

INWR



International Journal of Wrestling Science

Sept 2013
Volume 3
Issue 2



*Journal International de
Science de la Lutte*

*Международный Журнал Научных
Исследований В Спортивной Борьбе*

*THE INTERNATIONAL NETWORK OF WRESTLING RESEARCHERS
STUDIES THE WORLD'S MOST NOBLE SPORT - FROM ANTIQUITY,
NOW AND INTO THE FUTURE!*

International Journal of Wrestling Science

ISSN 2161-5667 (Print)

ISSN 2161-3524 (Online)

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Editor's Comments

Wrestling is Back!

The entire wrestling world rallied to show the strength, values and impact of our sport. We offer our gratitude to all those who were involved in this struggle since February. In particular, our presentation team of **Lise Legrand, Carol Huynh, Daniel Igali, and Jim Scherr.**



You all made us so proud to be part of the sport of wrestling and represented us in an unbelievably professional manner! Your thoughts, passion and joy for wrestling came through for the entire world to see. **President Nenad Lalovic** demonstrated intellect, strength and humility. His comments from Buenos Aires direct us to the future, "With this vote, you have shown that the steps we have taken to improve our sport have made a difference. I assure each of you that our modernization will not stop now. Now we must remain united to make certain we live up to the expectations that have been placed on all of us by virtue of this vote." All of us in the scientific community are ready to work!

Our work begins in Budapest as the FILA Scientific Commission convenes its first Scientific Symposium, at the **László Papp Sportarena**, September 17-19. In a short period of time we have been able to assemble a group of outstanding scholars to share their work. We want to thank all participants in advance, with particular appreciation to the Hungarian Wrestling Federation organizing team that has helped to support our gathering. This issue serves as the guide to the proceedings and contains all ten keynote lectures, as well as the abstracts and poster presentations submitted from around the world. I hope that you find them informative and useful in **"HELPING TO CREATE A SYSTEM OF WRESTLING PROMOTION FOR THE MASSES!"**

Sincerely yours in the advancement of Wrestling,

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Volume 3 Issue 2 September 2013

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

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TRAINING ADJUSTMENTS FOR THE NEW MATCH STRUCTURE

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INTRODUCTION

Having become a business factor, sports have become a show for mass needs. Public communication /media has annexed sports, in such a degree, that great part of sports rules had to be transformed according to the needs of media. The power of the media is out of doubt. But the wrestling has to pay a heavy price for these frequent changes in the rules lacking any scientific demanding. The number of falls, and technical points for a time unit has decreased, which unambiguously means the devaluation of the contextual value of wrestling, although the length of the bouts shows the same tendency. It is time to reverse the negative trend.

Key-words: wrestling, media, olympic profit, falls, rules.

METHODS

The followings were applied during 2025 bouts (Olympics, World Championships: WCh'85, Atlanta '96, Athen '04, WCh. '05, WCh '07, Beijing '08)

Direct recorded information from the minutes of the bouts

- number of bouts
 - duration of bouts
 - number of falls
 - number of technical points
- Indirect observation methods
- simple attack
 - complex attack
 - attempted attack and completed attacks are registered on a special survey sheet

RESULTS

1. As a result of the changing rules of the past years, wrestlers have minimised their actions initiated from standing, have decreased the number of their complex, but spectacular actions, have set themselves for holds worth one or two points. The number of falls and technical falls dramatically decreased in the past years, so - although suitable to TV broadcasting - wrestling has gradually lost its spectacle and spirit.

2. The number of technical points for a time unit decreased, which unambiguously means the devaluation of the contextual value of wrestling, although the length of the bouts shows a tendency to before changes 1985.

DISCUSSION OF DEVELOPMENT PROPOSAL

- THE WRESTLING RULES SHOULD BECOME UNDERSTANDABLE
 - COMPETITION SYSTEM
- (Area where the popularity of wrestling could be increase is team championships)

WEIGHT MANAGEMENT

Sadly, this chapter is relevant as Jung Se Hooni, a Korean judoist, champion at the Universiade in the 65 kg weight category, died as a result of excessive and drastically fast weight loss. In December of 1997, the United States Food and Drug Administration initiated proceedings as a result of the deaths of three young American wrestlers. The agency investigated whether the substances taken by the athletes before competitions led to their tragic deaths. In order to lose weight, the three talented wrestlers, Billy Jack Saylor (19), Jeff Reese (21), and Joseph LaRas (22), were taking an unnamed substance that was not listed on the prohibited list. The desire of wrestlers to compete in lower weight categories in good physical condition, as if that were their "regular weight," is as old as weight categories themselves. However, these desires are only rational if they do not inhibit performance, and is recommended only for adult and adolescent groups. Current rules in effect (weighing in on the preceding day of the competition) encourage weight loss!! This example might seem extreme, but even today's top adolescent competitors drop 10-12% of their weight before large competitions in their age group.

REVIEW OF TRAINING METHODS

SPEED STRENGTH

In wrestling, explosive strength is expressed by the speed of the technical tactical actions used against the opponent. Fairly large outside forces and resistance have to be overcome, since the opponent, whose body weight is similar to the attacker's, has to be thrown, twisted, or forced to the mat from a standing position. When executing a hold technique, there is a need for a large amount of initial acceleration to be able to unbalance the opponent and to refrain from providing the opponent with the time necessary to neutralize the forces that are striving to unbalance him, which basically means the opponent attempts to regain his balance. This also makes it very difficult to perform counterattacks. Since wrestling involves combating great resistance, a wrestler's focus should be on maximum strength and explosive strength.

percent of maximum power	Slower wrestler			Faster wrestler		
	repetition	series	rest (min)	repetition	series	rest (min)
20%	16	2	3-4			
30%	11	3	3-4			
40%	10	3	3-4			
50%	9	4	3-4			
60%				6	1	3-4
70%				6	1	3-4
80%				5	2	3-4
90%				3	2	3-4

The ATP-PC System

If you train any of your wrestlers at high intensity you must understand how this energy system works. Here's a simple explanation of energy metabolism shown in figure 1. As the name suggests the ATP-PC system consists of adenosine triphosphate (ATP) and phosphocreatine (PC). This energy system provides immediate energy through the breakdown of these stored high energy phosphates. If this energy system is 'fully stocked' it will provide energy for maximal intensity, short duration exercise for between 10-15 seconds before it fatigues.

All three energy systems contribute at the start of exercise but the contribution depends upon the individual, the effort applied or on the rate at which energy is used. The following graph, adapted from Davis et al. (2000)^[3], shows how the energy systems contribute to the manufacture of ATP over time when exercising at 100% effort. The thresholds (T) indicate the point at which the energy system is exhausted - training will improve the thresholds times.

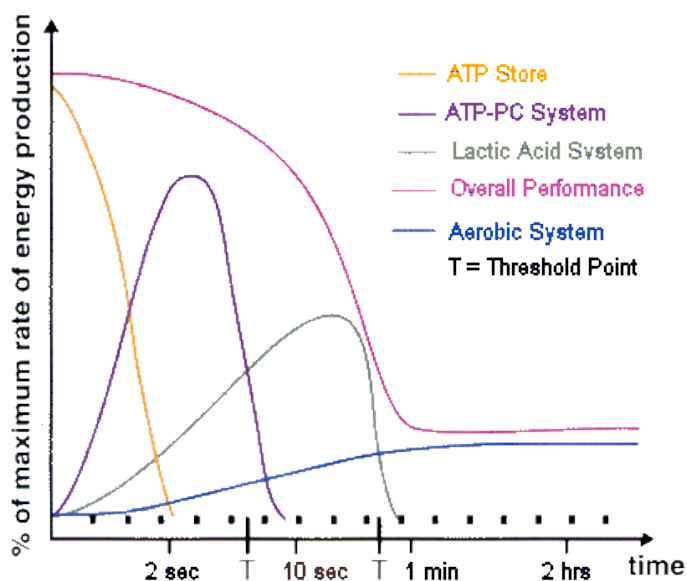


Figure 1 The various pathways for energy production

Sprint-type work, creatine phosphate mobilization increases

working time /sec/	set	repetition	exercise / rest time
0: 10	5	10	1:3
0: 15	5	9	1:3
0: 20	4	10	1:3
0: 25	4	8	1:3

Speed endurance is developing an anaerobic type

working time /sec/	set	repetition	exercise / rest time
0: - 30	5	10	1:3
0: 40 - 0:50	5	9	1:3
1: - 1:10	4	10	1:2
1:0 - 2:0	4	8	1:2

Highly anaerobic nature

working time /sec/	set	repetition	exercise / rest time
1:30: - 2:0	2	4	1:2
2:10 - 2:40	1	6	1:2
2:50 - 3:00	1	4	1:1

Aerobic nature of the circulatory system's capacity to develop ATP O2

working time /sec/	set	repetition	exercise / rest time
3:00 - 4:00	1	4	1:1
4:00 - 5:00	1	3	1:1/2

STRENGTH-ENDURANCE

Strength-Endurance is defined as the magnitude of the resistance posed by the body against the fatigue induced by long lasting strains with large strength components. Even quick attacks that last for approximately 20 seconds strain one's endurance. This can primarily be felt in standing combat and leg attacks, in almost all attacks in groundwrestling, and in bridge positions. However, Strength-Endurance can be shown by the fact that, during bouts, 10-12 attacks are initiated with the greatest strength possible for 6 minutes, and a wrestler has to deflect the same number of attacks during that same amount of time. International rules for both styles of wrestling show that the dynamics of the bout have increased, and the duration of decreased intensity between defensive and offensive actions that involve great strength are decreasing, allowing less time for rest.

METHODS FOR DEVELOPING WRESTLING-SPECIFIC ENDURANCE

The importance of endurance, as a performance-defining component, has also increased along with the fast-paced development of international wrestling performance. Endurance is a decisive factor in directing a wrestler's offensive attack in the bout. The significance of well-developed endurance, as a performance-defining component, is constantly increasing. The stringent requirements concerning endurance demonstrate the developments in the speed of bouts that started in 1970. This improvement in endurance has shown an especially large increase since 1992; in fact, the speed of combat might even surpass the limits of wrestling thought possible.

Muscle energy supply and training exercise:

Aerobic method: These training exercises aimed mainly at increasing the aerobic sources of energy development. The basis is provided by exercises performed at the level of anaerobic threshold (these can be cyclic exercises or the extended periods of wrestling in which the parts that lead to the sudden increase of anaerobic processes are omitted, e.g., static effort, holding breath, etc.).

Anaerobic method: These training exercises aid the performance of those systems that guarantee aerobic work capacity. The following are some parameters characterizing these exercises: Sixty to ninety second long exercises with periodic repetitions. Their intensity is about 80%, and resting time is around thirty seconds. During the exercises, the pulse is around 170- 180/minute and does not drop below 130/minute during the rest period. The number of maximum repetitions is ten.

Mixed method: Training exercises in which energy is provided through both aerobic and anaerobic methods. Hold exercises and training bouts in which the time of both the bouts and the rest periods are varied are most often used for these purposes.

GE (glycolytic) method: Training methods that mainly affect the capacity of the anaerobic glycolytic sources of energy. It has the following parameters:

- The exercises are completed in sequences, and each sequence is repeated three times. The duration of the repeated exercises is 90-120 seconds, and the rest time between the exercises is two minutes, with a rest time between the sequences of about 10-12 minutes.
- The intensity of the exercises performed with a dummy or partner and the intensity of properly organized matches is as great as possible.

GN (glycolytic) method: Training exercises which contribute to an increase in performance of those systems which affect anaerobic glycolytic performance.

These exercises have the following parameters:

- The exercises are performed in sequences (there are three sequences in all)
- The sequence contains three repetitions, each of which lasts about 40-50 seconds. The rest time between the repetitions is less than two minutes. The rest time between two sequences is 8-12 minutes.
- The exercises are carried out at maximum intensity. To prepare, taking part in properly organized bouts and performing sequences of throws with either a dummy or a partner are recommended.

Anaerobic alactacid method: This method includes exercises which aim at influencing the anaerobic alactate component of special endurance. These exercises can be generally characterized by the following:

- The exercises are performed in sequences, and there are a maximum of three. The sequences each contain 5-6 repetitions. The duration of each repetition is 10-15 seconds at most, and the rest time between the repetitions varies from thirty seconds to two minutes. Rest time between sequences is 6-10 minutes.
- Similar exercises can consist of special combat positions, exercises with dummies, and special bouts.

Emotional Intelligence

- Identify and track feeling
- Can you handle anger
- Motivation (ability to mobilize the emotions of a target)
- Empathy
- How to respond to environmental signals, how fast will it etc.
- The confidence of the coach, self-confidence

MENTAL ENDURANCE

The outstanding performance is not motivated by external factors, but also the inner flame of passion, the joy of accomplishment.

Decisions must be made!

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PSYCHOPHYSIOLOGICAL DIAGNOSTICS OF THE FUNCTIONAL STATES IN WRESTLERS

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ABSTRACT

The modern methods of diagnostics of elite wrestlers are ignored of the integral criteria of functional states.

The psychophysiological diagnostics may investigate: the individual typological characteristics of higher nervous activity, the process of formation and improvement of specific skills, fatigue and overstrain in athletes. 24 elite athletes (Greco-Roman Wrestlers) were examined. The age of the athletes was 20-25. The neurodynamics functions of nervous system and parameters of autonomic regulation of the heart rhythm in wrestlers were examined. The results show that the growth rate of sensory-motor response of wrestlers is accompanied by psychomotor tension, which leads to the stability of visual reaction. The rate of sensory-motor response has communication with the tension of regulation of heart rate, which is consistent with a decrease in the duration and frequency of the oscillations RR-intervals of athletes with high speed of sensory-motor response.

Conclusion. The psychophysiological diagnostics in elite wrestlers are characterized by the three components of the functional states: sensory-motor response, neurodynamics characteristics and heart rate regulation.

Keywords: psychophysiological diagnostics, elite wrestlers, functional states.

INTRODUCTION

The study of adaptation process of elite athletes in condition of increasing intensive of physical and psycho-emotional loads are directed to modern stage of sports science.

