety levels of participants were determined using The State-Trait Anxiety Inventory (STAI), and personal information form prepared by researchers was used to collect demographic information. As a result, statistical significance was noted in state anxiety levels of adolescent wrestlers according to region. Wrestlers from Elmalı were determined to have higher level of state anxiety compared to wrestlers from Antalya city center and Korkuteli regions. No further statistical significance was determined. In conclusion, region can be stated as a moderator of state anxiety level and the need for further research should be considered from different perspectives to get underpinning mechanisms of psychological performance parameters.

Özbey, Ö., & DOĞU, G. (2020). Güreş Antrenörlerinin İletişim Becerilerinin Değerlendirilmesi ; Evaluation of Communication Skills of Wrestling Trainers. *International Journal of Sport Culture and Science*, 8(2), 68-81.

The aim of this study is to evaluate the communication skills of wrestling coaches. In order to collect data from the trainers participating in the development seminar in the province of Trabzon, a questionnaire of 22 questions inspired by the 50-item Communication Skills Inventory developed by Kabadayı (2010) was used and a Cronbach alpha reliability analysis of 904 values was found by conducting Validity and Reliability. Descriptive statistical techniques (frequency, percentage, arithmetic mean, standard deviation) were applied in the analysis of the collected data. Age, gender, education level, level of education of the coach's demographic characteristics including training, duration, coaching period, and working status were determined. The lowest mean value of the subcontractors' ($X = 3,95$), and the highest mean value was verbal communication skills ($X = 4,28$). According to the results, it is necessary that the coaches should be more sensitive to listen to their athletes and deal with their problems and to develop themselves in this respect.

Phelan, D., Kim, J. H., & Chung, E. H. (2020). A Game Plan for the Resumption of Sport and Exercise After Coronavirus Disease 2019 (COVID-19) Infection. *JAMA Cardiol.* doi:10.1001/jamacardio.2020.2136

Pirruccio, K., Parisien, R. L., Olsen, C., & Kelly, J. D. (2020). Wrestling-related concussions and closed head injuries predominantly occur in high school age athletes. *The Journal of sports medicine and physical fitness.* doi:10.23736/S0022-4707.20.11194-0

Background: Sports-related concussions (SRC) and closed head injuries (CHI) have recently garnered national attention given mounting concern for long-term neurological sequelae resulting from repetitive head trauma. Despite historically dangerous techniques in wrestling that involve impacts to the head, there is a paucity of epidemiologic data in regards to wrestling-related concussions (WRCs) in the United States (US).; Methods: The National Electronic Injury Surveillance System (NEISS) database was queried (2000-2018) to report national estimates and demographic characteristics of patients 6-25 years of age presenting to US emergency departments (EDs) with WRCs and CHIs.; Results: The average annual number of patients presenting to US EDs with WRCs or CHIs was 3,465 (95% Confidence Interval [CI] 2,489-4,441). Over one-third of patients were between 15 (17.7%; CI 15.8%-19.7%) and 16 (17.0%; CI 14.9%-19.1%) years of age, which comprised the peak age groups during which such head injuries were sustained. The vast majority of patients were male (96.3%; CI 94.8%-97.7%). Lastly, 6.2% (CI 4.3%-8.2%) of patients did not present to the ED on the same day that the injury was sustained.; Conclusions: Due to the unique nature and culture of the sport, wrestlers may be more likely to attribute SRC or CHI symptoms to normal training-related fatigue, which can lead to underreporting or delayed diagnosis. It is therefore imperative that appropriate safety initiatives and concussion awareness campaigns be implemented in youth wrestling to decrease the incidence of SRCs at local and national levels.

Podlivaev, B., Kurashvili, V., Sinyuchkova, E., & Kuznetsov, A. (2020). The role of posturography on the initial stage of sports training. *BIO Web of Conferences*, 26, 00016. doi:10.1051/bioconf/20202600016

One of the main directions in the wrestlers training on the initial stage of sports training is the formation of the wrestler's motion coordination abilities. Equilibrium function and anthropometric data including wrestler's gender have essential differences in connection both with the child's biological specialities and choosen athletic discipline special aspects. This research is focused on comparsion of variations in kinetic postural control affected by the lassitude among young athletes and non-athletes. 16 youth female freestyle wrestlers participated in this research. They are on initial stage of sports training. The control group consisted of 14 youth females who did not participate in sports. There was made a hypothesis that the wrestlers lassitude can be measured subjectively (with the Borg scale) and objectively (with the stabilometrics), and that the wrestlers will better control their body position than the girls irrelevant to sports. Tecnobody Pro-Kin stabilometric platform was used to measure postural balance. There was determined statistically significant positive relationship of the investigated

parameters changes between groups. As a result of the research we can make a conclusion that the offered method can provide reliable data concerning wrestler's lassitude level. Analogues data are received with the rating of perceived exertion by Borg's scale. As the result we can conclude that the offered postural balance research method is valid for the wrestler's lassitude rating and can be used as a component of the complex athletes control system.

Polikanova, I., Leonov, S., Isaev, A., & Liutsko, L. (2020). Individual Features in the Typology of the Nervous System and the Brain Activity Dynamics of Freestyle Wrestlers Exposed to a Strong Physical Activity (a Pilot Study). *Behavioral Sciences* (2076-328X), 10(4), 79. doi:10.3390/bs10040079

Nowadays, knowledge of psychophysiological features, particularly on the nervous system's characteristics, is essential in the sporting context, particularly for freestyle wrestling. The study aimed to investigate the peculiarities of the wrestlers' nervous system—on the individual and electrophysiological levels in two functional states—in calm wakefulness and during intense physical fatigue. Psychological (Well-being, Activity, Mood; Spielberger–Hanin; Leonhard's questionnaires), as well as electrophysiological techniques (dynamics of the dominant and average frequencies of the main electroencephalogram (EEG) spectra—theta, alpha, low and high-frequency beta rhythms), were used in the study. It was shown that athletes were mainly characterized by the hyperthymic type of character accentuation and a low frequency of theta rhythm in a calm wakefulness state. After the acute physical load, wrestlers with high hyperthymia showed a moderate increase in theta, whereas other athletes showed a decrease in this parameter. Regardless of the level of hyperthymic accentuation, all wrestlers were characterized by an increase in the frequency of alpha rhythm after exercises in the left hemisphere. These results suggest the existence of a particular functional system in freestyle wrestlers, which allows the body's regulatory systems to be adapted for the effective implementation of sports activity.

Polmann, H., Melo, G., Conti Réus, J., Domingos, F. L., de Souza, B. D. M., Padilha, A. C., . . . De Luca Canto, G. (2020). Prevalence of dentofacial injuries among combat sports practitioners: A systematic review and meta-analysis. *Dental traumatology : official publication of International Association for Dental Traumatology*, 36(2), 124-140. 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.

Pryimakov, O., Iermakov, S., Eider, J., Prysiashniuk, S., & Mazurok, N. (2020). Physiological criteria of functional fitness and determinants of physical work capacity of highly skilled wrestlers. *Physical Education of Students*, 24(4), 205-212. doi:10.15561/20755279.2020.0403

The objective of the work is to study the key factors of highly skilled wrestler fitness structure determining the level of their functional state and physical work capacity at the stage of maximum realization of individual capacities. Material: 45 highly skilled wrestlers aged 19-27 years, members of the national teams of Ukraine in freestyle and Greco-Roman wrestling were examined. The 27 of Ukrainian National Team athletes, participated in this study, were at the student's age (19-24 y) during championships and 23 of them were currently students. Instrumental research methods were used to record indices of functional fitness (FF) and physical work capacity of wrestlers while performing a specialized test with throws of a partner and a block of testing physical loads on a bicycle ergometer. Results: It was revealed that among factors determining the structure of wrestlers' fitness, the integral factor of FF general level (31.13% of the total variance) has the greatest impact on the variability of physical work capacity indices of athletes. Increase in skill level of wrestlers is associated with decreased time of performing throws in a specialized test, increased relative values of lactate power, O₂-debt, general level of FF, O₂ consumption per 1 kg of body mass. Improvement of wrestler FF structure along with an increase in their skill level is characterized by higher contribution of FF integral parameters (anaerobic power, mobility of physiological reactions, FF general level) to the manifestation of physical work capacity. It was revealed that the general level of FF of wrestlers is characterized by the following ratio of key factors (relative to model values of elite athletes): anaerobic power - $52.6 \pm 4.9\%$, aerobic power - $52.8 \pm 4.1\%$, mobility - $80.4 \pm 5.3\%$, economy - $43.3 \pm 3.0\%$. In the course of studies, mathematical models of the key factors of wrestler FF structure associations with the level of special work capacity, skill level and weight category have been developed. Modeling allowed to specify the criteria and develop scales for assessing special physical work capacity level, differentiated according to skill level and weight category groups of highly skilled wrestlers. Conclusions: The findings reflect the crucial role of anaerobic energy supply mechanisms in the manifestation of high special work capacity in wrestling. Improvement of wrestler FF structure along with the increase of their skills is characterized by a decrease in the number of key functional parameters determining the level of physical work capacity during testing with loads that model specific activity of highly skilled wrestlers. This, along with body functions economization, is one of the important criteria for improving FF structure of the combat athletes.