The functional states of athletes reflect the integral complex of functional system elements which are responsible for the effectiveness of activity. The psychic reactions of athletes in physical activity conditions cause the psychophysiological changes (9). Due to this circumstance the psychophysiological diagnostic of functional states of athletes is one of the important ways of modern sports psychology. Many works deal with the psychological diagnostics (5, 10), influence of physical performance on cognitive functions (6), emotional states (13), arousal (4), anxiety (8) and emotions (17) in athletes. However, the modern ways of diagnostics of functional states of athletes are ignoring the complex criteria of psychophysiological components.

The one of the main properties of psychophysiological functions of athletes is the perception of sensory information. The several factors which characterize the efficiency of sporting activity: afferent component of information processing (reception and perception of information), central component (information processing) and efferent component of information processing which are influenced to the psychophysiological response of athletes (12,15).

With the increasing of qualification of athletes the speed of visual response is increased in order of the magnitude (6,13). At the same time, in the competition the manifestation of neural and psychomotor abilities of athletes depends on the functional state of the organisms (1,2). The system of vegetative regulation of heart rate is one of the key components of functional states of human in tension muscular activity. The results of investigation of relation between psychophysiological reaction and vegetative regulation of heart rate during extremely activity are presented in the literature (3,7,16).

The psychophysiological diagnostics gets to additional information for functional states of athletes. The first, psychophysiological functions are biological fundament of on individual and typological functions of higher neural system and may be used in different diagnostics of human functional states. The second, psychophysiological functions are characterised by the processes of forming and improvement of special experience which integrates the state of functional system, by technical performance of athletes. The third, functional states of psychophysiological functions are a sensitivity indicator of fatigue and hypertension of athletes. The aim was to elaborate of psychophysiological diagnostics complex of the functional states of elite wrestlers

METHODS

Participants 24 elite athletes (Greco-Roman Wrestlers) were examined. The age of the athletes was 20-25. All of the athletes were the members of Ukraine National Team of Greco-Roman Wrestling.

Instruments-Tests and Research design

The peculiarities of sensory-motor response were studied on individual-typological characteristics of nervous system by computer complex «Multipsychometer-05». The optimal regime and regime of imposed rhythm were used. The methods: balance of nervous process by response to a moving object and tapping-test were used. The parameters: frequency of touches, liability, stability, accuracy and excitation were studied.

The analysis of non-stationary transient system of regulation of heart rate analysis the scattergrams as a non-parametric method of analysis was used (11,14). Determine the parameters SD1 (display aperiodic fluctuations of heart rate) and SD2 (slow oscillations of the heart rhythm).

Procedures All of the athletes was divided in two groups depending on level of sensory-motor response :

- first group athletes with higher level of sensory-motor response, with the value of the latent period of a simple visual-motor response from 120 ms to 240 ms, this group was joined by 10 people;
- the second group - the athletes with an average level of sensory-motor response speed, with value of latent period of a simple visual-motor response of 240 ms and over . This group was of 14 people.

Analysis of the success of competitive activities of athletes revealed that the first group of athletes with high-speed sensory-motor response at the time of the study and had the best indicators of the effectiveness of technical actions (by video analysis) (14). The estimation of autonomic regulation of the heart rhythm was performed using cardiomonitor «Polar-S800» with the registration of the spectral characteristics of heart rate.

Statistical analysis Statistical significance was assumed for $p < 0.05$. Statistical analyses were performed with STATISTICA 6.0 software (StatSoft Inc., USA).

RESULTS and DISCUSSION

The median of latent period of simple visual reaction of wrestlers with different level of sensory-motor response are presented in table 1. As a seen the tab.1 the meanings of visual reaction of wrestlers with higher level of speed of sensory-motor response more quality significantly for comparing to wrestlers with low level.

Table 1. Latent period of simple visual-motor reaction in wrestlers with different level of sensory-motor response (n=24)

Speed of response	latent period of simple visual reaction, ms			Stability of reaction, %		
	Median	lower quartile	upper quartile	Median	lower quartile	upper quartile
Higher	259,85	246,01	272,50	14,03	10,30	16,50
Low	300,45*	280,43	325,05	17,05*	13,30	24,30

*- $p < 0,01$, for concerning of wrestlers with higher average speed of response

Low meanings of stability of reaction of athletes with higher level of speed of sensory-motor response are related with increasing tension of psychomotor regulation in comparison with athletes with low level of sensory-motor response. Thus, high speed of sensory-motor response in wrestlers related with tension of psychomotor regulation and reaction's stability. The data of tapping-test of wrestlers with different level of sensory-motor response are presented in table 2. The results of the study by the method of tapping-test showed that athletes with a high level of sensory-motor response speed has more qualitative characteristics compared with athletes with low-level sensory-motor response.

Table 2. Parameters of tapping-test in wrestlers with different level of sensory-motor response (n=24)

Parameters	Higher speed of response			Low speed of response		
	Median	lower quartile	upper quartile	Median	lower quartile	upper quartile
The frequency of touches, arbitrary unit	6,76	6,30	7,18	6,05*	5,55	6,65
Liability, arbitrary unit	51,40	49,20	58,15	37,45*	36,75	53,10
Duty cycle, arbitrary unit	2,80	2,55	3,08	4,20*	3,09	4,50
Stability, %	9,85	9,17	16,55	11,75*	10,80	17,05

*- $p < 0,01$, for concerning of wrestlers with higher average speed of response

The same difference is observed in the increase of frequency of touches in athletes with a high level of response rate. This fact indicates the improvement of the functional state of the neuromuscular system and the speed of nerve impulse (table 2).

The wrestlers with low level of sensory-motor response are showing the reduction meanings of liability and duty cycle during tapping-test. The presence of higher absolute values of the coefficient of variation of wrestlers with low speed sensory-motor responses indicates deterioration in the stability of frequency of touches during the tapping-test. Thus, the decline in the rate of sensory-motor response of wrestlers relates with the deterioration of the functional state of the neuromuscular system. The data of balance of nervous process of wrestlers with different level of sensory-motor response are presented in table 3.

Table 3. Balance of nervous process in wrestlers with different level of sensory-motor response (n=24)

Parameters	Higher speed of response			Low speed of response		
	Median	lower quartile	upper quartile	Median	lower quartile	upper quartile
Accuracy, arbitrary unit	3,40	2,70	3,60	3,05	2,65	3,90
Stability, %	2,70	2,60	4,02	4,60*	3,00	6,45
Excitation, arbitrary unit	-1,20	-3,18	-0,39	-0,93	-1,60	-0,61
Trend on the excitation, arbitrary unit	-243,70	-442,30	-11,80	-303,10	-427,55	-188,40

*- $p < 0,01$, for concerning of wrestlers with higher average speed of response

The wrestlers with a high level of sensory-motor response has tendency to excitation of nervous system, compared with a group of athletes with a low level of sensory-motor response.

The study of heart rate variability has made it possible to differentiate the athletes with different levels of sensory-motor response speed, in terms of autonomic regulation.

The results of the studies of heart rate variability in wrestlers with different levels of sensory-motor response speed are presented in tab.4.

The data of tab.4 reflects of the statistical difference between both groups of wrestlers by the mean duration of RR-intervals and SD2 parameters.

Thus, the rate of sensory-motor response of athletes has mediated relationship with the duration and frequency of the oscillations of heart rhythm.

As a seen tab.4 in wrestlers who has low level of sensory-motor response the presents the increase of aperiodic frequency of RR-intervals (for SD2 parameters).

Table 4 Statistical parameters of heart rate variability in wrestlers with different levels of sensory-motor response

Parameters	Higher speed of response			Low speed of response		
	Median	lower quartile	upper quartile	Median	lower quartile	upper quartile
Mean RR, ms	967,45	917,20	1083,05	1159,50*	1008,70	1221,40
STD, ms	96,45	61,95	138,35	110,10	99,40	123,40
SD1, ms	72,45	38,35	100,20	64,40	55,00	66,30
SD2, ms	130,85	82,500	180,65	167,40*	141,10	168,90

*- $p < 0,01$, for concerning of wrestlers with higher average speed of response

This fact illustrates a growth of level of tension of heart rate regulation in athletes with a high level of sensory-motor response.

Table 5 Spectral characteristics of heart rhythm in wrestlers with different levels of sensory-motor response

Parameters	Higher speed of response			Low speed of response		
	Median	lower quartile	upper quartile	Median	lower quartile	upper quartile
VLF, ms^2	5275,00	1267,50	10095,00	7088,00	4802,00	10398,00
LF, ms^2	2444,50	1674,00	3704,50	2428,00	2395,00	2767,00
HF, ms^2	1092,50	600,00	3512,50	2373,00*	1959,00	2586,00
LF/HF	1,91	1,308	2,65	1,41*	1,01	1,51

*- $p < 0,01$, for concerning of wrestlers with higher average speed of response

The data of spectral characteristics of heart rhythm in wrestlers with different level of sensory-motor response are presented in table 5. The results of table 5 illustrates the more high level of HF parameters in wrestlers with low levels of sensory-motor response. This fact indicates the activation of parasympathetic tone of the autonomic regulation of heart rate in this group of wrestlers. The increase of autonomic balance (LF/HF) of wrestlers with high level of sensory-motor reaction indicates a growing intensity of autonomic regulation of heart rate at the expense of activation of parasympathetic tone (table 5). Thus, the rate of sensory-motor response has mediate relation with the regulation of the heart rate tension at the expense of parasympathetic tone, which is consistent with a decrease in the duration and frequency of the oscillations cardio in wrestlers with high speed sensory-motor response. This result is consistent with the our previously dates which showed a reduction in the accuracy and speed of movements according to the test performance with activation of sympathetic nervous system (11).

CONCLUSIONS AND ADVICE FOR ATHLETES AND COACHES

1. The psychophysiological diagnostics in elite wrestlers are characterized by the three components of the functional states: sensory-motor response, neurodynamics characteristics and heart rate regulation.
2. The results are showed the increasing of duration aperiodic oscillation of RR-intervals in athletes with higher level of sensory-motor response. This fact may use as prognosis the functional states of wrestlers. The reduction of aperiodic fluctuation of RR-intervals is indicated on the violation of heart rate regulation.
3. The increasing level of sensory-motor response has communication with the tension of regulation of heart rate at the expense of parasympathetic tone. This peculiarities are indicate on possibilities of increasing of functional reserves of the wrestlers. One of the ways of this increasing is orientation training process of wrestlers on the short-term intense exercise with a complex coordination.
4. The presence of a activation of parasympathetic tone of regulation of heart rate with intensive of neurodynamics regulation in wrestlers reflects the ability of an athlete to adapt to the intense muscular activity.

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ПСИХОФИЗИОЛОГИЧЕСКАЯ ДИАГНОСТИКА ФУНКЦИОНАЛЬНЫХ СОСТОЯНИЙ У БОРЦОВ

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РЕЗЮМЕ

Современные методы диагностики недооценивают использование интегральных критериев функционального состояния элитных спортсменов.

Психофизиологическая диагностика может исследовать: индивидуально-типологические характеристики высшей нервной, процесс формирования и развития специальных навыков, утомление и перенапряжение у спортсменов.

Было обследовано 24 элитных спортсмена (борцы греко-римского стиля). Возраст спортсменов 20-25 лет. Исследовались нейродинамические функции нервной системы и параметры регуляции ритма сердца у борцов.

Результаты свидетельствуют о том, что темпы роста сенсомоторной реакции у борцов сопровождается психомоторным напряжением, что приводит к стабильности зрительной реакции

Скорость сенсомоторной реакции связана с напряжением регуляции сердечного ритма, что согласуется с уменьшением продолжительности и частоты колебаний RR-интервалов у спортсменов с высокой скоростью сенсомоторного реагирования.

Заключение. Психофизиологическая диагностика элитных борцов характеризуется тремя компонентами функциональных состояний: сенсомоторным реагированием, нейродинамическими характеристиками и регуляцией ритма сердца.

Ключевые слова: психофизиологическая диагностика, элитные борцы, функциональные состояния.

Введение

На современном этапе развития спортивной науки, исследования направлены на изучение процесса адаптации спортсменов в условиях возрастания интенсивных физических и психо-эмоциональных нагрузок.

Функциональные состояния спортсменов отражают единый комплекс элементов функциональной системы, отвечающих за эффективность деятельности. В условиях физической активности психические реакции спортсменов обусловлены психофизиологическими изменениями (9). Исходя из этого обстоятельства, психофизиологическая диагностика функционального состояния спортсменов является одним из важных направлений современной психологии спорта. Многие работы в области психологической диагностики (5, 10), влиянию физической нагрузки на когнитивные функции (6), эмоциональных состояний (13), возбуждение (4), тревога (8) и эмоции (17) у спортсменов.

Однако, современные подходы к диагностике функциональных состояний у спортсменов недооценивают комплексные критерии психофизиологических компонентов.

Одним из важных свойств психофизиологических функций спортсменов является восприятие сенсорной информации. Выделяют несколько факторов которые характеризуют эффективность спортивной деятельности: афферентная компонента переработки информации (регистрация и восприятие информации), центральная компонента (переработка информации) та афферентная компонента переработки информации, которые влияют на психофизиологическую реактивность спортсмена (12,15).

С ростом квалификации спортсменов скорость зрительного ответа увеличивается на порядок [6,13]. В то же время, при соревнованиях проявление нервных и психомоторных способностей спортсменов зависит от функционального состояния организма (1,2).

Система вегетативной регуляции сердечного ритма является одной из ключевых компонент функциональных состояний организма человека при напряженной мышечной деятельности. Результаты

исследования связи между психофизиологическими реакциями и вегетативной регуляцией сердечного ритма в условиях экстремальной деятельности представлены в литературных источниках (3,7,16). Психофизиологическая диагностика дает дополнительную информацию о функциональных состояниях спортсменов. Во-первых, психофизиологические функции являются биологическим фундаментом индивидуально-типологических функций высшей нервной системы и могут быть использованы при дифференциальной диагностике функциональных состояний человека. Во-вторых, психофизиологические функции характеризуют процессы формирования и усовершенствования специального опыта, который отражает состояния функциональной системы, ответственной за техническую подготовленность спортсменов. В-третьих, функциональные состояния психофизиологических функций являются чувствительным индикатором усталости и перенапряжения спортсменов. Цель состояла в том, чтобы разработать комплексную психофизиологическую диагностику функционального состояния элитных борцов

МЕТОДЫ

Организация исследований Было обследовано 24 спортсмена (борцов греко-римского стиля). Возраст спортсменов составлял 20-25 года. Все спортсмены являются членами Национальной сборной Украины по греко-римской борьбе.

Материалы и методы

Особенности сенсомоторной реакции изучали по индивидуально-типологическим характеристикам нервной системы с помощью компьютерного комплекса «Мультисихометр-05». Были задействованы оптимальный режим и режим навязанного ритма. Были использованы методы исследования: баланс нервных процессов в ответ на движущийся объект и теппинг-тест. Изучались параметры: частота касаний лабильность, стабильность, точность и возбуждение.

Был использован анализ нестационарных переходных системы регуляции сердечного ритма по характеру скатерограммы, как непараметрического метода исследования (11,14). Определяли параметры SD1 (отражение аperiодических колебаний сердечного ритма) и SD2 (отражение медленных колебаний ритма сердца).

Процедура исследования

Все спортсмены были разделены на две группы в зависимости от уровня сенсомоторного реагирования:

– первая группа спортсменов с высоким уровнем сенсомоторного реагирования, с величиной латентного периода простой зрительно-моторной реакции от 120 мс до 240 мс, этой группе соответствовали 10 человек;

– вторая группа - спортсмены со средним уровнем сенсомоторной скорости реакции, со значениями латентного периода простой зрительно-моторной реакции 240 мс и более. Эта группа состояла из 14 человек.

Анализ успешности соревновательной деятельности спортсменов показал, что первая группа спортсменов с высокой скоростью сенсомоторного реагирования, на момент исследования, имели лучшие показатели эффективности технических действий (по видеоанализу) (14).

Оценка вегетативной регуляции ритма сердца проводилась с использованием кардиомонитора «Polar-S800» с регистрацией спектральных характеристик сердечного ритма.

Статистический анализ Статистическую значимость рассчитывали на уровне значимости $p < 0,05$. Статистический анализ проводился с помощью пакета программного обеспечения STATISTICA 6.0 (StatSoft Инк, США).

РЕЗУЛЬТАТЫ и ОБСУЖДЕНИЕ

Средние значения латентного периода простой зрительной реакции у борцов с разным уровнем сенсомоторного реагирования представлены в табл.1. Как видно из табл.1 значения зрительной реакции у борцов с высоким уровнем скорости сенсомоторного реагирования статистически выше, чем у борцов с низким уровнем.

Таблица 1 Латентный период простой зрительно-моторной у борцов с различным уровнем сенсомоторного реагирования (n=24)

Скорость реагирования	Латентный период простой зрительно-моторной реакции, мс			Стабильность реакции, %		
	Медиана	Нижний квартиль	Верхний квартиль	Медиана	Нижний квартиль	Верхний квартиль
Высокая	259,85	246,01	272,50	14,03	10,30	16,50
Низкая	300,45*	280,43	325,05	17,05*	13,30	24,30

*- $p < 0,01$, по сравнению с борцами высокого уровня сенсомоторного реагирования

Низкие значения стабильности реакции спортсменов с более высоким уровнем скорости сенсомоторного реагирования связаны с ростом напряженности психомоторного регулирования по сравнению со спортсменами низкого уровня сенсомоторной реакции.

Таким образом, высокая скорость сенсорного реагирования у борцов связана с напряженностью психомоторного регулирования и стабильности реакции.

Данные теппинг-теста у борцов с различным уровнем сенсомоторного реагирования представлены в табл. 2.

Результаты исследования по методике теппинг-теста показал, что спортсмены с высоким уровнем сенсорно-моторной скорости реакции имеют более качественные характеристики по сравнению со спортсменами с низким уровнем сенсорно-моторной реакции.

Таблица 2 Параметры теппинг-теста у борцов с различным уровнем сенсомоторного реагирования (n=24)

Параметры	Высокая скорость реагирования			Низкая скорость реагирования		
	Медиана	Нижний квартиль	Верхний квартиль	Медиана	Нижний квартиль	Верхний квартиль
Частота касаний, усл.ед.	6,76	6,30	7,18	6,05*	5,55	6,65
Лабильность, усл.ед.	51,40	49,20	58,15	37,45*	36,75	53,10
Скважность, усл.ед.	2,80	2,55	3,08	4,20*	3,09	4,50
Стабильность, %	9,85	9,17	16,55	11,75*	10,80	17,05

*- $p < 0,01$, по сравнению с борцами высокого уровня сенсомоторного реагирования

Такое же различие наблюдается в увеличении частоты касаний у спортсменов с высоким уровнем скорости реакции. Этот факт указывает на улучшение функционального состояния нервно-мышечной системы и скорости прохождения нервного импульса (табл.2).

Борцы с низким уровнем сенсомоторного реагирования, показывающие уменьшение значений лабильности и скважности во время выполнения теппинг-теста. Наличие более высоких абсолютных значений коэффициента вариации у борцов с низкой скоростью сенсомоторных реакций указывает на ухудшение стабильности частоты касаний во время выполнения теппинг-теста.

Таким образом, снижение скорости сенсомоторной реакции у борцов соотносится с ухудшением функционального состояния нервно-мышечной системы.

Данные баланса нервных процессов у борцов с различным уровнем сенсомоторного реагирования представлены в табл.3.

Таблица 3 Баланс нервных процессов у борцов с различным уровнем сенсомоторного реагирования (n=24)

Параметры	Высокая скорость реагирования			Низкая скорость реагирования		
	Медиана	Нижний квартиль	Верхний квартиль	Медиана	Нижний квартиль	Верхний квартиль
Точность, усл.ед.	3,40	2,70	3,60	3,05	2,65	3,90
Стабильность, %	2,70	2,60	4,02	4,60*	3,00	6,45
Возбуждение, усл.ед.	-1,20	-3,18	-0,39	-0,93	-1,60	-0,61
Тренд по возбуждению, усл.ед.	-243,70	-442,30	-11,80	-303,10	-427,55	-188,40

*- $p < 0,01$, по сравнению с борцами высокого уровня сенсомоторного реагирования

Борцы с высоким уровнем сенсомоторной реакции имеют тенденцию к возбуждению нервной системы, по сравнению с группой спортсменов, имеющих низкий уровень сенсомоторной реакции.

Исследование variability сердечного ритма позволило дифференцировать спортсменов с различным уровнем сенсомоторной реакции, с точки зрения вегетативной регуляции.

Результаты исследования variability сердечного ритма у борцов с разным уровнем скорости сенсомоторной реакции представлены в таб.4.

Данные табл.4 отражают статистические различия между обеими группами борцов по параметрам средней длительности RR-интервалов и SD2.

Таким образом, скорость сенсомоторной реакции у спортсменов опосредованно связана с продолжительностью и частотой колебаний сердечного ритма.

Как видно из табл.4 у борцов с низким уровнем сенсомоторной реакции показано наблюдается увеличение аperiodических колебаний RR-интервалов (по SD2 параметру).

Таблица 4 Статистические параметры ритма сердца у борцов с различным уровнем сенсомоторного реагирования (n=24)

Параметры	Высокая скорость реагирования			Низкая скорость реагирования		
	Медиана	Нижний квартиль	Верхний квартиль	Медиана	Нижний квартиль	Верхний квартиль
Mean RR, ms	967,45	917,20	1083,05	1159,50*	1008,70	1221,40
STD, ms	96,45	61,95	138,35	110,10	99,40	123,40
SD1, ms	72,45	38,35	100,20	64,40	55,00	66,30
SD2, ms	130,85	82,500	180,65	167,40*	141,10	168,90

*- $p < 0,01$, по сравнению с борцами высокого уровня сенсомоторного реагирования

Этот факт иллюстрирует рост уровня напряженности регуляции сердечного ритма у спортсменов с высоким уровнем сенсомоторной реакции.

Таблица 5 Спектральные характеристики ритма сердца у борцов с различным уровнем сенсомоторного реагирования (n=24)

Параметры	Высокая скорость реагирования			Низкая скорость реагирования		
	Медиана	Нижний квартиль	Верхний квартиль	Медиана	Нижний квартиль	Верхний квартиль
VLF, ms^2	5275,00	1267,50	10095,00	7088,00	4802,00	10398,00
LF, ms^2	2444,50	1674,00	3704,50	2428,00	2395,00	2767,00
HF, ms^2	1092,50	600,00	3512,50	2373,00*	1959,00	2586,00
LF/HF	1,91	1,308	2,65	1,41*	1,01	1,51

*- $p < 0,01$, по сравнению с борцами высокого уровня сенсомоторного реагирования

Данных спектральных характеристик сердечного ритма у борцов с различным уровнем сенсомоторного реагирования представлены в табл.5.

Результаты табл.5 иллюстрируют наличие более высокого уровня параметров HF у борцов с низким уровнем сенсомоторного реагирования. Этот факт указывает на активацию парасимпатического тонуса вегетативной регуляции сердечного ритма в этой группе борцов.

Увеличение показателя вегетативного баланса (LF/HF) у борцов с высоким уровнем сенсомоторного реагирования свидетельствует о росте напряженности вегетативной регуляции сердечного ритма за счет активации парасимпатической нервной системы (табл.5).

Таким образом, скорость сенсомоторной реакции имеет опосредованное отношение к регуляции напряжения сердечного ритма, за счет парасимпатической нервной системы, что согласуется с уменьшением продолжительности и частоты колебаний кардиоинтервалов у борцов с высокой скоростью сенсомоторного реагирования.

Этот результат согласуется с нашими ранними данными, где показано снижение точности и скорости движения в тесте на производительность, при активации симпатической нервной системы [11].

ВЫВОДЫ И РЕКОМЕНДАЦИИ для спортсменов и тренеров:

1. Психофизиологическая диагностика у элитных борцов характеризуется тремя компонентами функциональных состояний: сенсомоторным реагированием, характеристиками нейродинамики и регуляцией сердечных сокращений.
2. Результаты исследований показали увеличение длительности аperiodических колебаний RR-интервалов у спортсменов с более высоким уровнем сенсомоторного реагирования. Этот факт может быть использован в качестве прогноза функциональных состояний борцов. Снижение аperiodических колебаний кардиоинтервалов указывает на нарушение в системе регуляции сердечного ритма.
3. Повышение уровня сенсомоторного реагирования связано с напряжением регуляции сердечного ритма за счет парасимпатической нервной системы. Эта особенность указывает на возможность повышения функциональных резервов борцов. Одной из возможностей повышения функциональных резервов организма у борцов – изменение направленности тренировочного процесса борцов на краткосрочные интенсивные упражнения со сложной координацией.
4. Наличие активации парасимпатической нервной регуляции сердечного ритма с ростом интенсивности регуляции нейродинамики у борцов отражает способность спортсмена адаптироваться к напряженной мышечной деятельности.

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VARIATION OF THE ATHLETIC PERFORMANCE IN QUALIFIED WRESTLERS IN GRECO-ROMAN WRESTLING BY THEIR LEVEL OF FUNCTIONAL SKILLS

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Keywords: Greco-Roman style wrestling, cardio - vascular system, the concentration of lactate in the blood, aerobic and anaerobic performance, and central nervous and muscular systems.

INTRODUCTION

Competitive activity in Greco-Roman wrestling is very demanding with regard to anaerobic and aerobic performance in the area of zone glycolytic energy supply. Improving athletic performance is often associated with increasing the energy capacity of athletes (5, 6, 7). The physical state of the central nervous and neuromuscular systems of wrestlers also must meet high demands (8). Few studies have been conducted in which the changes in the CNS and the NMS of Greco-Roman wrestlers of differing qualifications identified the influence of competitive training (2). Studies relating to comprehensive research concerning energy adaptation and analyzing systems limited to non-specific training for qualified wrestlers depending on the level of athletic performance in important competitions so far have not been found. The purpose of the study. Identify the features of adaptation to the highly non-specific training of Greco-Roman wrestlers, characterized by different levels of athletic achievement.

METHODS AND ORGANIZATION OF THE STUDY.

On the eve of important competitions (UEFA) 20 qualified Greco-Roman wrestlers (MS, MSIC, ZMS) participated in a comprehensive survey. To assess physical performance, stepped training on a bicycle ergometer "to capacity" was used with measurement of the cardiorespiratory system, aerobic capacity and anaerobic threshold (ANSP was determined by the lactate curve) and maximal anaerobic capacity (lactate determination in capillary blood was carried out for a 3 minute recovery). Simultaneously, the state of the analyzing systems (central and neuromuscular systems) was assessed. Thresholds were determined by the muscle response (M-1, M-2) by the rate of sensorimotor reactions.

In Greco-Roman wrestlers, the typical model level of aerobic performance indicators are: IPC is 60-65 ml/minute/kg, HR ANSP is 160-165 beats /minute, HR maximum at peak stress is 170-180 beats/minute, the heart rate is very high, above 190 beats/minute. The threshold of muscle response (M-1) is 7-10 LIP, the threshold of muscle response (M-2) is 10-20 LIP, the rate of simple motor response is 250-260 milliseconds, and the speed of selected reaction is 350-360 milliseconds.

RESEARCH RESULTS.

The task of the athletes was to train on the bicycle ergometer "to capacity", in order to determine the maximum reserve capacity of the body. Athletes trained on the bicycle ergometer after a stationary brake stop and immediately before participation in important competitions. A comprehensive assessment was applied in the analysis of adaptation to a training test that included the following criteria:

- ergometric parameters (during exercise)
- limit of the functionality of the cardio-respiratory system, causing the level of aerobic and anaerobic performance, efficiency, and performance of the cardio-respiratory system,
- definition of the transition boundary from one regime to a different muscular work (ANSP)
- the presence of the factors limiting performance (cardiorespiratory system reserve, fatigue of the CNS and NMS).