Pulido-Pedrero, S., de la Vega-Marcos, R., & Fuentes-Garcia, J. P. (2020). Achievement motivation in elite combat athletes: computerised objective assessment. *Revista De Psicologia Del Deporte*, 29(1), 75-82.

The objective of the study was to identify the differences in task motivation, personal goal motivation, aspiration level, and competence motivation in combat sports, depending on gender, type of sport and competitive level. To overcome the limitations of self-report motivation assessments, achievement motivation was assessed by means of a computerised objective test, the Objective Achievement Motivation Test (OLMT, Schuhfried (R)). The sample comprised 69 judo and wrestling combat athletes. A MANOVA test was carried out to analyse the differences in gender (male and female), type of sport (wrestling and judo), and competitive level (high-performance athletes and lower level athletes), as well as t-tests for independent samples. Significant differences were only found in the aspiration level variable in terms of gender, with a moderate-to-high effect size in favour of women ($d(R).6$). These results point in two directions: first, to consider differences in comparison to other studies on

achievement motivation, in which significant differences appear when self-report is used. Second, emphasise the importance of going deeper into the study of the aspiration level as a core aspect of achievement motivation, which could explain sports engagement in combat sports, as well as its relationship with variables such as satisfaction, tolerance to frustration or sport abandonment. The use of the computerised psychological assessment is defended by justifying tests such as the OLMT to achieve more accurate results in studies conducted within the framework of sport motivation.

Puntmann, V. O., Carerj, M. L., Wieters, I., Fahim, M., Arendt, C., Hoffmann, J., . . . Nagel, E. (2020). Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol.* doi:10.1001/jamacardio.2020.3557

Coronavirus disease 2019 (COVID-19) continues to cause considerable morbidity and mortality worldwide. Case reports of hospitalized patients suggest that COVID-19 prominently affects the cardiovascular system, but the overall impact remains unknown. To evaluate the presence of myocardial injury in unselected patients recently recovered from COVID-19 illness. In this prospective observational cohort study, 100 patients recently recovered from COVID-19 illness were identified from the University Hospital Frankfurt COVID-19 Registry between April and June 2020. Recent recovery from severe acute respiratory syndrome coronavirus 2 infection, as determined by reverse transcription–polymerase chain reaction on swab test of the upper respiratory tract. Demographic characteristics, cardiac blood markers, and cardiovascular magnetic resonance (CMR) imaging were obtained. Comparisons were made with age-matched and sex-matched control groups of healthy volunteers (n = 50) and risk factor–matched patients (n = 57). Of the 100 included patients, 53 (53%) were male, and the mean (SD) age was 49 (14) years. The median (IQR) time interval between COVID-19 diagnosis and CMR was 71 (64–92) days. Of the 100 patients recently recovered from COVID-19, 67 (67%) recovered at home, while 33 (33%) required hospitalization. At the time of CMR, high-sensitivity troponin T (hsTnT) was detectable (greater than 3 pg/mL) in 71 patients recently recovered from COVID-19 (71%) and significantly elevated (greater than 13.9 pg/mL) in 5 patients (5%). Compared with healthy controls and risk factor–matched controls, patients recently recovered from COVID-19 had lower left ventricular ejection fraction, higher left ventricle volumes, and raised native T1 and T2. A total of 78 patients recently recovered from COVID-19 (78%) had abnormal CMR findings, including raised myocardial native T1 (n = 73), raised myocardial native T2 (n = 60), myocardial late gadolinium enhancement (n = 32), or pericardial enhancement (n = 22). There was a small but significant difference between patients who recovered at home vs in the hospital for native T1 mapping (median [IQR], 1119 [1092–1150] ms vs 1141 [1121–1175] ms; P = .008) and hsTnT (4.2 [3.0–5.9] pg/dL vs 6.3 [3.4–7.9] pg/dL; P = .002) but not for native T2 mapping. None of these measures were correlated with time from COVID-19 diagnosis (native T1: r = 0.07; P = .47; native T2: r = 0.14; P = .15; hsTnT: r = –0.07; P = .50). High-sensitivity troponin T was significantly correlated with native T1 mapping (r = 0.33; P < .001) and native T2 mapping (r = 0.18; P = .01). Endomyocardial biopsy in patients with severe findings revealed active lymphocytic inflammation. Native T1 and T2 were the measures with the best discriminatory ability to detect COVID-19–related myocardial pathology. In this study of a cohort of German patients recently recovered from COVID-19 infection, CMR revealed cardiac involvement in 78 patients (78%) and ongoing myocardial inflammation in 60 patients (60%), independent of preexisting conditions, severity and overall course of the acute illness, and time from the original diagnosis. These findings indicate the need for ongoing investigation of the long-term cardiovascular consequences of COVID-19.

Rajpal, S., Tong, M. S., Borchers, J., Zareba, K. M., Obarski, T. P., Simonetti, O. P., & Daniels, C. J. (2020). Cardiovascular Magnetic Resonance Findings in Competitive Athletes Recovering From COVID-19 Infection. *JAMA Cardiol.* doi:10.1001/jamacardio.2020.4916

Myocarditis is a significant cause of sudden cardiac death in competitive athletes and can occur with normal ventricular function. Recent studies have raised concerns of myocardial inflammation after recovery from coronavirus disease 2019 (COVID-19), even in asymptomatic or mildly symptomatic patients. Our objective was to investigate the use of cardiac magnetic resonance (CMR) imaging in competitive athletes recovered from COVID-19 to detect myocardial inflammation that would identify high-risk athletes for return to competitive play.

Reale, R., Burke, L. M., Cox, G. R., & Slater, G. (2020). Body composition of elite Olympic combat sport athletes. *European journal of sport science*, 20(2), 147-156. 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.

Roklicer, R., Trivic, T., Milovanovic, I., Ostojic, S. M., & Drid, P. (2020). Fitness and anthropometric profiles of Serbian elite Greco-Roman wrestlers. *Science & Sports*, 35(2), 115-116. doi:10.1016/j.scispo.2019.10.008

The aim of this research was to determine anthropometric and fitness profiles of Serbian Greco-Roman national wrestling team and to provide useful information for wrestling coaches in order to improve the training process of athletes. In this research, 11 male wrestlers were divided in three different weight category groups: light, middle and heavyweight. The first group consisted of competitors lighter than ≤ 70 kg (69.66 ± 4.16 kg, 25.66 ± 4.50 years, and 170.66 ± 2.30 cm), the second group contained competitors weighing between 70–90 kg (84.87 ± 4.55 kg, 23.25 ± 3.86 years, 177.5 ± 4.79 cm) and the third group was a heavyweight group with athletes weighing over ≥ 90 kg (110.25 ± 13.59 kg, 21.75 ± 3.5 years, 186.87 ± 7.26 cm). Four of these 11 athletes were Euro-pean, World and Olympic medalists, and have participated in Olympic Games multiple times. The rest of the wrestlers were national medalists and regular participants in European and World Championships. Tests were carried out during the off-season. Anthropometric and body composition measures were estimated by bioimpedance. Dynamic strength tests were carried out by estimating 1-RM in bench press, squat and power clean exercise. One-minute sit-up test was used for muscular endurance determination. Flexibility was assessed by the sit-and-reach test, with oxygen uptake estimated using ergospirometry procedure on a treadmill. The study was approved by the Ethics Committee of the University of Novi Sad and was conducted in accordance with Helsinki Declaration. Anthropometric characteristics in lightweight compared to heavyweight category group were different in every variable (Table 1). Neither light nor heavyweight group differed in anthropometrics compared to middleweight wrestlers. A significant difference has been found between light weight vs heavyweight group in 1RM bench press and maximal running velocity, and between heavyweight and middle weight in 1RM squat exercise.