The results are presented in Table 1. For data analysis, there was an isolated group, which included the winners of competitions (two athletes who took 1st place, one athlete who took 2nd place, and one athlete who took 3rd place). Another group of wrestlers were not included in the participating group from the UEFA, as well as wrestlers who did not win prizes. This group is referred to as unqualified.

Integrated application of physiological methods of examination revealed the relationship indicators of the aerobic and anaerobic working capacity to the state of the central nervous and muscular systems of athletes with different

levels of achievement in important competitions. It should be noted that some athletes, due to pronounced fatigue in the muscular system, when the lower limbs were tested by the ergometer had not reached the maximum level of efficiency, therefore their maximal reserve capacities of aerobic and anaerobic performance were not identified. A comparative analysis of qualified and unqualified wrestlers in competition shows that the level of physical activity, the IPC index percentage of O₂ breathing efficiency, HR maximum, and the concentration of lactate in the blood in both groups did not differ. At the same time, the maximum ventilation rate (RMV), the heart rate upon reaching ANSP, the threshold of motor response (M-2), and the rate of sensorimotor reactions of the qualified wrestlers were significantly higher.

Table 1. Adaptation of wrestlers to bicycle exercise stress (M±m)

Athletes	Indices	Time of Work m., s.	VO ₂ ml/min/kg	RMV l/min	%O ₂	HR ANSP beats /min	HR max beats /min	La mols./l	Muscle response, LIP		The rate of sensorimotor reactions/msec.	
									M-1	M-2	Simple reaction	Select reaction
n=20	M	8.82	50.15	142	3.67	147	168	11.3	9.8	24.5	284	372
	±m	0.54	0.82	1.7	0.01	0.90	1.4	0.52	0.64	0.78	1.4	1.75
Qualified, n=4	M	8.9	50.0	152	3.6	154	167	12.0	9.0	21	260	337
	±m	0.75	1.4	2.8	0.095	1.5	1.9	0.57	0.72	1.02	1.8	1.9
Unqualified, n=16	M	8.7	50.3	133	3.63	133	169	11.0	9.5	27.8	290	374
	±m	0.58	1.25	1.5	0.011	1.4	1.35	0.48	0.78	0.74	1.5	1.65

RESULTS

In trained athletes, extreme performance models in non-specific training reaction of the body were inherent in adaptation to a competitive activity. This is associated with the formation in qualified athletes of an autonomic component in the dynamic stereotype, which is typical for certain types of sports specialization (1). Analysis of complex laboratory testing revealed that the qualified, over the unqualified, are characterized by higher functional capacity in terms of aerobic capacity (higher heart rate, RMV level, and ANSP) and of the analyzing systems (M responses, motor speed reactions).

The higher compensatory potential of the respiratory system facilitates the rapid excretion of CO₂, the aerobic nature of energy conservation, and reduction in the concentration of lactate in the blood (4). The intensity of adaptation during training and the recovery rate of the body depend on aerobic capacity, and the state of the CNS and the NMS. The higher the aerobic capacity and state of the analyzer systems, the more effective is the regulation of motor and autonomic functions.

The level of technical and tactical training, which is largely determined by the state of analyzer systems, increases, if coupled with specialized training exercises used for the development of coordination abilities (resistance exercises for the development of the body, the body's orientation in space, exercises on a trampoline, etc.) and the rate of motor responses (games, etc.) (2, 3). Short-term high-intensity training (5-10 seconds) also contributes to the functional state of the analyzer systems. Such high-speed training is applied as soon as warm-up and during exercises (3). In general, switching systems of the body to another mode of activity that is not associated with highly specialized training increases the speed of the recovery processes and improves psychological stability.

The comparison of a common group of indicators for the level of aerobic performance characteristic of the model indicates that the values of the aerobic capacity of the athletes are significantly below the model. This is a weakness in the preparedness of wrestlers and therefore it is appropriate to pay significant attention to further preparation for the development of aerobic capacity. The results obtained allow us to make some recommendations for the training of wrestlers. In particular, exercise pre-planning should take into account the optimal sequence for performing various kinds of training.

Weight training of great or moderate intensity enhances aerobic capacity with voluminous loads allowing a planned increase in the volume of the heart's cavities and of myocardial capacity, forming adequate peripheral vascular responses, the morphology and function of consistent improvement of the fast and slow muscle fibers. The application of such training also increases the efficiency of the mitochondrial apparatus in muscle cells, which combine to provide an increase in aerobic capacity for the mechanism of energy supply for intensive training, i.e. increasing the threshold of anaerobic metabolism.

At the same time, it is necessary to increase and maximize aerobic capacity, which is subject to high demands in competitive bouts. High intensity training in the zones of maximal and submaximal intensity increases not only the reserves of the maximum respiratory, circulatory and maximum aerobic function, but also at the same time promote the growth of anaerobic (anti-lactic and glycolytic) features (9, 10, 11, 12).

The specifics of Greco-Roman wrestling are associated with the almost monthly participation of athletes in competitions at different levels. Typically, responsible preparation for a competition is dominated by special and intensive weight training. Therefore, to maintain aerobic capacity the athletes have to constantly use the supported mode of training, especially at and above the level of the ANSP. Uniform running with the inclusion of short spurts of submaximal and maximal intensity (10-15 seconds), and at intervals of sufficient fitness for 30-40 seconds), allows aerobic function at a high level.

In the absence of the necessary aerobic capacity, i.e. aerobic base training, to preserve energy with a competitive, regimented intensity, in the wrestlers come a compensatory enhancement of anaerobic reactions in the extreme stress of the circulatory system and fatigue in the CNS and NMS, which significantly reduces the effectiveness of technical and tactical actions in competitive bouts. In addition, the lack of basic training can contribute to various degrees of overstrain.

CONCLUSIONS:

1. For qualified Greco-Roman wrestlers a strong correlation was revealed between indicators of functional training and sports results. In competition, qualified wrestlers are characterized by high levels of aerobic function and conditioning of the CNS and the NMS, as compared to unqualified wrestlers, concerning adaptation in non-specific training.
2. A strong relationship between motor and autonomic functions (cardiorespiratory and analyzer systems) contribute to the preservation of a stable performance in competitive bouts. Insufficient development of individual functional systems (most of the cardiorespiratory system) leads to a decrease in efficiency and limits the effectiveness of technical and tactical actions in terms of competitive activity.
3. Indicators of adaptation during maximum non-specific training in qualified wrestlers can be used as criteria for the selection of athletes for competition.

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ЗАВИСИМОСТЬ СПОРТИВНЫХ РЕЗУЛЬТАТОВ КВАЛИФИЦИРОВАННЫХ БОРЦОВ ОТ УРОВНЯ ИХ ФУНКЦИОНАЛЬНОЙ ПОДГОТОВЛЕННОСТИ

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Ключевые слова: борцы греко-римского стиля, сердечно - сосудистая система, концентрация лактата в крови, аэробная и анаэробная работоспособность, центральная и нервно-мышечная системы.

Введение. Соревновательная деятельность борцов греко-римского стиля осуществляется в зоне гликолитического энергообеспечения, предъявляя высокие требования, как к анаэробной, так и аэробной производительности. Улучшение спортивных результатов зачастую связывают с повышением энергетических возможностей спортсменов (5, 6, 7). К состоянию центральной нервной и нервно-мышечных систем организма борцов также предъявляются высокие требования (8). Проводились единичные исследования, в которых выявлялись изменения ЦНС и НМС у борцов греко-римского стиля разной квалификации под воздействием соревновательной нагрузки (2). Работ, связанных с комплексным исследованием адаптации энергетической и анализаторной систем к предельной неспецифической нагрузке у квалифицированных борцов в зависимости от уровня спортивных результатов в ответственных соревнованиях до настоящего времени не обнаружено.

Цель исследования. Выявить особенности адаптации неспецифической нагрузке высококвалифицированных борцов греко-римского стиля, отличающихся различным уровнем спортивных достижений.

Методы и организация исследования.

Накануне проведения ответственных соревнований (ЧЕ) у 20 квалифицированных борцов греко-римского стиля (МС, МСМК, ЗМС) проводилось комплексное обследование. Для оценки физической работоспособности использовалась ступенчатая нагрузка на велоэргометре «до отказа» с определением показателей кардиореспираторной системы, аэробной производительности и порога анаэробного обмена (ПАНО определялся по лактатной кривой) и максимальных анаэробных возможностей (определение La в капиллярной крови проводилось на 3 мин. восстановления). Одновременно оценивалось состояние анализаторных систем (центральной и нервно-мышечной систем). Определялись пороги мышечных ответов (М-1, М-2), скорость сенсомоторных реакций.

У борцов греко-римского стиля уровень модельных характеристик показателей аэробной производительности: МПК-60-65 мл/мин/кг, ЧСС ПАНО-160-165 уд/мин, ЧСС_{мах} на пике нагрузки-170-180 уд/мин, ЧСС очень высокий - выше 190 уд/мин. Порог мышечного ответа (М-1)-7-10 мА, порог мышечного ответа (М-2)-10-20 мА, скорость простой двигательной реакции-250-260 м/сек, скорость реакции выбора-350-360 м/сек.

Результаты исследований. Для решения поставленной задачи у спортсменов проводилась ступенчатая велоэргометрическая нагрузка «до отказа», с целью определения максимальных резервных возможностей организма. Нагрузку на велоэргометре спортсмены выполняли после окончания УТС и непосредственно перед участием в ответственных соревнованиях. При анализе адаптации к тестирующей нагрузке применялась комплексная оценка, включающая в себя следующие критерии:

- эргометрические параметры (время нагрузки),
- предел функциональных возможностей кардиореспираторной системы, обуславливающих уровень аэробной и анаэробной производительности, экономичности и эффективности деятельности кардиореспираторной системы,
- определение границы перехода с одного режима мышечной работы на другой (ПАНО),
- наличие факторов, лимитирующих работоспособность (резерв кардиореспираторной системы, утомление ЦНС, НМС).

Результаты исследования представлены в таблице 1.

Таблица 1
Адаптация борцов к велоэргометрической нагрузке ($M \pm m$)

Спортсмены	Показатели	Время работым., с.	VO ₂ мл/мин/кг	МОД л/мин	%O ₂	ЧСС ПАНО уд/мин	ЧССmax уд/мин	La моль/л	Мышечный ответ, мЛА		Скорость сенсомоторных реакций, млск	
									М-1	М-2	Простая реакция	Реакция выбора
n=20	M	8,82	50,15	142	3,67	147	168	11,3	9,8	24,5	284	372
	$\pm m$	0,54	0,82	1,7	0,01	0,90	1,4	0,52	0,64	0,78	1,4	1,75
Призеры, n=4	M	8,9	50,0	152	3,6	154	167	12,0	9,0	21	260	337
	$\pm m$	0,75	1,4	2,8	0,095	1,5	1,9	0,57	0,72	1,02	1,8	1,9
Непризеры, n=16	M	8,7	50,3	133	3,63	133	169	11,0	9,5	27,8	290	374
	$\pm m$	0,58	1,25	1,5	0,011	1,4	1,35	0,48	0,78	0,74	1,5	1,65

Для анализа данных была выделена группа, в которую вошли победители и призеры соревнований (2 спортсмена, занявших 1 место, 1 спортсмен, занявший 2 место и 1 спортсмен, занявший 3 место). Другую группу составили борцы, не вошедшие в состав команды для участия в ЧЕ, а также борцы, не завоевавшие призовых мест. Эта группа обозначена как непризеры.

Комплексное применение физиологических методов обследования позволило выявить взаимосвязь показателей, характеризующих аэробную и анаэробную работоспособность с состоянием центральной и нервно-мышечной систем спортсменов с различным уровнем достижений в ответственных соревнованиях. Следует отметить, что часть спортсменов из-за выраженного утомления мышечной системы нижних конечностей при тестировании на велоэргометре не достигли максимального уровня работоспособности, что не позволило выявить их максимальные резервные возможности аэробной и анаэробной производительности.

Сравнительный анализ данных призеров и непризеров соревнований показывает, что уровень физической нагрузки, МПК, %O₂-показатель эффективности дыхания, ЧССmax, концентрация лактата в крови у спортсменов обеих групп не отличается. В то же время максимальная вентиляция легких (МОД), ЧСС при достижении ПАНО, порог двигательного ответа (М-2), скорость сенсомоторных реакций у призеров достоверно выше.

Обсуждение результатов.

У квалифицированных спортсменов выполнение предельной неспецифической нагрузки моделирует реакцию организма, свойственную адаптации в условиях соревновательной деятельности. Это связано с формированием у квалифицированных спортсменов вегетативного компонента динамического стереотипа, характерного для отдельных видов спортивной специализации (1).

Анализ данных комплексного тестирования в лабораторных условиях выявил, что призеры соревнований по сравнению с непризерами характеризуются более высоким функциональным потенциалом по показателям аэробной производительности (выше уровень МОД и ЧСС ПАНО), так и состоянию анализаторных систем (М-ответы, скорость двигательных реакций).

Более высокие компенсаторные возможности дыхательной системы способствуют быстрому выведению из организма CO₂, сохранению аэробного характера энергообеспечения и снижению концентрации лактата в крови (4). Напряженность адаптации в схватках, скорость восстановления организма зависит от аэробного потенциала, состояния ЦНС и НМС. Чем выше аэробный потенциал и состояние анализаторных систем, тем эффективней осуществляется регуляция деятельности двигательных и вегетативных функций.

Уровень технико-тактической подготовки, которой в значительной степени определяется состоянием анализаторных систем, возрастает, если наряду со специализированной тренировкой используются упражнения для развития координационных способностей (упражнения для развития устойчивости тела, ориентации тела в пространстве, упражнения на батуте и т. д.), скорости двигательных реакций (игры и т.д.) (2, 3). Кратковременная высокоинтенсивная работа (5-10 сек.), также способствует повышению функционального состояния анализаторных систем. Такие скоростные нагрузки применяются как сразу

после разминки, так и в процессе тренировки (3). Вообще переключение систем организма на другой режим деятельности, не связанный с узкоспециализированной подготовкой, повышает скорость восстановительных процессов и улучшает психологическую устойчивость.