Romero Frómeta, E., Aymara Cevallos, V. D., & Rojas Portero, J. M. (2020). Efectos de la pliometría en la fuerza explosiva de miembros inferiores en la lucha libre senior. *Effects of plyometrics on the explosive strength of lower limbs in senior freestyle wrestling.*, 39(1), 1-10.

Introduction: Explosive strength is the physical capacity to generate greater muscular strength in a shorter time without losing effectiveness. This is a crucial component of sports training and an indirect indicator of yield in wrestling. Objective: Improve the explosive strength of the lower limbs through plyometric exercises performed by senior freestyle wrestlers. Methods: A correlational quasi-experimental study was conducted based on a three-stage plyometric program for the lower limbs. The study population was 15 wrestlers (male sex, age under 21 years) who were evaluated for explosive strength capacity. Results: Significant improvement was established in the following tests: vertical jump (VJ: $p = 0.000$), horizontal jump (HJ: $p = 0.000$), 20-meter dash (D20m: $p = 0.000$) and jump 8 (J8: $p = 0.001$). In all cases the post-test obtained better results. Determination was made of a moderate positive linear correlation between VJ and HJ (0.50), a moderate negative correlation between HJ and C20m (-0.58), a very low negative correlation between VJ and C20m (-0.03), a moderate positive correlation between VJ and J8 (0.61), a very low positive correlation between HJ and J8 (0.16) and a moderate positive correlation between C20m and J8 (0.59). Conclusions: The plyometric intervention was found to significantly improve the explosive strength of lower limbs, thus becoming an effective alternative to indirectly enhance sport yield. Of the six linear correlations performed, four were moderate, which shows that plyometric strengthening of a specific muscular plane may consecutively improve other muscular planes related to speed and explosive strength.

Rutkowska, K., & Gierczuk, D. (2020). Achievement motivation and emotional intelligence in elite female and male wrestlers. *Ido Movement for Culture. Journal of Martial Arts Anthropology*, 20(1), 14-22.

Achievement motivation is the tendency to act towards a specific goal attainment that makes it possible to gain personal fulfilment even if it is necessary to surmount some obstacles. According to studies described in the literature of the subject, it is associated with emotional intelligence, which plays an adaptive role. Emotional competences help the individual to cope with different situations. The study sought to diagnose achievement motivation and emotional intelligence and to establish correlations between them in elite female and male wrestlers. The study included 11 female and 64 male Greco-Roman wrestlers aged 16-26. Two comparative groups (11 females and 11 males) were formed for the needs of the comparative analysis. The analysis of research results makes it possible to state that in the examined group of female and male wrestlers, the dimensions of both achievement motivation and of emotional intelligence fall within the range of average results. The study revealed significant differences in the results concerning the levels of achievement motivation in women and men. The men demonstrated higher levels of eagerness to learn, pride in productivity, engagement, competitiveness and flow than the women. An overall result obtained with the use of LMI was also higher in male wrestlers. Furthermore, male competitors were found to exhibit significantly higher levels of ambition. A number of correlations between particular dimensions of emotional intelligence and achievement motivation were noted; however, it also refers to factor results. Intrapersonal emotional intelligence was correlated with self-assurance and self-control, whereas general emotional intelligence was correlated with self-assurance and ambition. It is recommended that psychological training and long-term cooperation with sports psychologists should be implemented in the wrestling training process. Achievement motivation and emotional intelligence are factors that help the individual to cope better with stress/difficult situations both within and outside the sport. The study is a contribution to the discussion on the issue of the professionalization of wrestling in Poland.

Rutkowska, K., Gierczuk, D., & Buszta, M. (2020). Selected psychological factors in elite Greco-Roman wrestlers at various levels of competition. *Journal of Physical Education and Sport*, 20(S3), 2277-2282. doi:10.7752/jpes.2020.s3306

Due to the deterioration in mental health in the societies and, in view of significant challenges of contemporary sport, it is necessary to carry out research on psychological factors and, based on research results, to hold interdisciplinary discussions about the role of mental preparation in sport. It is suggested that psychological resources, i.e. psychological factors that determine optimal performance in sport and in other activities not related to sport, should be enhanced. These factors include, inter alia, styles of coping with stress (coping styles) and achievement motivation. The aim of the study was to investigate selected psychological factors (including achievement motivation and coping styles) in wrestlers at various levels of competition. This study sought to explore selected psychological factors in wrestlers at various levels of competition. The study included elite Greco-Roman wrestlers from two age groups: juniors (n = 25) and seniors (n = 25). The first group consisted of athletes aged 16-18 and with training experience of 4 to 10 years. The other group was composed of athletes 19-26 years of age and with training experience of 5 to 17 years. CISS and LMI inventories were applied. Dimensions of achievement motivation and different coping styles were analysed. Compared to juniors, seniors exhibited more developed task-oriented coping style. Furthermore, they were more self-confident. In seniors, task-oriented coping style correlated positively with a general dimension of achievement motivation and self-confidence; however, emotion-focused coping style correlated negatively with a general level of achievement motivation and self-control. In addition, a negative correlation was noted between self-control, avoidance coping style and distraction. In juniors, achievement motivation and ambition correlated positively with task-oriented coping style. In the future, it would be useful to carry out longitudinal studies to check possible age- and experience-related changes in the use of certain coping styles as well as dimensions of achievement motivation in particular groups. The process of training in elite wrestlers requires constant cooperation with sports psychologists in terms of monitoring psychological variables (e.g. achievement motivation and coping styles) and, if necessary, implementing sport-specific mental training. Further research is needed to investigate psychological factors in wrestling more thoroughly. However, the data gathered may be used when developing mental training oriented at elite wrestlers.

Sagayama, H., Kondo, E., Tanabe, Y., Ohnishi, T., Yamada, Y., & Takahashi, H. (2020). Bone mineral density in male weight-classified athletes is higher than that in male endurance-athletes and non-athletes. *Clinical nutrition ESPEN*, 36, 106-110. doi:10.1016/j.clnesp.2020.01.008

Background: Weight-bearing physical activity and intense mechanical stimuli affect the bone through the endocrine system; hence, bone-loading sports affect bone mineral density. We hypothesized that weight-classified athletes, such as those practicing wrestling and judo, have relatively high bone mineral density because these activities have a higher impact on the entire body during daily training compared to low- or non-impact activities. We aimed to investigate the bone mineral density of weight-classified athletes (participating in wrestling and judo) to compare the parameters with those of endurance-athletes and non-athletes.; Methods: Thirty-three college athletes (aged 18-22 years) were divided into three groups, wrestlers, judoka, and endurance-athletes, according to their sports history. Eight non-athletes participated as controls. Bone mineral density was determined by whole-body dual-energy X-ray absorptiometry.; Results: Mean whole-body bone mineral density of wrestlers and judoka was higher than that of endurance-athletes and non-athletes ($P < 0.01$). The bone mineral density of athletes competing in wrestling and judo was higher than that of non-athletes when adjusted for body mass.; Conclusions: The present study demonstrated that weight-classified athletes have significantly higher bone mineral density compared to endurance- and non-athletes, despite rapid weight loss before competitions.

Sayyadi, P., & Sheikhhoseini, R. (2020). Investigating the Range of Motion and Balance Symmetry Between the Dominant and Non-dominant Arms in the Classic Female Wrestlers. *Modern Rehabilitation*, 14(2), 81-88. doi:10.32598/JMR.14.2.1

Introduction: The purpose of this study was to investigate the Range of Motion (ROM) and balance symmetry between dominant and non-dominant arms in classic female wrestlers. **Materials and Methods:** In this cross-sectional study, 13 members of the Iranian Women's National Classic Wrestling Team participated voluntarily. The shoulder ROM was measured by a goniometer and dynamic balance was assessed by the Y-balance test. Data analysis was done by running a paired t-test, with a 0.95 confidence level ($\alpha < 0.05$). **Results:** There was no significant difference between dominant and non-dominant upper extremities in flexion ($P=0.162$), extension ($P=0.264$), abduction ($P=0.077$), internal rotation ($P=0.972$), and external rotation ($P=0.945$). A significant difference was found in the Y-balance test in medial ($P=0.026$) and inferior-lateral directions ($P=0.047$), but no significant difference in superior-lateral direction ($P=0.715$) and composite score ($P=0.071$). **Conclusion:** Based on the results, it seems that the balance in the dominant arm is better than that in non-dominant arm in the athletes so the non-dominant arm may be at more risk for injury development. We, therefore, recommend that the coaches and trainers pay particular attention to these findings in designing the injury prevention programs.