Сопоставление общегрупповых показателей аэробной работоспособности с уровнем модельных характеристик, свидетельствует, что значения аэробного потенциала спортсменов значительно ниже модельного. Это является слабой стороной подготовленности борцов, в связи с чем, при дальнейшей подготовке для развития аэробных возможностей целесообразно уделять существенное внимание.

Полученные результаты позволяют внести некоторые рекомендации в систему подготовки борцов.

В частности, при планировании тренировки необходимо учитывать оптимальную последовательность при выполнении тренировочных нагрузок различной направленности.

Выполнение объемных нагрузок большой и умеренной интенсивности способствует расширению аэробного потенциала, при этом объемные нагрузки обеспечивают возможность планомерного увеличения объема полостей сердца и мощности миокарда, формирования адекватных периферических сосудистых реакций, последовательного морфофункционального совершенствования медленных и быстрых мышечных волокон. В результате применения подобных нагрузок повышается также эффективность митохондриального аппарата мышечных клеток, что в совокупности обеспечивает увеличение мощности аэробного механизма энергообеспечения для выполнения интенсивных нагрузок, т.е. увеличение порога анаэробного обмена.

В то же время необходимо повышать и максимальные аэробные возможности, к которым предъявляются высокие требования в соревновательных схватках. Нагрузки высокой интенсивности в зонах максимальной и субмаксимальной интенсивности повышают не только максимальные резервы дыхания, кровообращения и максимальные аэробные функции, но также одновременно способствуют росту анаэробных (алактатных и гликолитических) возможностей (9, 10, 11, 12).

Специфика греко-римской борьбы связана практически с ежемесячным участием спортсменов в соревнованиях различного ранга. Как правило, при подготовке к наиболее ответственным соревнованиям преобладают интенсивные специальные и силовые нагрузки. Поэтому для сохранения аэробного потенциала спортсмены должны постоянно использовать поддерживающие режимы нагрузок, особенно на уровне и выше уровня ПАНО. Равномерный бег с включением кратковременных спуртов максимальной и субмаксимальной интенсивности (от 10-15 с., а при достаточной тренированности на отрезках 30-40 с.) позволяет сохранять аэробные функции на высоком уровне.

При отсутствии необходимого аэробного потенциала, т.е. аэробной базовой подготовки, для сохранения энергообеспечения в соревновательных режимах интенсивности у борцов происходит компенсаторное усиление анаэробных реакций при предельном напряжении деятельности системы кровообращения и утомлении ЦНС и НМС, что существенно снижает эффективность технико-тактических действий в соревновательных схватках. Кроме этого недостаточная базовая подготовка может способствовать различным степеням перенапряжения организма.

Выводы:

1. У квалифицированных борцов греко-римского стиля выявлена тесная взаимосвязь между показателями функциональной подготовленности и спортивным результатом. Призеры ответственных соревнований по сравнению с не призерами при адаптации к неспецифической нагрузке характеризуются более высоким уровнем аэробных функций и состоянием ЦНС и НМС.
2. Выраженная взаимосвязь деятельности двигательных и вегетативных функций (кардиореспираторной и анализаторных систем) способствуют сохранению устойчивой работоспособности в соревновательных схватках борцов. Недостаточное развитие отдельных функциональных систем (чаще кардиореспираторной системы) приводит к снижению работоспособности и ограничивает эффективность технико-тактических действий в условиях соревновательной деятельности.
3. Показатели адаптации призеров к максимальной неспецифической нагрузке можно использовать в качестве критериев отбора спортсменов для участия в соревнованиях.

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FILA AND SCIENCE

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The elite sport has always been and remains to be one of those social institutions, to which the world community owes the present-day globalization. One of the important results of the global sporting and competitive activities is scientific and practical communications, which, since immemorial time, has been fulfilling a function of a peculiar locomotive ensuring the progress in sport due to the latest achievements of science and practice, though in a specific country.

I fully support the two of six candidates to the post of a new IOC President – Mr. Denis Oswald and Mr. Tomas Bach, who stated recently: “Wrestling is one of the fundamental sports. The other sports are interesting but they cannot compete with the ancient sport such as wrestling. The IOC made a mistake – wrestling must be restored in the program of the Games. It has good chances for success at the IOC Session in Buenos Aires in September 2013.”

I think I express general opinion when positively evaluate past activities carried by FILA Scientific Commission. Especially when we take into account that our International Federation of Associated Wrestling Styles is an organization which develops not only Olympic styles: Greco-Roman, Freestyle and Female wrestling, but also an organization which promotes traditional wrestling styles to the world sport elite since 2006.

At present, the fundamental provisions of the elite sport management have been formulated by the leading sports scientists of the planet. However, in each sport discipline there are certain difficulties that require concrete definition of scientific scientific inquiry. It fully relates to those, who in a professional way practice wrestling styles. I shall take the liberty to suppose that a certain regress, which has recently occurred in the Olympic wrestling movement, is, in particular, owing to the lack of full scientific and methodical provision of sport events organized under FILA aegis. That proves once again that nowadays, it is practically impossible to ascent the Olympia without creative cooperation of science and sport. That is why I think it is necessary to optimize the work of the FILA Scientific Commission in this field. I think following measures have to be implemented for these purposes:

- In the near future to set a complex group of specialists under the FILA Scientific Commission to develop urgent measures for the Olympic rehabilitation of the wrestling styles included into the program of the Olympic Games.
- Considering the fact that one of the main FILA objectives is a counterstand to all forms of discrimination and segregation, the national federations should be authorized to develop appropriate scientifically grounded advisory guidebooks in order to involve more youth to practice wrestling.
- A special Department for researches shall be established in the FILA structure to enhance the role of science. This Department will supervise a wide range of matters related to scientific, methodical and informative provision of national federations.
- Skilled specialists of the FILA Headquarters and those of the national federations should be sent to different countries to render scientific, methodical and practical assistance in staging workshops and conferences for coaches and referees to assist in popularization of the rules of wrestling competitions which will improve spectacularity. It will contribute to further wrestling promotion.
- Certain measures shall be undertaken to publish a scientific & practical FILA magazine, and certainly with a non-zero impact factor; Distribution of the available periodical scientific & methodical printed and electronic sources among FILA member-countries must be carried out.
- Special grants of FILA should be assigned for national federations to conduct scientific researches in the most vital trends of improvement of the top mastership in wrestling.
- To hold in 2015 an International Congress of scientists from various countries of the world, devoted to the final stage of preparation of wrestlers to 2016 Olympic Games.
- Taking into consideration the enhancement of repressive tendencies in the activity of the World Antidoping Agency, scientific researches must be financed and a special preventive and explanatory program shall be drawn up for wrestlers who take part at the rating competitions, as we do not have sufficient scientifically grounded tutorial practices.

- Priorities should be determined, required, from the scientific point of view, for the further development of wrestling styles being under the responsibility of FILA; the most global trends should be properly financed, and their development should be entrusted to the FILA Scientific Commission.

Now we know that preparation of an Olympic champion in any country of the world would take lots of funds. The primary and final selection of athletes – pretenders to Olympic awards - is impossible if there is no science-intensive training system applied. In the matter we discuss many things depend on ultramodern innovation technologies including medicogenetic ones to constantly control an increase in the Sensory & Motor IQ Index.

I think that any disregard of the full multifactorial scientific inquiry will throw back the Olympic expectations of FILA for many decades. This concerns not only individual athletes, and national wrestling federations of different countries worldwide, but wrestling and combat sports in a whole. Thus, it is instructive to recall a rather old but well known statement: “No progress can be made if one adheres to the past.”

Dear participants of the FILA Scientific Symposium! Let me thank you for this opportunity afforded to me to make a speech at this forum. Beyond all doubt, its results will serve the cause of further popularization and development of all styles of wrestling throughout the world.

OPTIMAL RECOVERY FROM THE MAKING WEIGHT PROCESS FOR WRESTLERS

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INTRODUCTION

The popularity of wrestling largely results from the weight category system, which is designed to reduce the risk of injury between opponents and provides opportunities for athletes of all body sizes to compete on an equal level. However, many (Horswill, 1992; Walberg Rankin, 2006) or even most wrestlers (Kiningham and Gorenflo, 2001) seem to believe that it is necessary to qualify for the lowest weight category possible in order to gain a competitive advantage. Therefore, bodyweight reduction prior to competition is common among wrestlers (Walberg Rankin 2006), despite a number of potentially detrimental health consequences of such behavior (Wilmore, 2000) and, regrettably, the practice of making weight has reached even children's sports (Sansone and Sawyer, 2005).

Depending on the duration, distinction is made between rapid (i.e. within 24-72h), moderate (from 72h to several weeks) and gradual (from several weeks to months) bodyweight reduction (Wilmore, 2000). The techniques for achieving weight loss are quite varied and include, for example, limiting food and fluid intake, using sauna procedures, exercising in a sweat or rubber suit, taking laxatives etc. These techniques, especially if they are employed for achieving rapid or moderate weight loss, may impair physiological functions and physical performance (Horswill et al., 1990; Hickner et al., 1991; Ööpik et al., 1996; Walberg Rankin et al., 1996; Tarnopolsky et al., 1996; Umeda et al., 2004; Karila et al., 2008; Timpmann et al., 2008) and have a negative impact on mood state and cognitive ability (Choma et al., 1998; Filaire et al., 2001; Landers et al., 2001). However, a wrestling match requires strength and power of both upper and lower body musculature, as well as isometric force for various wrestling techniques. Therefore, optimal recovery from the making weight process is apparently of great importance for achieving success in wrestling. The main goal of this brief review is to summarize the results of research work regarding the impact of nutritional factors on the recovery after rapid bodyweight loss in relation to physical performance in wrestlers.

Weight loss techniques, physiological functions and physical performance Limiting food and fluid intake and stimulating dehydration by using sauna procedures and/or exercising in a sweat or rubber suit are common techniques employed by wrestlers for achieving bodyweight loss prior to competition. In case of rapid or moderate rate of bodyweight reduction, dehydration and a decrease in skeletal muscle and liver glycogen stores as well as in the capacity of body buffer systems are among the most noteworthy physiological changes that can potentially impair physical performance of athletes (Horswill, 1992; Wilmore, 2000).

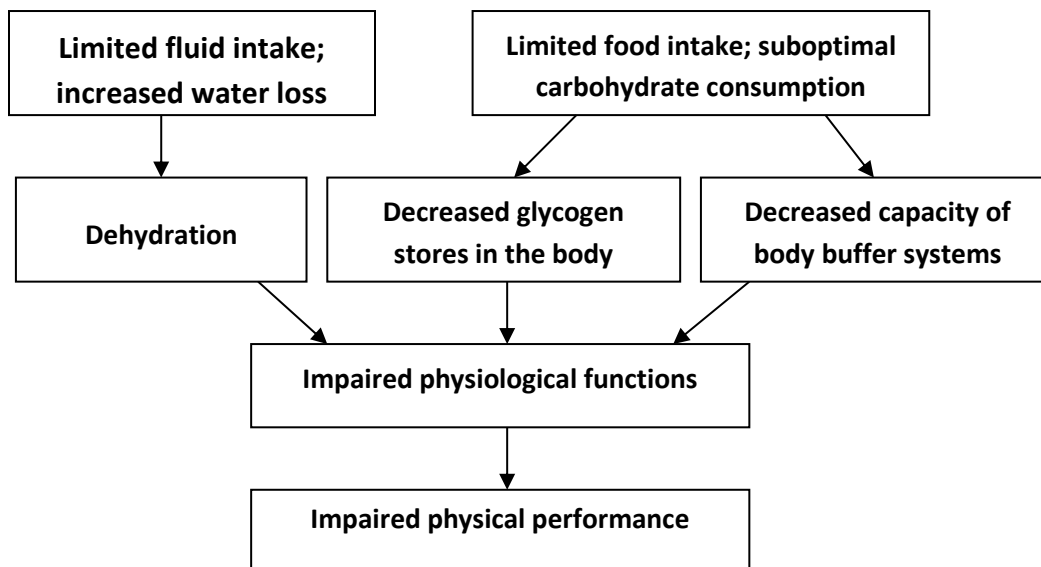


Figure 1. Relationship between weight loss techniques, physiological functions and physical performance.

Impact of weight loss on physical performance in wrestlers The data on the impact of bodyweight loss on physical performance in combat sports athletes are quite controversial. However, analysis revealed that in studies where performance was assessed by testing procedures that took into account the specific features of combat sports, rapid and moderate bodyweight reduction had a substantial negative effect on the physical performance of athletes. On the other hand, in cases when the performance did not decrease or, according to some characteristics, even improved on the background of bodyweight reduction, the applied testing procedures did not consider the specific features of a sport event (Timpmann and Ööpik, 2001).

In many cases, the results of studies may have been influenced by the fact that the subjects were instructed to follow an experimental design that did not enable them to employ the approach to bodyweight reduction they were accustomed to and had regularly practiced. However, our data reveal that even in experienced combat sports athletes the use of a self-selected regimen for rapid bodyweight reduction may result in a significant decrease in physical performance (Timpmann et al., 2008). Our subjects (wrestlers and karate athletes) reduced their bodyweight on an average by 5.1% within 3 days. The bodyweight loss was achieved by a gradual reduction of energy and fluid intake, employing mild sauna procedures and maintaining normal training load. A battery of tests was performed before and immediately after bodyweight loss. The test battery included the measurement of the peak torque of knee extensors at three angular velocities (1.57, 3.14, and 4.71 rad·s⁻¹) and an assessment of the amount of work performed during an intermittent intensity knee extension exercise. The latter test consisted of submaximal knee extensions at an angular velocity of 1.57 rad·s⁻¹ for 45 s at the rate of 30 contractions per minute followed by 15 s maximal efforts. The total duration of the test was 3 min.

Peak torque measured after rapid bodyweight loss was significantly lower in comparison with the values observed before bodyweight manipulation at angular velocities of 1.57 rad·s⁻¹ (by 6.7%) and 3.14 rad·s⁻¹ (by 10.2%). However, peak torque in relation to bodyweight remained unchanged at all three angular velocities tested. There was a significant decrease in total work (by 14.7%) accomplished during the whole 3-min muscle performance test. More importantly, the amount of total work was also significantly reduced (by 9.6%) in relation to bodyweight as a result of rapid weight loss.

Altogether, these data (Timpmann et al., 2008) suggest that a self-selected regimen of rapid bodyweight loss has a more pronounced detrimental effect on muscular endurance (absolute as well as relative reduction in the amount of total work performed during a 3-min muscle performance test) than on the ability to perform a single maximal effort (absolute but not relative reduction in peak torque of knee extensors) in experienced combat sports athletes.

Dietary interventions during recovery from rapid and moderate weight loss In wrestling athletes are expected to weigh-in only once at the start of a competition. Official weigh-in takes place on the evening before a competition and athletes may have approximately 12-18 hours between weigh-in and the first match of a tournament.

Walberg Rankin et al. (1996) conducted a study with the aim to assess the dependence of physical performance on the content of food consumed during a short-term (5 hours) recovery period following rapid bodyweight loss. Their wrestlers lost ca 5% of their initial bodyweight within 72 hours consuming a low-calorie diet while avoiding dehydration. During the following 5-hour recovery period, the subjects consumed an isoenergetic diet containing either a high (75% of energy) or moderate (47% of energy) proportion of carbohydrates. The anaerobic performance of the subjects was tested on a hand-pedalled ergometer for three times: at normal weight (baseline), after bodyweight reduction, and after a 5-hour recovery period. Decreased performance was observed after bodyweight loss in comparison with baseline conditions. The wrestlers who were re-fed a low carbohydrate diet over 5 hours did not recover their performance to baseline levels, while those fed a high carbohydrate diet had a performance similar to the baseline after recovery. These data suggest that during short-term recovery from rapid bodyweight loss a high proportion of carbohydrates in a diet may promote normalization of physical performance in trained wrestlers.

The hypothesis that creatine ingestion together with carbohydrate supplementation during recovery period after rapid bodyweight reduction accelerates the restoration of bodyweight and physical performance in well-trained wrestlers was controlled in our study (Ööpik et al., 2002). The subjects reduced their bodyweight by 4.5 – 5.3% within 56 hours in two series of investigations separated by one month. The bodyweight loss was achieved by a gradual reduction of energy intake, maintaining a close to normal training load and using a mild sauna procedure. During the 17-hour recovery period after bodyweight loss, the subjects consumed a controlled isoenergetic diet

supplemented with 320 g of glucose (glucose trial) or with 320 g of glucose plus 30 g of creatine monohydrate (glucose plus creatine trial). Muscle performance was tested three times in both trials: with normal bodyweight (baseline), after bodyweight loss and after 17 hours of recovery following bodyweight loss. The muscle performance test consisted of submaximal knee extensions at an angular velocity of $1.57 \text{ rad}\cdot\text{s}^{-1}$ for 45 s at the rate of 30 contractions per minute followed by 15 s maximal efforts. The total duration of the test was 5 min in this study.

The amount of total work was smaller after rapid bodyweight loss in comparison with baseline values in both trials. At that, the decrease in the amount of total work was mainly induced by the fall in maximal work, i.e. the amount of work performed during the 15s periods of maximal effort. Comparing the amount of total work and especially that of maximal intensity work performed by the subjects during the 5-min muscle performance test after rapid bodyweight loss and after 17 hours of recovery following bodyweight loss revealed that muscle performance capacity was better restored in the glucose plus creatine trial than in the glucose trial. Indeed, the average increase in the amount of total work over 17 hours of recovery was only 3.6% in the glucose trial instead of 12.8% in the glucose plus creatine trial. Moreover, the average increase in the amount of maximal work over the same time period was 7.3% in the glucose trial and 19.2% in the glucose plus creatine trial. A strong positive correlation ($r = 0.92$) was observed between the whole body creatine retention during 17 hours of recovery and the extent of an increase in the amount of maximal work over the same period. More careful analysis of the muscle performance of the subjects revealed that there was a significant increase in the amount of maximal work over 17 hours of recovery during the 1st (by 13.8%), 2nd (by 16.1%) and 4th (by 44.5%) minute of the test in the glucose plus creatine trial, while a much less pronounced and insignificant improvement was evident in the glucose trial.

Creatine ingestion has been shown to increase bodyweight supposedly by stimulating an increase in body water content (Burke et al., 2006). Green et al. (1996) demonstrated that the whole body as well as muscle creatine retention in humans was significantly increased when subjects ingested creatine together with carbohydrates and that the mean bodyweight gain was approximately 78% higher in the creatine plus carbohydrate trial in comparison with the creatine-only trial. Taking these facts into account and considering the rather short supplementation period, we expected to see an approximately 0.2 – 0.25 kg greater increase in bodyweight during 17 hours of recovery after rapid bodyweight loss in the glucose plus creatine trial in comparison with the glucose trial in our subjects. Faster bodyweight gain in this range could be considered an important factor having an impact on success in wrestling (Wroble and Moxley, 1998). However, the absolute as well as relative change in bodyweight during the recovery period was practically the same in the two trials.

Altogether, our data suggest that dietary creatine supplementation with concomitant glucose ingestion during 17 hours of recovery from rapid bodyweight loss enhances the rate of restoration of physical performance during maximal intensity efforts in well-trained wrestlers. The extent of the increase in physical performance during recovery from rapid bodyweight loss is correlated to the rate of whole body creatine retention but not to the rate of bodyweight restoration.

An important issue during recovery from rapid weight loss is rehydration. Recently we assessed urinary indices of hydration status of Greco-Roman wrestlers in an authentic pre-competition situation at the time of official weigh-in (Ööpik et al., 2013). Altogether 51 wrestlers out of 89 competing in the Estonian Championship in 2009 donated a urine sample for measuring urine specific gravity and osmolality. Questionnaire responses revealed that 27 wrestlers reduced bodyweight before the competition, whereas 24 wrestlers did not. In 42 wrestlers, values of urine specific gravity ≥ 1.020 and urine osmolality $\geq 700 \text{ mOsmol}\cdot\text{kg}^{-1}$ revealed a hypohydrated status. The prevalence of hypohydration in the bodyweight losers (96.3%) was higher than in the rest of the wrestlers (66.7%; $\chi^2 = 7.68$; $p < 0.05$). Serious hypohydration (urine specific gravity values > 1.030) was observed in 14 wrestlers and the prevalence of serious hypohydration was 5.3 times greater ($\chi^2 = 8.32$; $p < 0.05$) in bodyweight losers than in non-bodyweight losers. The extent of bodyweight gain during 16 h recovery in bodyweight losers ($2.5 \pm 1.2 \text{ kg}$) was associated ($r = 0.764$; $p < 0.05$) with self-reported pre-competition bodyweight loss ($4.3 \pm 2.0 \text{ kg}$) and exceeded the bodyweight gain observed in non-bodyweight losers ($0.7 \pm 1.2 \text{ kg}$; $p < 0.05$).

Altogether, these data (Ööpik et al., 2013) reveal that hypohydration is prevalent among Greco-Roman wrestlers in authentic pre-competition conditions at the time of weigh-in. The prevalence of hypohydration and serious hypohydration is especially high among wrestlers who are used to reducing bodyweight before competition. These results suggest that an effective rehydration strategy is needed for Greco-Roman wrestlers.

Recovery of fluids lost due to dehydration may take 24-48 hours, i.e. much longer than is commonly appreciated by athletes and coaches (Walberg Rankin, 2006). The effectiveness of rehydration strongly depends on the volume and composition of fluids consumed. The volume of fluid needed for full rehydration may be 150% or even more of the volume of water lost through dehydration (Shirreffs et al., 1996). Rehydration occurs more rapidly if fluids consumed contain electrolytes, primarily sodium. Sodium maintains thirst drive, stimulates water absorption in the gut and improves water retention in the body. A sodium content of at least $50 \text{ mmol} \cdot \text{L}^{-1}$ is considered optimal for a rehydration beverage (Shirreffs and Maughan, 2000). However, drinks with high sodium content (over $40 \text{ mmol} \cdot \text{L}^{-1}$) are unpalatable to many people, which results in reduced consumption (Jeukendrup and Gleeson, 2004). According to current recommendations, athletes having less than 24 hours for recovery after weight loss should not lose more than 2% of their bodyweight through dehydration (Walberg Rankin, 2006).

A reduction in buffering capacity has been observed as a result of rapid bodyweight loss and this may induce a decrease in performance (Horswill et al., 1990). However, ingestion of sodium bicarbonate or sodium citrate has been shown to increase blood buffering capacity, to improve performance in different types of exercise (Requena et al., 2005), and to increase water retention, bodyweight and plasma volume (Ööpik et al., 2010). Therefore, sodium citrate ingestion after rapid bodyweight loss may be expected to facilitate rehydration, regaining normal body mass, plasma volume, buffering capacity, and physical performance. Moreover, dehydration concomitant with rapid bodyweight loss is a factor inducing affective disturbances (Landers et al., 2001; D'Anci et al., 2009). Hence, if sodium citrate use stimulates rehydration, it could also be expected to improve the affective state.

Therefore we recently conducted a study with aim to assess the effects of dietary sodium citrate supplementation during 16 h recovery from 5% rapid bodyweight loss on physiological functions, affective state and performance in trained wrestlers (Timpmann et al., 2012). Sixteen wrestlers performed an upper body intermittent sprint performance test in 3 conditions: before and after rapid bodyweight loss and following 16 h recovery. During recovery, the subjects ate a prescribed diet supplemented with sodium citrate ($600 \text{ mg} \cdot \text{kg}^{-1}$; CIT group) or placebo (PLC group) and drank water *ad libitum*. Rapid bodyweight loss reduced ($p < 0.05$) mean power in upper body intermittent sprint performance test and increased urine specific gravity. Reduction in mean power was associated with changes in plasma volume ($r = 0.649$; $p = 0.006$) and urine specific gravity ($r = -0.553$; $p = 0.026$). During 16 h recovery, increases in bodyweight and plasma volume were greater ($p < 0.05$) in CIT than in PLC group. Bodyweight gain was associated with water retention in CIT ($r = 0.899$; $p = 0.002$) but not in PLC group ($r = 0.335$; $p = 0.417$). Blood pH, HCO_3^- concentration and base excess increased ($p < 0.05$) only in CIT group. Changes in upper body intermittent sprint performance, General Negative Affect and General Positive Affect did not differ in the two groups.

Altogether, these results (Timpmann et al., 2012) reveal that ingestion of sodium citrate increases blood buffering capacity and plasma volume and stimulates bodyweight regain during 16 h recovery from rapid bodyweight loss in trained wrestlers. However, sodium citrate does not improve upper body intermittent sprint performance nor does it have an impact on the affective state.

SUMMARY

Depending on the duration, distinction is made between rapid (i.e. within 24-72h), moderate (from 72h to several weeks) and gradual (from several weeks to months) bodyweight reduction. Rapid and moderate bodyweight loss by approximately 5% or more may impair physical performance capacity in well-trained wrestlers. Research data suggest that high carbohydrate intake as well as creatine supplementation with concomitant glucose ingestion promotes recovery of physical performance after rapid/moderate bodyweight loss. Recovery of fluids lost due to dehydration may take 24-48 hours, i.e. much longer than is commonly appreciated by athletes and coaches. Therefore, athletes who have less than 24 hours for recovery after weight loss should not lose more than 2% of their bodyweight through dehydration. Rehydration occurs more rapidly if fluids consumed contain electrolytes, primarily sodium. Dietary sodium citrate supplementation during recovery after rapid bodyweight loss increases blood buffering capacity and plasma volume and stimulates bodyweight regain in trained wrestlers.

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KINESTHETIC SENSE AND AWARENESS IN WRESTLING: THE STRUCTURE, CONDITIONS AND DEVELOPMENT OF AN “OPPONENT’S FEELING”

“...muscle feeling is a sum of sensations accompanying very body movement, and every change un their position in respect to one another [Sietschenov, 1952]

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ABSTRACT

The level of coordination abilities is of crucial importance in combat sports and martial arts. Its particular and very specific manifestation is the “*opponent’s feeling*” which exerts a considerable impact on the effectiveness of the fight. Despite the considerable importance of the “*opponent’s feeling*” this problem has been treated very marginally so far. The proof of the fact is the lack of very little number of publications [Blady et al., 1998; Starosta, 2003] and attempts to define the notion, to describe its structure and conditions of development. Therefore, the aim of the work was: 1. Define the term of “*opponent’s feeling*” in combat sports and martial arts competitors. 2. Specify components (structure) of “*opponent’s feeling*”. 3. Define the conditions of high level of “*opponent’s feeling*”. 4. Attempt to establish the conditions affecting the “*opponent’s feeling*” and methods of its development. 5. Look for reserves as far as the development of movement coordination, and focus particularly on its complex manifestation such as “*opponent’s feeling*”, “*mat feeling*” etc. Material and method. Studies were conducted on 154 advanced athletes: wrestlers in classical style (n =50) and female and male wrestlers in free style (n=11+59=70), 20 kyokushinkai karatekas and 14 wrestling coaches. A particularly high level of advancement was recorded for wrestlers, who included former Olympic champions and medal winning athletes of the highest rank. Responses to 12 of them were then processed. The age of studied individuals was within 18-40 years, and the training period was 5-25 years. A questionnaire prepared by W. Starosta and containing 21 questions dealing with “*opponent’s feeling*” was research method. The questions concerned the “*opponent’s feeling*” among representatives of selected of combat sports and martial arts. Conclusions: 1. A complex manifestation of a high level of coordination abilities such as “*opponent’s feeling*” or “*mat feeling*” depend on a number of conditions: level of sport advancement, training experience, length of training period, part of training session, temperature of the surrounding, level of emotions etc. 2. The majority of the questioned observed in the themselves a higher level of “*opponent’s feeling*” during the start training period, rather than during preparatory period. 3. According to the surveyed (45%), the highest level of the “*opponent’s feeling*” occurred in the main/ core part of the training session, and the lowest in its further part (31%). 4. The symptoms of the high level of “*opponent’s feeling*” include: 4.1. The correct predicting of the opponent’s intentions; 4.2. Proper psychic attitude; 4.3. The certainty of the fight; 4.4. The improper of “*opponent’s feeling*” is the lack of these symptoms.