Schellhorn, P., Klingel, K., & Burgstahler, C. (2020). Return to sports after COVID-19 infection. *Eur Heart J*. doi:10.1093/eurheartj/ehaa448

Sharifian, M., Behpour, N., Mohajerani, H., & Darabi, F. (2020). Effect of four weeks supplementation with silybum marianum on indicators of serum muscle damage in incremental training wrestlers. [تأثیر مکمل یاری بلند مدت خار مریم همراه با چهار هفته تمرین فزاینده بر فاکتورهای آسیب عضلانی زمان استراحت در مردان کشتی گیر]. *RJMS*, 27(3), 75-84. (Farsi)

Background: The purpose of this study was to evaluate the effect of four weeks incremental training with silybum marianum supplementation on Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Lactate dehydrogenase (LDH), and resting Creatine phosphokinase (CPK) levels among wrestlers. **Methods:** Twenty volunteer wrestlers were randomly divided into 2 groups of 10 participants namely "Exercise with silybum marianum supplementation, and placebo with training". Written consents were received from everyone. Silybum marianum supplements were administered every day three times at 300 mg for four weeks. At the baseline, blood samples were collected one hour, 24 hours, and 36 hours after the same wrestling exercise. Independent t-test, repeated measures ANOVA, Bonferroni post-test were used for data analysis. **Results:** AST values were significantly decreased in 24 hr ($p=0.004$) and 36 hr ($p=0.001$) post exercise training in silybum marianum group. There was also a significant decrease in CPK values 24 hr ($p=0.03$), and 36 hr ($p=0.001$) and in ALT levels 24 hr ($p=0.001$) and 36 hr ($p=0.001$) after exercise in the silybum marianum group. LDH levels were not significantly different between groups. According to the analysis of variance with repeated measures of CPK ($p=0.02$), AST ($p=0.003$) and ALT ($p=0.011$), there was a significant decrease in silybum marianum group. **Conclusion:** According to the results of the present study, long-term supplementation with silybum marianum may lead to a decrease in serum markers of muscle injury, and better confrontation with the enzymes produced after training.

Shchetin Nikolay, V., Lukin Anatoly, A., Novikov Yuri, N., & Gostev Valery, N. (2020). THE HISTORICAL ROLE OF THE GRECO-ROMAN STRUGGLE IN THE EDUCATION OF YOUTH IN RUSSIA. *Bulletin social-economic and humanitarian research*, 5(7).

The article deals with historical aspects of the role of Greco-Roman wrestling in the physical education of young people in higher education institutions. The strategic direction of the country's economic and social development requires new people in all areas, distinguished primarily by the fact that they lead a healthy lifestyle and establish civilized forms of production and interpersonal relations. In the light of these trends, we can only consider as a temporary crisis the fact that the authority of sports clubs and departments of physical culture in universities is declining. The relevance of new approaches to physical education is dictated by the need to promote combat sports and the interest of young people in power forms of physical education. The further development of society encourages us to raise physical education to a new level, to reveal its humanistic orientation. This indicates the relevance of the studied problem of the role of combat sports in particular Greco-Roman wrestling among the younger generation in Russia.

Shokoufeh, S., & Türkmen, M. (2020). An examination of athletes' mental skill, aggression and leadership levels: Turkish national wrestling team's sample. *International Journal of Applied Exercise Physiology*, 9(8), 70-80.

Purpose of this study is to analyze leadership, aggression and mental ability levels of elite male and female wrestlers in Turkey. The research sample consists of 129 athletes from four different age categories (Cadets, Juniors, U23 and Seniors) of Turkish National Wrestling Team. The scales used in this study includes; "Ottawa Mental Skills Assessment Tool (OMSAT-3)" developed by Durand-Bush, Salmela and Green-Demers (2001), validity and reliability study for Turkish language done by Erhan, Güler, Agduman and Gerek (2015); "Aggression Scale" developed by Envantery, Perry and Buss (1992), validity and reliability study for Turkish language done by Demirtas (2012); "Leadership Scale" developed by Bolman and Deal (1991), validity and reliability study for Turkish language done by Dereli (2003). Aggression Scale's total score was normally distributed ($p > 0.05$). Total scores of Leadership and Mental Skills scales didn't have a normal distribution ($p < 0.05$). In the analysis of Aggression Scale's total score, t-test was used for comparison of two groups and variance analysis was used for comparison of more than two groups. In the Leadership and Mental Skills scales' total score analysis, Mann-Whitney U test was used for comparison of two groups and Kruskal-Wallis H test was used for more than two groups. Statistical tests were performed using IBM SPSS (Statistical Package for the Social Sciences). Statistically significant differences were found between the sub-dimensions of Leadership, Mental Skill and Aggression. As a result of this study, we reached the conclusion that male wrestlers had higher physical aggression, transformational leadership and Competition Planning subscale scores compared to female wrestlers, and freestyle wrestlers had higher Stress Reactions, Refocusing and Fear Control subscale scores compared to Greco-Roman wrestlers.

Spires, A. (2020). Decreasing Skin and Soft Tissue Infections in Wrestlers. *Sport Journal*, 41(2).

Lack of coach education, standardized disinfection protocols, and standardized return to play procedures amongst wrestling programs have led to a high incidence of Skin and Soft Tissue Infections (SSTI) in the school age and adolescent athletic community. An educational intervention was performed with coaching staff in a pre/post intervention study. SSTI rates were calculated both pre and post intervention to assess for effective intervention in reducing SSTI incidence in the youth athletes. Pre-intervention review of aggregate infection data revealed a 22.6% SSTI occurrence rate. Post-intervention the SSTI occurrence rate was reduced to 3.5%. A McNemar chi-square test was run and the results were statistically significant at $\chi^2(1) = 54.721$, $p < 0.001$. The intervention had a significant impact in lowering the SSTI rate in wrestlers. Future directions include improved education of youth wrestling coaches to include recognition of SSTI as well as best practice disinfection and infection control protocols.

Stahl, R. A., & Eckenrode, B. J. (2020). THE NONOPERATIVE REHABILITATION OF A TRAUMATIC COMPLETE ULNAR COLLATERAL LIGAMENT TEAR OF THE ELBOW IN A HIGH SCHOOL WRESTLER: A CASE REPORT. *International Journal of Sports Physical Therapy*, 15(6), 1211-1221. doi:10.26603/ijsp20201211

Background and Purpose: Injuries frequently occur in competitive wrestling, with the elbow joint representing about 25% of all injuries. Specific to the elbow, the ulnar collateral ligament (UCL) can be injured traumatically from takedowns in wrestling. In athletes with complete UCL tears, surgical management is often recommended with nonoperative management resulting in less favorable outcomes. The purpose of this case report is to present a nonoperative criterion-based rehabilitation program for a high school wrestler with a complete UCL tear of the elbow. **Case Description:** A 17-year-old male wrestler presented to outpatient physical therapy with a complete UCL tear sustained from falling on an outstretched hand during a wrestling match. He presented with limited elbow range of motion (ROM), medial elbow instability, and weakness of the involved shoulder and forearm musculature. A three staged criterion-based rehabilitation protocol was developed for this subject based on specific criteria, including pain, elbow ROM, arm strength, and functional outcomes. **Outcomes:** The subject was treated for nine visits over six weeks, and demonstrated improvements in all strength tests of the involved upper extremity, with elbow flexion strength improving the most by 58%. Return to sport (RTS) tests were used to assess the subject's ability to return to practice. At approximately eight weeks after initial injury, the subject was able to return to full participation in competitive wrestling with no reports of elbow pain or instability. **Discussion:** Through the utilization of a criterion-based rehabilitation protocol for the nonoperative management of an UCL injury, this high school wrestler was able to safely progress back to wrestling without pain or instability in an accelerated time frame. Previously, no detailed rehabilitation guidelines for nonoperative management of UCL injuries in contact sports have been described. Additionally, few studies exist which report on the inclusion of RTS testing following an injury to the UCL of the elbow, as RTS testing is optimal for determining readiness for sport.

Stefani, R. (2020). Ancient Olympic Superstars and the Remarkable Skills They Could Teach Today's Athletes. *Sport Journal*, N.PAG-N.PAG.