Key words: *coordination abilities, “opponent’s feeling”, training period, structure of “opponent’s feeling”, conditions of this feeling, advanced competitors.*

INTRODUCTION

In combat sports a high level of movement abilities is a requisite for achieving a significant result. In the event of an equal level of physical abilities and technical and tactic preparation, coordination abilities become of crucial importance. The application of appropriate proportions in the development of physical and coordination abilities allows achieving a champion level of technique. Combat sports belong to sport disciplines that are of complex coordination, as they necessitate manifestation of accurate and quick movements in changing conditions (fig. 1). This means that they should be classified to the third, highest level of movement coordination. They occupy leading positions in the hierarchy of sport disciplines taken into account at this level, along with sport games. They demand from the athletes high level of almost all coordination abilities. Their higher level is advantageous when mastering the technique at a champion level. One of particularly significant elements are specific kinaesthetic impressions called: “*opponent feeling*”, “*mat feeling*”, “*tatami feeling*”, “*distance feeling*” etc. Those sensations form an individualised synthesis of all types of preparation of an athlete (fig.2).

Suggested Degree of Sports Discipline Complexity	III Precision and Movement Speed in Changing Conditions	1. Ice and Roller Hockey 2. Handball, Basketball 3. Football 4. Volleyball 5. Judo, Wrestling-freestyle 6. Karate (fight with real opponent) 7. Wrestling-Greco Roman 8. Fencing 9. Table Tennis 10. Tennis. Badminton 11. Kayak, Alpine skiing 12. Cycling 13. Sky Jumps
	II Precision and Movement Speed	14. Karate (Kata) 15. Figure and Roll Skating 16. Gymnastics 17. Acrobatics 18. Diving 19. Rhythmic Gymnastics 20. Track Cycling 21. Speed Skating 22. Weight lifting 23. Archery 24. Pistol shooting
	I Movement Precision	25. Karate (kihon) 26. Golf 27. Darts 28. Curling 29. Snooker 30. Pentathlon
III – Spatial, time and strength precision of movement performed in minimum time units under changing conditions II – Spatial, time and strength precision of movement performed in minimum time units under standard conditions I – Spatial, time and strength precision of movement performed according to pattern		

Fig. 1. Suggested classification of selected sports disciplines according to their degree of complexity of coordination level [Starosta, 2004]

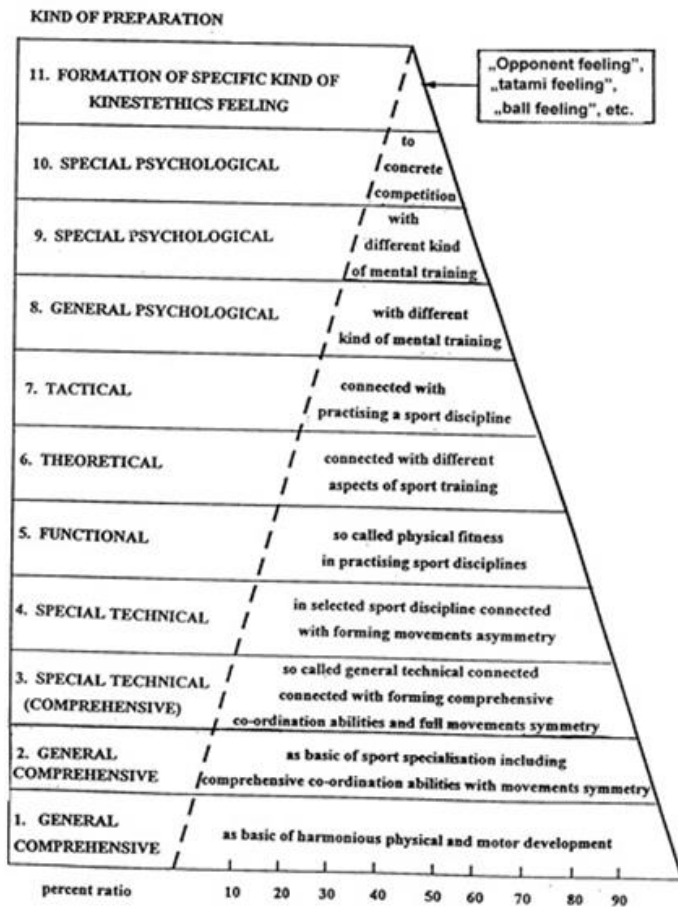


Fig. 2. Formation of specific kinesthetic sensations (feelings) by competitors in comprehensive preparation during long-term training [Starosta, 2001]

The concept of “ball feeling” or “water feeling” have been present in theory for quite some time [Farfel, 1960; Hirtz, Hotz, Ludwig, 2003; Hirtz, Starosta, 1994; Hotz, Weineck, 1983; Starosta, 1995, 2003; Ulatowski, 1981] and also in sport practice. Representatives of psychology have dedicated to them most attention [Džamgarov, Puni, 1979;

Gagajewa, 1973; Puni, 1956; Rudik, 1958]. A lot of attention was furthermore dedicated to “ball feeling”. For example, for T. T. Džamgarov and A.C. Puni [1979] “ball feeling” “...is a multiform complex regulator of motor activity and a manifestation of sensory culture”. A comprehensive definition was proposed by G. M. Gagajewa, who defined “ball feeling” as: “Ability of accurate regulation of movements and muscle effort based on observations in relation to specified activities and evaluation of distance between players, the ball and the goal” [1973, 23]. “Ball feeling”, “opponent feeling” and its other specific types concern especially important elements of technique, and their high level is an indispensable component of sport championship. Hence, determination of the content of those notions, their structure and conditions is of considerable theoretical importance, and even of a bigger practical

one. It would help activating reserves which up to now have not been sufficiently used, and would also modify the presently functioning system of training in sport games and in combat sports.

Despite the fact that the notion of “ball feeling” and its importance has been emphasised by many sport theoreticians, research related to this issue has continued to a limited extent in football, which was commenced by G. Gagajewa [1973] several years ago [Starosta, Kordecka, 1998; Bielicki, 1994]. They were expanded by “ball feeling” in basketball [Krawczyk, 1994; Starosta, 1995] and in table tennis [Starosta, Felbur, 1998, 2001]. Despite the fact that the exceptional importance of “ball feeling” for effectiveness of the game has never been questioned, hitherto studies have not taken up this issue too frequently [Gagajewa, 1973; Starosta, 1995, 2003, 2006].

The situation was much less advantageous for the notion of “opponent feeling”, which up to now has not been used much, and which differs practically in each type of combat sports. It occupies a special position owing to its range and multiaspect character of manifestation. It was not long ago that the content of this notion and its associated conditions were taken up, probably for the very first time [Blady et al., 1998, 2003]. A survey performed using a questionnaire with 21 questions was based on material that comprised 56 athletes from the national teams of 5 Arab countries practising taekwondo. It was found that the majority of tested subjects (64%) experienced a higher level of “opponent feeling” in the competition period, and the lowest one in the preparatory period (31%). In the opinion of the majority of surveyed persons (45%) the highest level of this feeling occurred in the basic part of the training, and its lowest level in the initial (33%) or final part (18%). Symptoms of high level of “opponent feeling” comprised: correct “perceiving” of intentions of the opponent (35%), appropriate mental attitude (29%), self-assertiveness during the fight (21%), appropriate body position (6%), quick reaction to a movement made by the opponent (4%). Almost a half of surveyed athletes (47%) have noticed a relation that occurs between “opponent feeling” and the level of movement coordination. The high level of this is affected to a large extent (57%) by the acquired training level, as well as by the quality of performed training (17%).

Results of those tests outlined a problem that appears in taekwondo for 56 high class athletes of five Arab countries. It was impossible to say whether research conducted on representatives training other combat sports and on a more numerous group would allow achieving similar results. Hence, the aim of this study was the: 1.

Attempt to formulate a definition for the content of the notion "opponent feeling". 2. Seeking of elements of the structure of this notion. 3. Determination of the level of "opponent feeling" depending on the length of the training period. 4. Attempt to determine associations between "opponent feeling" and the sport result. 5. Seeking of dependencies between "opponent feeling" and the dominant body side. 6. Endeavour at determining associations between "opponent feeling" and external conditions. 7. Determination of conditions that affect the high or low level of "opponent feeling" and methods of its shaping. 8. Determination of interdependencies between "opponent feeling" and the level of movement coordination.

MATERIAL AND METHODS

Studies were conducted on 154 advanced athletes: wrestlers in classical style (n =50) and female and male wrestlers in free style (n=11+59=70), 20 kyokushinkai karatekas and 14 wrestling coaches [Augustyniak, 1997; Daniłowicz, 1997; Kaminiecki, 2001; Mazurczak, 2000]. A particularly high level of advancement was recorded for wrestlers, who included former Olympic champions (A. Wroński, R. Wolny, W. Zawadzki) and medal winning athletes of the highest rank (among others J. Fafiński, J. Tracz, P. Stępień). A considerable majority of surveyed athletes belonged to a group of leading Polish athletes and had a long training experience. On all the subjects a survey was conducted using an identical questionnaire, which comprised two parts. The first one of them included information concerning personal data, training period, age, advancement in sport, achievements and self-evaluation of lateral differentiation of the upper and lower extremities. The second one comprised 21 questions connected with the notion of "opponent feeling", its structure and determining conditions. Responses to 12 of them were then processed. The age of studied individuals was within 18-40 years, and the training period was 5-25 years. Hence, those were athletes with long sport training experience.

RESULTS

1. The notion of "opponent feeling" and its understanding by the surveyed athletes

The vast majority of advanced wrestlers in both styles (65%) understood this notion in the following way: "ability of anticipating, feeling movements of the opponent and immediate response to them". Their individual opinions related to "opponent feeling" differed: "ability of performing a counteraction with the entire body to the opponent's action"; "ability of making use of the opponent's force to one's advantage"; "ability of the body to anticipate intentions of the opponent, as well as their full control"; "experiencing each factor applied on us by the opponent"; "ability of quick recognition and reaction to stimuli applied by the opponent". In a similar way it was possible to define the feeling based on opinions expressed by karate athletes: "ability of anticipating the behaviour of the opponent during a fight". However, in individual statements they provided a different definition: "feeling each factor that the opponent uses on us"; "feeling of distance and the ability of anticipating movements of the opponent"; "ability of foreseeing movements of the opponent allowing preparation for defence and counterattack".

In addition efforts were made to define interpersonal conditions for shaping the "opponent feeling". Athletes of various combat sports have listed similar components: congenital predispositions, high level of movement coordination, "feeling of the muscles", high level of technical training, mental resilience, ability of tensing and relaxing muscles, reaction time, ability of foreseeing the opponent's movements, general frame of mind, intellectual fitness, experience.

2. Manifestation of the "opponent feeling"

A synthetic formulation of opinions expressed by female and male wrestlers showed that this feeling was manifested in: quick response, controlling progress of the fight, appropriate muscle tension, anticipating intentions of the opponent, selection of the best moments for attack, quick and accurate assessment of developments on the mat, suitable position during the fight. Also of interest were opinions of some wrestlers with respect to manifestation of this feeling: "I manage to perform all the planned technical elements"; "readiness of response to actions of the opponent at an appropriate time, including also dominating over the opponent"; "muscle tension"; "the athlete is able to feel the opponent anticipates his actions, does not let the opponent take him by surprise or avoids a part of a fight which seems to him to be dangerous. He is able to foretell attacks in the so-called second and third intention".

Statements made by karatekas were generally the same. Also of interest was a statement of one of them that this feeling is manifested by: "appropriate fight control (during the fight I must feel well and be relaxed)". The original wording was maintained for statements of the athletes, even though at times it was similar to slang used in the athlete milieu, as some of them pertinent expressed the essence of the discussed notion. Responses granted to the first two questions form constituents, out of which it may be possible to formulate a more comprehensive and a more correct definition of the notion of "opponent feeling".

3. Symptoms of high and low level of “opponent feeling”

An analysis of symptoms of both levels of synthetic approach to this feeling in wrestlers (table 1) and karatekas has indicated a considerable convergence of their statements. A certain differentiation was observed in opinions of particular athletes. Below are some selected statements of wrestlers: *“a symptom of low level of this feeling is the insufficient anticipation of actions of the opponent”*; *“a high level of this feeling is associated with quicker response and vigour, and the lower level – heaviness, lack of fight concept, insufficient endurance”*; *“high level of the “feeling of the opponent” is manifested by correct response and control of actions of the opponent, and the low one with stress, continuous muscle tension and belated reaction”*; *“direct contact with the largest possible surface of the opponent’s body allows good feeling, the smaller this surface, the inferior is this feeling”*; *“at a high level of this feeling I can sense in the hands changes in muscle tension of the opponent and I know exactly when he is going to attack, and when he is only feigning an attack, and I can also tell when he is relaxed. Then I am not overly tired in simple actions. At a low level of this feeling I must continuously be fully alert and careful, and I am unable to foresee the consequent action of my opponent, and if I get the feeling that he is weaker, I loose the fight”*.