A data base of Ancient Olympic events was exhaustively researched by the Perseus Project and combined into one table by Wikipedia, containing nearly 900 results. The Wikipedia table was sorted to obtain the distribution of events and to identify the most successful Olympians of Ancient Greece. From 776 BC through 277 AD, just 30 events were contested, eight of which were offered only once. An average of only 3.5 events were contested in each Olympics. Of the five sports, track and field (called athletics internationally) comprised 49% of all contested events with the 200 m stadion sprint, comprising 30% of all contested events. Competition was so highly focused that winning once was very difficult and winning repeatedly was remarkable. From the sorted winners, 12 superstars of antiquity are chosen for discussion. These superstars include the most unlikely winner in that men's Olympics, a woman, Kyniska of Sparta, who became a double winner by owning and training the horses that won two chariot races. Leonides of Rhodes won all three of the major running events four times successively, for 12 individual wins, not exceeded until 2016 by Michael Phelps. Herodoros of Megara won the trumpeter's competition nine consecutive times. Two wrestlers won the boy's event followed later by five successive wins in the open competition. The emperor Nero of Rome won six times, showing venerability by acting and playing the lyre in public. The pentathlete Phayllos of Kroton outfitted and commanded a battleship at the 480 BC Battle of Salamis, helping Greece defeat Persia. One of the few recorded measurements of Ancient Greece, his long jump of 55 feet has been nearly duplicated by five successive standing long jumps, each employing a re-invented strategy for jumping with weights in each hand. The remarkable skills of those 12 may serve as inspirations for today's athletes.

Steiner, T. (2020). Training plan development webinar [combat sports]. Vevey: United World Wrestling.
<https://unitedworldwrestling.org/article/webinar-terry-steiner-training-plan-development-webinar>

Stephens, S. (2020). Cheating and gaming the system in ancient athletics. *Journal of the Philosophy of Sport*, 47(3), 391-402. doi:10.1080/00948705.2020.1811110

The contradictions and ambiguities in, admiration for, and potential benefits derived from cheating in modern athletics have numerous parallels in ancient Greek culture. Because both ancient and modern competitive sports share common structures and behavioral patterns that enable cheating, viewing attitudes of the ancients provides a useful lens through which to assess our own ambivalent responses to rule-breaking today. This paper traces the growth of ancient sports and the financial and personal rewards that motivated many athletes to game the system. Numerous examples of athletes and the parents of athletes who sought success at all costs indicate that ancient sports cheating was not so distant from cheating in modern sports.

Sybil, M., Pervachuk, R., Shandrygos, V., Svyshch, Y., Petryna, R., & Petryna, L. (2020). A method of optimizing the preparation of female wrestlers in the lunar mesocycle. *Journal of Physical Education and Sport*, 20(4), 1925-1929. doi:10.7752/jpes.2020.04260

This article highlights the research material by pedagogical, biochemical, bibliographic methods, as well as methods of mathematical statistics during the process methods of the process of training female wrestlers during the lunar mesocycle. It was established that the lowest level of both anaerobic and aerobic efficiency of female wrestlers was observed in the ovulatory phase of the ovarian menstrual cycle, and during the menstrual phase individual indicators varied widely as their increase and decrease. It was also found that the highest level of general and special physical performance of athletes takes place in the postmenstrual and post-ovulatory phases of the ovarian-menstrual cycle. Biochemical monitoring has established the lowest catecholamine peaks and the highest fatigue (urea) levels during the ovulatory phase, indicating a cause for poor female wrestler's performance. On the basis of these data, a new approach is proposed for the distribution of loads during the monthly mesocycle of female wrestlers. Namely, symmetrically to the phase distribution of the sympatho-adrenal system during the lunar mesocycle: menstrual cycle - 9%, postmenstrual cycle - 26%, ovulatory cycle - 5%, postovulatory cycle - 29%, yellow-body phase - 20%, premenstrual cycle - 11%. It is known that the sympathetic - adrenal system plays a key role in the organization of adaptive changes in the body, both in the pre-start period, forming a state of pre-start combat readiness, and during the overcoming of the muscles of physical activity. It is this circumstance that forms the basis of the recommendations on the analytical proposal in the distribution of physical activity by volume and intensity during the lunar mesocycle of wrestlers.

Takata, K., Yamauchi, E., Shakado, S., Uehara, Y., Fukuda, H., Yamauchi, R., . . . Hirai, F. (2020). Horizontal Transmission of Hepatitis B Virus Genotype C Among Members of a Wrestling Club in Japan. *The American journal of case reports*, 21, e925044. doi:10.12659/AJCR.925044

BACKGROUND In adulthood, most cases of acute hepatitis B virus (HBV) infection are transmitted either by sexual contact or by contaminated needles, but there are other modes of transmission. We report on three cases of HBV infection among members of a wrestling club. **CASE REPORT** A 19-year-old male wrestling athlete was admitted with acute hepatitis B. Five months later, 2 other men, who were members of the same wrestling club, were diagnosed with HBV infection. The full-length sequences of the HBV DNA were identical in all three cases and classified as subgenotype C2 on phylogenetic analysis. This is the most common genotype found in Japan. No history of sexual or bleeding contact with acquaintances outside the club was noted in any of these cases. This suggests horizontal transmission

within the wrestling club. CONCLUSIONS The possibility of HBV transmission through bleeding wounds and sweat is a concern in contact sports such as wrestling. Hence, hepatitis B vaccination is recommended for unvaccinated contact-sports players.

Tarabrina, N. Y., Kraev, Y. V., & Tikhonov, A. I. (2020). Physiological substantiation and practical implementation of methods of development of strength-building component of endurance training for wrestlers. *Theory and Practice of Physical Culture*(2).

Objective of the study was to determine the effects of a complex of high-intensity interval trainings with the use of a "Bulgarian Bag" on the development of special endurance in wrestlers of various qualifications and speed-strength fitness level. Methods and structure of the study. In view of the specifics of working in anaerobic modes during a wrestling bout, 25 freestyle wrestlers aged 17-19 years old were to perform a one-minute "takedown" test, which simulates the elements of wrestling using biomechanical, temporal and dynamic parameters of movement. Before and after the usual training cycle in the Control Group and the additional use of a set of exercises with the use of a "Bulgarian Bag" in the Experimental Group, all athletes were found to have changes in the special endurance indices. Results and conclusions. It was found that the accelerated formation of a glycolytic energy source is facilitated by specific strength loads of submaximal power. In the glycolytic mode the test was performed by the athletes at a different pace, with different time intervals and stress levels. The pace and time of work correlate directly ($0.52 < r < 0.63$), while the pulse rates inversely ($-0.50 < r < -0.74$) correlate with the wrestlers' level of strength fitness. Sports trainings with predominant use of certain physiological modes significantly change the balance between the energy sources of muscular activity towards the formation of executive links of the functional system of activity.

Tarakanov, B. I., Apoyko, R. N., Petrov, S. I., & Vorobyeva, N. V. (2020). National women's wrestling elite: competitive performance rating and monitoring system improvement model. *Theory and Practice of Physical Culture*(9), 3-5 (print).

Objective of the study was to explore the ways to improve the competitive performance indexing and monitoring system applied in the elite women's wrestling sports. Methods and structure of the study. A database for the study was mined by analyses of the 2018 Russian Women's Freestyle Wrestling Championship's (RWFWC) video replays and competitive reports (referees' protocols) to rate performance of the strongest national female wrestlers ($n=124$) in 10 weight classes. We analyzed 146 bouts of the championship to obtain the following most informative competitive performance indices: total tactical/ technical actions; total score; specific/ total competitive success rates (by the weight classes); average tactical/ technical actions per bout and per minute; scoring attack interval; average bout time; tactical skill ratio; and technical mastery ratio. Results and conclusions. Summarizing our findings on the ways to improve the competitive performance rating and monitoring system for the national women's wrestling elite, we have grounds to state that the proposed champion's competitive performance index rating and benchmarking method offers a sound reference base for comparative competitive performance analyses and rankings sensitive to the individual competitive performance indices and progress needs of every athlete. It should be also mentioned that the top competitive successes in this sport discipline will be secured not only by the sub-maximums on every specific competitive performance index scale but also the optimal individual competitive performance indices combinations for success in the national championships.

Temur, H. B. (2020). The examination of body compositions with some blood parameters while wrestling. *International Journal of Applied Exercise Physiology*, 9(1), 179-185.

In this study, Blood Cells (MCV), Red blood cell (RBC), Hemoglobin (HGB), Triglyceride, High density lipoprotein (HDL), Low density lipoprotein (LDL), levels of heart rate values, height, weight, age, body mass index (BMI) and waist / height ratios were investigated. The mean age of the patients was 29.50 ± 4.28 years, mean length was 173.10 ± 4.14 cm, and 20 non-sported male participants were included in the study. Height, weight, age, BMI, waist circumference and waist / height ratios of the participants were determined. Blood samples of participants were also taken in a health facility on an empty stomach in the morning. The data was transferred to computer. The data were analyzed by using SPIVAL test in SPSS 23 package program. There was a significant relationship between resting pulse rate and body weight, waist circumference value and BMI at $p < 0.01$ level. Again, it was seen that MVC was negatively correlated with waist circumference, waist-to-length ratio and BMI at $p < 0.01$ level. Triglyceride level was found to be positively positive at $p < 0.01$ level and body weight at $p < 0.05$. Together with this, it is another finding that LDL is positively correlated with the waist to aspect ratio at $p < 0.05$. As a result, resting heart rate values ??were found to increase due to body weight, waist circumference values and BMI values. Again, triglyceride levels increase in height and body weight values in parallel with the increase in LDL 's with the increase in the waist / height ratio is another result.

Teo, C., Yamashita, D., Kondo, E., Nakajima, K., & Nishimaki, M. (2020). Prevalence, methods of rapid weight loss amongst elite Japanese wrestlers a questionnaire-based study of the 2016 Japanese Wrestling Championship. *Journal of High Performance Sport*, 6, 12. doi:10.32155/jissjhs.6.0_12

This study aims to investigate weight loss practices of elite Japanese wrestlers who participated at the 2016 Japanese Wrestling Championship. In this study, we defined rapid weight loss (RWL) as losing 5% or more of their weight relative to their intended weight class, one week before weigh-in. 241 wrestlers completed a questionnaire on their weight loss practices. 109 wrestlers reported RWL and were used for analysis. We found that wrestlers who cut weight over a longer duration utilized a greater variety of weight loss methods than those who cut weight over a shorter duration. Reduced carbohydrate intake was commonly used by wrestlers who cut weight over a longer duration utilized a greater variety of weight loss methods than those who cut weight over a shorter duration. Dehydration was commonly done by all wrestlers. We also identified that the use of low carbohydrate and low salt diets are not optimized for RWL, and suggest for wrestlers to be educated to improve the effectiveness of these methods. Studies to investigate the revision of the weigh-in rules are recommended to better understand the implications of these changes on RWL and recovery practices in wrestlers.

Terri A, Z., & Jay F, D. (2020). HIP INJURY -- WRESTLING: 1360 May 28 10:50 AM - 11:10 AM. *Medicine & Science in Sports & Exercise*, 52(7 Suppl), 358-359. doi:10.1249/01.mss.0000677684.73233.a5

A 21-year-old college wrestler presented with progressive, persistent pain in his right hip after undergoing arthroscopy at an outside institution. Despite multiple attempts at nonoperative management, including activity modification, rest, physical therapy, and use of nonsteroidal anti-inflammatory drugs, pain and stiffness limited his sport-specific function.

Timpka, T. (2020). Sports Health During the SARS-Cov-2 Pandemic. *Sports Med*, 50(8), 1413-1416. doi:10.1007/s40279-020-01288-7

Titarenko, V., & Tropin, Y. (2020). Dynamics of indicators of competitive activity of highly qualified wrestlers; Динамика показателей соревновательной деятельности борцов высокой квалификации. *Slobozans`kij naukovo-sportivnij visnik*, No. 1(75), pp. 53-57, doi:, 1(75), 53-57. doi:10.15391/sns.v.2020-1.009

Purpose: to trace the dynamics of competitive performance indicators of highly qualified wrestlers. Material & Methods: the following methods were used in the study: analysis of scientific and methodological information, generalization of best practices, analysis of protocols and videos of the final fights of highly qualified Greco-Roman style wrestlers at the world championships 2017, 2018, 2019; methods of mathematical statistics. In total, an analysis was made of 81 final duel of athletes (wrestling for first and third places). Results: analysis of the competitive activity of highly qualified wrestlers at the world championships 2017, 2018, 2019 allowed us to identify 11 basic technical actions that are most often used: handspring, handspring with a hand and head grip, tackles with a back belt, back belt, counter-measures in the standing and mat, transfers to the mat, tackles with a twist and a deflection, suplex, pushing over the carpet. It was determined that at the World Championships 2017, 2018, 2019, the most performed technical actions in the stalls are handspring, and in the standing “dumping and pushing an opponent out of the carpet. Conclusions: it was found that during the study period, the effectiveness of attacks in the standing and mat, the effectiveness of the standing and mat have dynamics to improve, which positively affects the entertainment of Greco-Roman wrestling. The average bout time is reduced from 354 seconds at the 2017 World Cup to 273 seconds at the 2019 World Cup. Such a distribution of time shows that the number of fights won ahead of schedule in wrestlers increased.

Toro Castañeda, W. S., & Agudelo Velásquez, M. S. M. S. C. A. (2020). Design and validation of the contents of an instrument for the tactical technical control of the Olympic wrestling. Diseño y validación de los contenidos de un instrumento para el control técnico táctico de la lucha olímpica. *Pensar en Movimiento: Revista de ciencias del ejercicio y la salud*, 18, 221-238. (Spanish)

The purpose of this paper was to design and validate the contents of a tool that monitors the technical and tactical component in Olympic wrestling athletes, using related research projects and validation of expert judgment. The methodology applied consisted of accepting or rejecting contents, taking into account cut-off values (0.75) determined by the number of evaluators (8 subject experts in the sport) and the rating scale recorded in the surveys (between 1 and 5) to assess the items (11 of the tool and 65 of contents), based on the validation of contents of an instrument, using Aiken's V statistic. As a result, four out of 12 items of the instrument and seven elements of the contents (four of which were directly related to those rejected in the instrument) were eliminated. In conclusion, the design of a tool to observe, control, and determine the technical and tactical behavior of Olympic wrestlers is of great importance for all experts, but some contents must be removed or modified either because they are hard to understand or, according to experts, are not practical. The usefulness of a tool such as the one "approved" is inferred to support the preparation process of athletes.

Tuxtanazarov, I., & Maxmutaliyev, A. (2020). SCIENTIFIC AND METHODOLOGICAL PROBLEMS OF WRESTLING DEVELOPMENT. *Theoretical & Applied Science*, 81, 781-785. doi:10.15863/TAS.2020.01.81.141

The paper deals with the main scientific and methodological problems of training Greco-Roman style wrestlers. The author proposes a system for managing the training process based on optimizing the parameters of technical actions and using special technical devices with feedback.

Valenzuela, P. L., McGuigan, M., Sánchez-Martínez, G., Torrontegi, E., Vázquez-Carrión, J., Montalvo, Z., . . . Loturco, I. (2020). Reference power values for the jump squat exercise in elite athletes: A multicenter study. *Journal of Sports Sciences*, 38(19), 2273-2278. doi:10.1080/02640414.2020.1783150

The present study aimed to provide reference values for lower-limb muscle power assessed during the incremental jump squat (JS) test in elite athletes (i.e., professional athletes competing at international level). We pooled data from all JS tests performed by elite athletes of different sports in two high-

performance centres between 2015 and 2019, and computed reference values (i.e., terciles) for mean power (MP), mean propulsive power (MPP), and peak power (PP). Reference values were obtained from 684 elite athletes (458 male and 226 female) of 16 different sports (boxing, judo, karate, fencing, taekwondo, wrestling, basketball, soccer, futsal, handball, rugby union, badminton, tennis, long distance running, triathlon, and sprinting). Significant differences ($p < 0.001$) were found between male and female athletes for MP (7.47 ± 1.93 and 6.15 ± 1.68 W·Kg⁻¹, respectively), MPP (10.50 ± 2.75 and 8.63 ± 2.43 W·Kg⁻¹), and PP (23.64 ± 6.12 and 19.35 ± 5.49 W·Kg⁻¹). However, the velocity at which these power measures was attained seemed to be independent of sex (~ 0.95 , 1.00 and 2.00 m·s⁻¹ for mean, mean propulsive, and peak velocity, respectively) and homogeneous across different sport disciplines (coefficient of variation $< 10\%$). These data can be used to classify athletes' power capabilities, and the optimum velocity ranges provided here could be useful for training purposes.

Valinurov, R., Denisenko, Y., Akhmetov, A., Gilmutdinov, I., & Seliverstova, N. (2020). The muscles` relaxation characteristics improvement of belt wrestlers using exercises on the basis of the instantaneous simulators. *BIO Web of Conferences*, 26, 00070. doi:10.1051/bioconf/20202600070

In modern times, qualified athletes reached high level of physical fitness. That`s why, the greater increase in the volume and intensity of the training process becomes difficult task. The first step is to develop the search for new forms of the training process organization. They create optimal conditions for the full-value realization of the adaptive possibilities and the restoration of energy resources. Therefore, it is very important to search for fundamentally new means and methods to improve the physical performance of athletes. One of them is often power simulators, in which the resistance force is formed by a set of brakes that have significant inertia. However, special research and experience in sports practice indicate that the use of traditional strength training equipment, although it contributes to the development of strength quality. At the same time negatively affects the development of speed and endurance. The problem of finding new tools that cannot slow down the development of speed and endurance during the development of strength qualities remains urgent. Among the few tools of this kind, special attention should be paid to exercises that help improve the relaxation characteristics of the muscles. A number of studies showed the beneficial effect of special exercises that improve the relaxation characteristics (relaxation rate) of skeletal muscles, and contribute to improving the effectiveness of special physical performance and improving sports results.

Vasconcelos, B. B., Protzen, G. V., Galliano, L. M., Kirk, C., & Del Vecchio, F. B. (2020). Effects of High-Intensity Interval Training in Combat Sports: A Systematic Review with Meta-Analysis. *Journal of strength and conditioning research*, 34(3), 888-900. doi:10.1519/JSC.0000000000003255

Combat sports (CS) are intermittent by nature and high-intensity interval training (HIIT) has been used as a tool to maintain and improve physical fitness among CS athletes. The aim of this study was to perform a systematic review and meta-analysis about chronic effects of HIIT in CS athletes. An electronic search was performed in PubMed, Science Direct, and Google Scholar using the following Boolean criteria: ("CS" OR "martial arts" OR "judo" OR "taekwondo" OR "jiu jitsu" OR "boxing" OR "karate" OR "wrestling" OR "wushu" OR "kung fu") AND ("HIIT" OR "intermittent exercise" OR "sprint interval training" OR "repeated sprint training [RST]"). To be included, the studies needed to be original, involve CS athletes, present HIIT intervention protocol (HIIT, sprint interval training [SIT] or RST), and analyze chronic physiological outcomes. From 2,211 identified studies, after screening and eligibility evaluation, 12 studies were included in this review with meta-analysis. Aerobic (aerobic capacity, heart rate, and maximum oxygen uptake), anaerobic (peak and mean power in single and successive Wingate tests, and blood lactate concentration), and anthropometric outcomes (body mass and body fat percentage) were evaluated. Data of 255 subjects from 12 studies were assessed. Regarding methodological quality, 7 studies obtained 9-10/12 on the TESTEX scale. For the interventions, 5 studies used HIIT, 4 studies used

RST protocols, one used SIT protocols, and one used an intermittent protocol that could not be classified. Relating to aerobic power, was found an increase in $\dot{V}[\text{Combining Dot Above}]\text{O}_2\text{max}$, with a mean difference (MD) of 2.83 ml·kg·min (CI 95% = 0.40-5.25; $p < 0.001$) for striking and 2.36 ml·kg·min (CI 95% = 1.05-3.66; $p < 0.001$) for grappling athletes. No differences on anaerobic peak power for striking (MD = 0.67 W; CI 95% = -0.43 to 1.77; $p = 0.23$) were found, and a statistical improvement for grappling athletes, (MD = 0.51 W; CI 95% = 0.03-0.98; $p = 0.04$) was found. Seven studies analyzed anthropometric variables, with differences for body mass in striking (MD = -0.93 kg; CI 95% = -1.68 to -0.19; $p = 0.01$) and no differences for grappling (MD = -0.09 kg; CI 95% = -2.80 to 2.62; $p = 0.95$). Differences in body fat percentage in striking (MD = 0.50%; CI 95% = 0.30-0.70; $p < 0.001$) and no differences in grappling (MD = -0.87%; CI 95% = -1.77 to 0.03; $p = 0.06$) were found. It was concluded that HIIT positively influences maximum oxygen uptake and anaerobic power in combat sport athletes, with a minor impact on body composition.

Vasilev, G. F., Tiunova, O. V., & Filchenkov, D. A. (2020). *Modern approaches to technical mastery formation among wrestlers of throw type by the example of Greco-Roman wrestling*. Paper presented at the Advances in Economics, Business and Management Research. <https://www.atlantispress.com/proceedings/fichehs-19/125932341>

The article is about modern tendencies in scientific-methodical support development in training athletes-combatants. Main attention is paid to technical-tactical planning and the training process development. There appears the necessity to use a system approach in training athletes-combatants, competitive statistics thorough analysis and new evaluation criteria for the training process creation. The article presents distorting factors systematization in competitive activity. Methodical peculiarities of training throw type wrestlers are considered. The whole range of methodical theses of this article can be used in other kinds of sports single combats. Modern approaches analysis to technical mastery formation among throw type wrestlers by the example of Greco-Roman wrestling is the reason to reconsider methodical complex analysis of modern training system aspects among athletes-combatants. The article has not only methodical, but also survey character. It has the references to the main scientific-methodical articles of the authors according to this topic.

Verwoert, G. C., de Vries, S. T., Bijsterveld, N., Willems, A. R., Vd Borgh, R., Jongman, J. K., . . . Jorstad, H. T. (2020). Return to sports after COVID-19: a position paper from the Dutch Sports Cardiology Section of the Netherlands Society of Cardiology. *Neth Heart J*, 28(7-8), 391-395. doi:10.1007/s12471-020-01469-z

The coronavirus disease 2019 (COVID-19) pandemic has led to preventive measures worldwide. With the decline of infection rates, less stringent restrictions for sports and exercise are being implemented. COVID-19 is associated with significant cardiovascular complications; however there are limited data on cardiovascular complications and long-term outcomes in both competitive (elite) athletes and highly active individuals. Based on different categories of disease severity (asymptomatic, regional/systemic symptoms, hospitalisation, myocardial damage, and/or myocarditis), in this point-of-view article we offer the (sports) cardiologist or sports physician in the Netherlands a practical guide to pre-participation screening, and diagnostic and management strategies in all athletes >16 years of age after COVID-19 infection.

Vorona, V., Lazorenko, S., Dovhopolova, H., Ratov, A., & Chkhailo, M. (2020). The Hematological Parameters of Ukrainian National Women's Wrestle Team before the Competition. *International Journal of Applied Exercise Physiology*, 9(6), 160-165.

Preparing athletes of high-level qualification for competitions requires a continuous biochemical monitoring. This research is conducted to examine the hematological parameters of female wrestlers while preparing for the Wrestling World Cup. The study involved 10 female athletes of the national team of Ukraine aged from 21 to 23 of different weight categories.

In most studies the authors state that hematological parameters may change while doing exercises. They may indicate overstrain and overtraining, but at the same time they were not useful markers for the early detection of overreaching. According to the results of our own research, the majority of female athletes had hematological parameters within the normal range. The four female wrestlers showed the signs of inadequate recovery. Timely detection of these features allowed us to make adjustments to the training process. The best results in the competition showed a female wrestler, whose biochemical examination data were within normal limits, and hemoglobin concentration was the highest among the surveyed. At the same time, two female athletes who won prizes had deviations from the norm of hematological parameters. In our opinion, in freestyle wrestling the result is determined by many factors. The classification of the wrestler, psychological and technical-tactical readiness, the level of the development of physical qualities and individual functionality are very important.

Walsh, J. A., Petrie, T. A., & Chatterton, J. (2020). The frequency of weigh-ins, weight intentionality and management, and eating among male collegiate athletes. *Eating behaviors*, 39, 101432. doi:10.1016/j.eatbeh.2020.101432

Sociocultural pressures in male athletics emphasize masculinity in the form of muscularity, leanness, and physical strength. Although research has examined extensively weight, weigh-ins, and weight pressures among female athletes, these issues have been minimally considered with male athletes. Thus, our purpose was to examine the weight environment and practices of NCAA (i.e., Divisions I, II, III) collegiate male athletes from 19 different sports (e.g., basketball, cross country, golf, tennis, wrestling). Specifically, we surveyed 698 male athletes regarding frequency and circumstances of team weigh-ins, weight management behaviors, weight intentions, caloric intake, and guidance received for healthfully managing weight and eating. Overall, relatively few male athletes reported undergoing mandatory team weigh-ins (21.8%). However, within this subgroup required to engage in them, most weigh-ins occurred at least once per week or more (59.2%), and most athletes' weights were made public (75.7%). Just over 30% of the weighed athletes used at least one strategy to prepare for weigh-ins, primarily relying on exercise or caloric restriction. The majority (85.2%) wanted to change their weight, primarily by gaining muscle mass. Most athletes received guidance from qualified sources (e.g., athletic trainer) regarding healthy weight management (63.5%) and nutrition (70.2%). Overall, few male athletes are subjected to mandatory weigh-ins, and such participation is not related to pathological weight control behaviors. Further, male athletes appear to have access to qualified sources for information on healthful management of weight and eating, which may help them as they pursue their goals of increased muscularity and strength.

Waluch, K. (2020). Book Review: The Story of Catch: The Story of Lancashire Catch-as-Catch-Can Wrestling. *Frontiers in Psychology*, 11, 2003. (Book Review) <https://www.frontiersin.org/article/10.3389/fpsyg.2020.02003>

Warrick, A., Faustin, M., & Waite, B. (2020). Comparison of Female Athlete Triad (Triad) and Relative Energy Deficiency in Sport (RED-S): a Review of Low Energy Availability, Multidisciplinary Awareness, Screening Tools and Education. *Current Physical Medicine & Rehabilitation Reports*, 8(4), 373.

Purpose of Review This paper aims to review low energy availability (low EA), compare the Female Athlete Triad (Triad) and Relative Energy Deficiency in Sport (RED-S) screening tools and eating disorder/disordered eating questionnaires, and discuss multidisciplinary awareness, education, and

treatment strategies. It provides an overview on the current state of the Triad and RED-S and assists clinicians with an overview of options for screening tools for their practice. Recent Findings Triad Consensus Panel Screening Questions, Preparticipation Physical Exam (PPE), and Periodic Health Exam (PHE) have overlapping questions from the Triad Consensus Panel Screening Questions. The Low Energy Availability in Females Questionnaire (LEAF-Q) is used in complement with eating disorder/disordered eating questionnaires (Table 2). Summary It is important to screen athletes for low EA during the PPE. If concerned for low EA, referral to healthcare professional and registered dietitian is warranted.

Yamashita, D., Nishimaki, M., Nagao, H., Ikeda, M., Numata, M., Inoue, K., & Nishiguchi, S. (2020). Body composition, muscle strength, power, and endurance of elite male Japanese freestyle wrestlers. *Journal of High Performance Sport*, 6, 33-43. doi:10.32155/jissjhs.6.0_33

Wrestlers are categorized into a series of weight classes to ensure fair competition. Since the implementation of new rules in January 2018, weight categories and the timings of weigh-ins have changed. The purpose of the study was to establish baseline physical profiles, such as body composition, muscle strength, power, and endurance for Japanese elite freestyle wrestlers in each of the new weight classes. We collected a total of 242 data points from 70 elite Japanese male freestyle wrestlers at 14 training camps over two years. Body composition measurements, one-repetition maximum tests (bench press, parallel back squat, one-handed dumbbell snatch, and weighted chinup) and muscle endurance tests (pull-up) were performed. Body fat percentages for wrestlers in the 86-kg class or below were from 9.1% to 11.6%, whereas body fat percentages for wrestlers in the 92-, 97-, and 125-kg classes were 14.0 ± 3.5 , 19.8 ± 6.9 , and $26.6 \pm 3.4\%$, respectively. This result suggests that the wrestlers in the heavier weight classes have a higher capacity to reduce body fat and increase muscle mass, which is essential if they improve strength and power. Absolute muscle strength and power performance tended to increase with heavier classes (the major results were as follows: 1RM bench press: 88.0 ± 13.0 kg in the 57-kg class and 142.0 ± 13.0 kg in the 125-kg class), whereas these relative values tended to decrease with heavier classes. Muscle endurance performance tended to decrease with heavier classes (the pull-up test: 23.8 ± 1.5 repetitions in the 61-kg class and 10.0 ± 5.4 repetitions in the 125-kg class). This study provides baseline data that can be used in the prescription of individual training programs for wrestlers, assessing areas of strength and weakness, and developing the wrestler's technical-tactical strategies.

Yerlikaya, H. S., Akyildiz, I., Ugurlu, B. N., Gulel, O., & Arslan, N. (2020). Use of Thermoplastic Splint for the Treatment of Auricular Hematoma. *The Journal of craniofacial surgery*. doi:10.1097/SCS.00000000000006631

Auricular hematoma is commonly seen in ear nose and throat clinical practice and mostly caused by blunt trauma as a result of traffic accident, wrestling, boxing etc. If hematoma does not discharge, blood supply of the cartilage fails and this results with the necrosis of the auricular cartilage. Incision and drainage of the hematoma is the cornerstone of the surgical treatment and simple compression methods are limited in terms of their ability to eliminate the empty space. Various techniques have been described for the elimination of the death space such as; dental rolls, cotton bolsters, buttons, silastic sheets, etc but compression materials may be insufficient to apply this pressure because of irregular shape of auricle. Resolving these problems, the authors have used thermoplastic splint as a compressive material at 7 patients for elimination of the death space in auricular hematoma treatment.

Zachos, T. A., & Deimel, J. F. (2020). Hip Injury - Wrestling. *Medicine and science in sports and exercise*, 52(5 Supp), S282-283.

Case Study: A 21-year-old college wrestler presented with progressive, persistent pain in his right hip after undergoing arthroscopy at an outside institution. Despite multiple attempts at nonoperative

management, including activity modification, rest, physical therapy, and use of nonsteroidal anti-inflammatory drugs, pain and stiffness limited his sport-specific function.

Zadorozhna, O., Briskin, Y., Pityn, M., Perederiy, A., & Neroda, N. (2020). Tactical training of elite athletes in Olympic combat sports: practice and experience. *Trends in Sport Sciences*, 27(2), 71-85.

The work studied specifics of tactical training in Olympic combat sports. According to the current researches, technical and tactical training is the basis of athletes' training, but in most papers and official documents, tactical training is not substantiated. Aim of Study. This study aimed to analyze the practical experience of tactical training performed by elite athletes in Olympic combat sports. Material and Methods. We have recruited 40 coaches. Their average experience was almost 15 years. Experts had to rank the components of tactical training such as directions, means, and methods of tactical training, control of tactical preparedness, components of tactical knowledge. Results. In some questions, expert's opinions were similar, but in other questions, they were different inside groups and between them. Average and strong concordance ($p < 0.05$) was found in such groups of experts: fencing - about directions of tactical training (0.56); verbal, visual and practical methods (0.53; 0.63; 0.62 respectively); means and methods of control (0.53); wrestling - about directions and practical methods (0.74 and 0.59 respectively); boxing - only about practical methods (0.56); taekwondo - about directions (0.58); verbal, visual and practical methods (0.55; 0.64; 0.73 respectively); means and methods of control (0.64); karate - about verbal, visual and practical methods (0.62; 0.64; 0.70 respectively); means and methods of control (0.72); information blocks "Basics of Tactics in Sports" (0.55) and "Competition performance" (0.61). In judo, concordance was weak in all questions (0.41-0.45). Conclusions. The general algorithm of tactical training of elite athletes consists of six steps and is aimed to prepare for the main competition of the year (the Olympic Games or World Championship). The tasks are to choose an effective strategy; to develop the most effective tactical actions against the main rivals; to train to make correct decisions during the bout; to learn how to predict the opponent's actions

Ziemba, A., Adamczyk, J. G., Barczak, A., Boguszewski, D., Kozacz, A., Dąbrowski, J., . . . Żekanowski, C. (2020). Changes in the Hormonal Profile of Athletes following a Combat Sports Performance. *BioMed Research International*, 1-7. doi:10.1155/2020/9684792

Background and Study Aim. Stimulation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis are a crucial mechanism of adaptation to physical exercise, in particular in combat sports. This study assesses changes of the relevant hormonal profiles upon performance in selected combat sports. Material and Methods. Participants (130 men practicing combat sports at a high level) were divided by discipline: karate (K), taekwondo (T), and judo, wrestling, and sumo combined (JWS). Blood concentration of adrenaline, noradrenaline, cortisol, testosterone, and brain-derived neurotrophic factor (BDNF) was determined before and after fighting. Results. Following fighting, the adrenaline concentration was significantly higher in all athletes, most markedly in K ($p < 0.001$). Baseline cortisol and BDNF levels did not differ among the groups and rose significantly in all the groups after the performance. Baseline testosterone concentration was slightly higher in K than in JSW and rose in all the groups to reach similar levels; the increase in T was significantly higher than in K. Conclusions. Despite substantial differences in the characteristics of the combat sports investigated, including the type of physical effort and the required balance between restraint and aggression, the performance in each of them gives rise to similar hormonal changes with a possible exception of karate showing higher stress hormone levels.