Tab. 1. Symptoms high and low level of “opponent feeling” in opinion advanced wrestlers of free and Greco-roman style and karate n=156 [Starosta, 2006]

Nb	Symptoms of high level	Nb	Symptoms of low level
1.	Quick reaction to the opponent’s movement	1.	Delayed reaction to the opponent’s movement
2.	Correct feelings towards the opponent’s (i.e. distinguishing simulated from real attack)	2.	Lack of abilities to foresee the intentions of the opponent
3.	Adequate preparation for competitions	3.	Inadequate preparation for competitions
4.	Proper position of body during various parts of the fighting	4.	Inproper position of body during various various parts of the fighting
5.	Proper psychical attitude (towards the realization of the tactical programme)	5.	Inproper psychical attitude (towards the lost fight) or its lack
6.	Contact with large surface of the opponent’s body	6.	Contact with small surface of the opponent’s body
7.	Ability to relax muscles at various moments of the fight	7.	Constant tension of the muscles during the fight
8.	Confidence in applying technical and tactic elements	8.	Uncertainty as far as own actions
9.	Lack of injuries and fear of them	9.	Fear of the recurrence of the injury or of suffering another one
10.	Control of actions executed by the opponent	10.	Inability to adjust the way of fighting or imposing one’s own style fighting
11.	Skillful use of the opponent’s strength	11.	Low level or lack as far as the use of the opponent’s strength
12.	Ability to anticipate the opponent’s movements	12.	Delayed reaction towards the opponent’s movements i.e. inability to foresee

Karatekas, have to a large extent, repeated symptoms stated by the wrestlers. Among individual opinions worthy of attention were: *“symptoms of high level of this feeling are observable when I am generally well prepared and when I am fully in form”*; *“at a high level of this feeling self-assertiveness appears”*; *“at a low level of this feeling I become unable to adapt to the fight of the opponent”*; *“low level of this feeling is manifested in erroneous responses to attack and in the lack of feeling of the distance involved”*.

4. Factors affecting high or low level of the “opponent feeling”

Wrestlers in both styles specified 15 factors and ordered them hierarchically according to percentage values (table 2). They agreed with respect to the first three of them: congenital predispositions, level of training and movement abilities. Divergence of opinions took place with respect to technical preparation, which was placed by classical style wrestlers on the fourth position, and free style on 5th- 6th, including professional training experience. For the latter ones the fourth position was taken by the level of movement coordination, which was not specified by classical style wrestlers (*it may not be ruled out that they have ascribed it to the level of movement abilities?*). Karatekas took 12 such factors into account, a part of which did not come up for wrestlers: level of involvement in the fight, atmospheric conditions, health state, frame of mind. Medal winners of Olympic games have provided an interesting formulation of factors that affect the high level “opponent feeling”: *high disposition, general physical, speed and endurance preparation, as well as freshness of the athlete* (R.W.); *“first*

of all the attitude of the athlete, his involvement in training and general feeling during the fight” (J.T.); general feeling, temperature, acquired training level” (P.S.).

Table 2. Factors influencing high and low level of „opponent feeling” in the opinion of advanced wrestlers of free and Greek-roman style (n=43) [Starosta, 2006]

No	Factor	Classic style	Free style
1.	Inborn predispositions	43,8	40,7
2.	Degree of training	37,5	40,7
3.	Level of motor abilities	25,0	25,9
4.	Level of technical preparation	25,0	14,8
5.	Number of executed fights	18,8	3,7
6.	Psychological features	18,8	7,4
7.	External (outside) practice	6,3	3,7
8.	Training period	12,5	7,4
9.	Level of sport advancement	12,5	-
10.	Competitor (sport) practice	-	14,8
11.	Adequate concentration of attention	-	11,1
12.	High speed of executed movements	-	7,4
13.	Recognition of the opponent	-	3,7
14.	Kind and quality of training	-	3,7
15.	Level of motor coordination	-	18,5

5. Level of the “opponent feeling” in various training periods

The highest level of this feeling in the major part of free style wrestlers (88.9%), of the classical style (93.7%) and karatekas (95%) was observed in the competition period (fig. 3). In a very small group of surveyed subjects it took place in the preparatory period (5 to 11.1%). The appearance of the highest level of this feeling already in the preparatory period may be the proof of: application of adequate training loads for the given individual, appropriate proportions occurring between exercises that shape fitness and coordination abilities, high level of sensory sensitiveness of the athletes, as well as insufficiently correct self-evaluation. A considerable divergence of opinions concerned the lowest level of this feeling. In the majority of surveyed classical style (50%) and free style (59.2 to 100%) wrestlers and karatekas (10%) it was observed in the preparatory period, and in part of wrestlers (22.2 to 70%) and karatekas (90%) in the transitory period. In the light of modern training theory, it appeared to be difficult to explain the occurrence of the lowest level of “opponent feeling” in the transitory period, i.e. when the training content was supposed to have been focused on shaping various coordination abilities and kinaesthetic impressions.

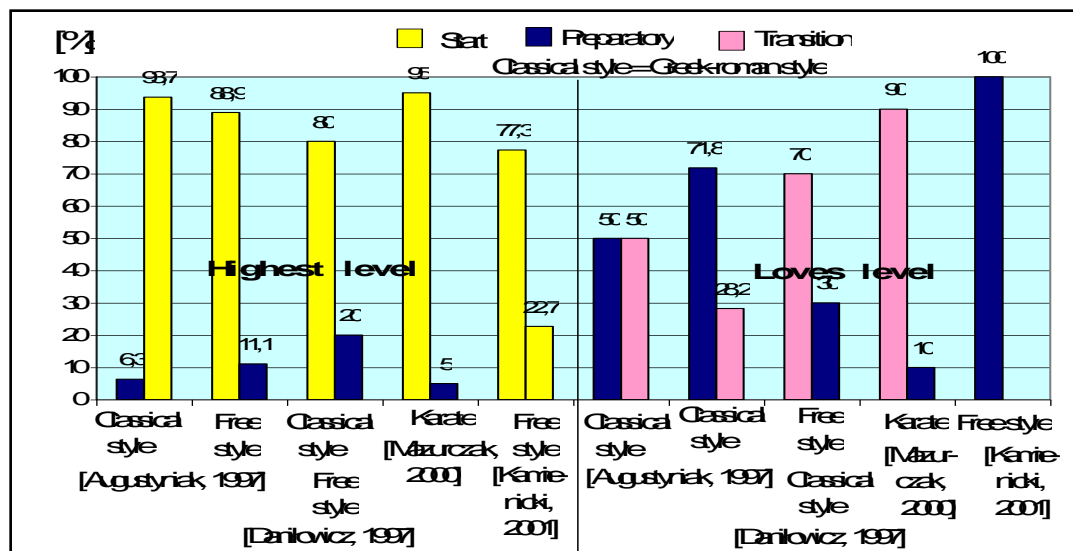


Fig. 3. Level of „opponent feeling” in different periods of training in the opinion of advanced wrestlers and karate competitors n=156 [Starosta, 2006]

6. "Opponent feeling" in various parts of the training unit

In the vast majority of free style (62,5%) and classical style (92,5%) wrestlers, as well as karatekas (65%), the highest level of "opponent feeling" appeared in the upper part of the training unit (fig. 4). The occurrence of such a level in a numerous group of athletes (classical style wrestlers – 7.5%, and free style wrestlers– 25%, karatekas – 35%) already in the initial part was surprising. Perhaps they belonged to sensory individuals, for whom a high level of kinaesthetic sensations appears after a short warm up. It was unexpected that the lowest level of this feeling appeared for wrestlers of classical style (6%), free style (11%) and karatekas (70%) already in the initial part of their training unit. This may indicate an exceedingly intensive warm up or insufficient restitution of forces after the preceding training. In the considerable majority of wrestlers of the classical style (87.5%) and free style (85%) the lowest level of the feeling was found in the final part of the training unit. Results achieved by karatekas clearly diverged from that trend, as only 30% of them have observed such a level of this feeling in the final part of the training.

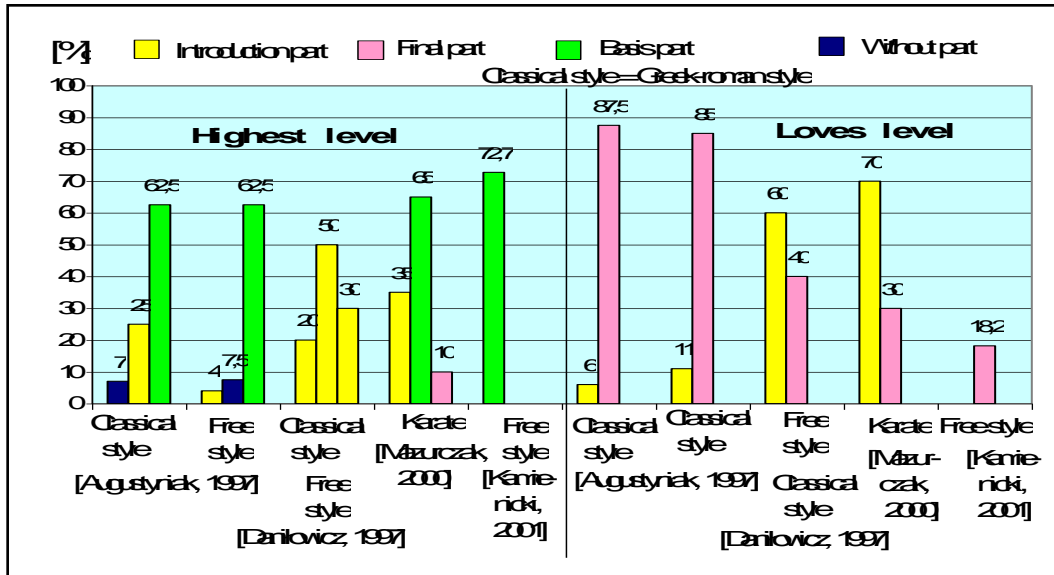


Fig. 4. Level of „opponent feeling” in different parts of the training session in the opinion of advanced wrestlers and karate competitors n=156 [Starosta, 2006]

7. "Opponent feeling" and the achieved sport result

A considerable majority of wrestlers in both styles and karatekas (90-100%) have noticed the relation taking place between the level of that feeling and the achieved sport result. For few wrestlers (10%) such a relation did not exist. Here are some selected opinions expressed by wrestlers: "This relation is manifested in the effectiveness of executed technical and tactical actions aimed at obtaining a score or technical advantage"; "High level of this feeling allows saving strength, endure the fight with regard to physical condition, and allows having some moments of rest during the fight. Following an unconscious tensioning of muscles in the arm, placing of the legs, and a "feeling" of the opponent in the hands enables quicker response", "if we do not "feel the opponent", and if the opponent feels us we are not likely to win the fight. In such a situation the opponent would be quicker or counter our holds. The athlete with no "opponent feeling" would never be able to achieve a significant sport result"; "when I have a good feeling of the opponent I am able to make use of his mistakes, which allows me to win the fight with him". Some karatekas have drawn our attention to slightly different aspects: "when we feel the opponent we can avoid dangerous situations and gain advantage, and in addition appropriately distribute strength during the entire fight"; "the higher is the level of "opponent feeling", the better is the style of conducted fights, and exhaustion of the organism is reduced and the number of injuries decreased". These opinions show that the level of this feeling is a determining condition for achieving a good result in a fight.

8. "Opponent feeling" and lateral differentiation of the lower extremities

In combat sports an important role is played by the lower extremities. Their importance grows particularly in free style wrestling and in karate. In karate actions with the use of legs get the highest scores. Speed of leg movement combined with the strength of the "blow" predetermines the result of the fight. Studies have shown a significantly higher level of kinaesthetic feelings of the lower extremities than of the upper ones [Starosta, 1975]. Long lasting sport training lowers the sensitiveness threshold, i.e. raises the level of space, time related and strength related differentiation of executed movements. The high level of technical championship requires an almost identical share of both extremities in the fight. A considerable majority of statements of the surveyed wrestlers of the classical style (87.5%), free style (81.5%) and karatekas (60%) indicates the domination of the right extremity. In

a very small number of wrestlers a much better level of feeling concerned the left leg (6.3% in the classical style and 7.4% in the free style).

In karatekas this was observed in almost 40% of surveyed individuals. Very few wrestlers have indicated a uniform level of feeling of both the extremities (6.3% in the classical style and 11.1% free style). Also quite interesting were opinions expressed regarding causes of lateral differentiation between the extremities. Here are some selected opinions concerning the wrestlers: *“I am a right handed athlete, and I tend to perform the majority of holds with the right arm and the right leg”*; *“because I use the right leg more frequently during training”*. Karatekas have provided a different justification: *“the right leg has a stronger blow, and is much more accurate”*; *“in karate a fighting stance is preferred, in which the left leg is in front and is characterised by a higher level of feeling, speed, but it is slightly weaker”*. Formation of a functional differentiation of the extremities, including also the dominating leg, results from its more frequent use during training, which in due course becomes a permanent habit. Possibilities of improving the *“opponent feeling”* though symmetrical performance of technical elements was noticed by few persons – mainly wrestlers (6.3 to 11.1%).

9. *“Opponent feeling”* and the level of movement coordination

Such a dependence was acknowledged by a vast majority of the surveyed wrestlers (96.3 to 100%) and a half of the karatekas. Such a relation was not observed by a numerous group of karatekas (50%). A vast majority of both styles of wrestlers (96.3% to 100%) and karatekas (95%) came to the conclusion that a high level of movement coordination is favourable to shaping of the *“opponent feeling”* as a component of the technical champion level. Medal winners in Olympic games have expressed quite interesting opinions with respect to such a relation: *“coordination affects significantly the level of the ‘feeling of the opponent”* (A.W.); *“motor coordination and this feeling go well together. Movements become easier to learn and to train”* (R.W.); *“a fitter athlete has a better movement coordination and consequently his ‘opponent feeling’ is higher”* (W.Z.); *“the fitness and movement coordination allow easier learning of the wrestling technique, and consequently helps improve the feeling”* (P.S.). Materials collected through the questionnaire supplement results of a survey performed on 24 wrestlers which concerned the influence of a particular coordination ability on the course and result of a fight during contests. The questionnaire included 8 abilities, and the surveyed individuals were to define the impact of particular abilities on the result of the fight in percentage (fig. 5). In this hierarchy the leading places were occupied by the following abilities: manifestation of quick response (22%), maintaining balance (18%), adaptation (combining) (15%), space and time related orientation (12%), movement differentiation (11%), movement coordination (11%), movement rhythmisation (5%), and muscle relaxation (6%). Such an approximate hierarchy may become the subject of discussion.

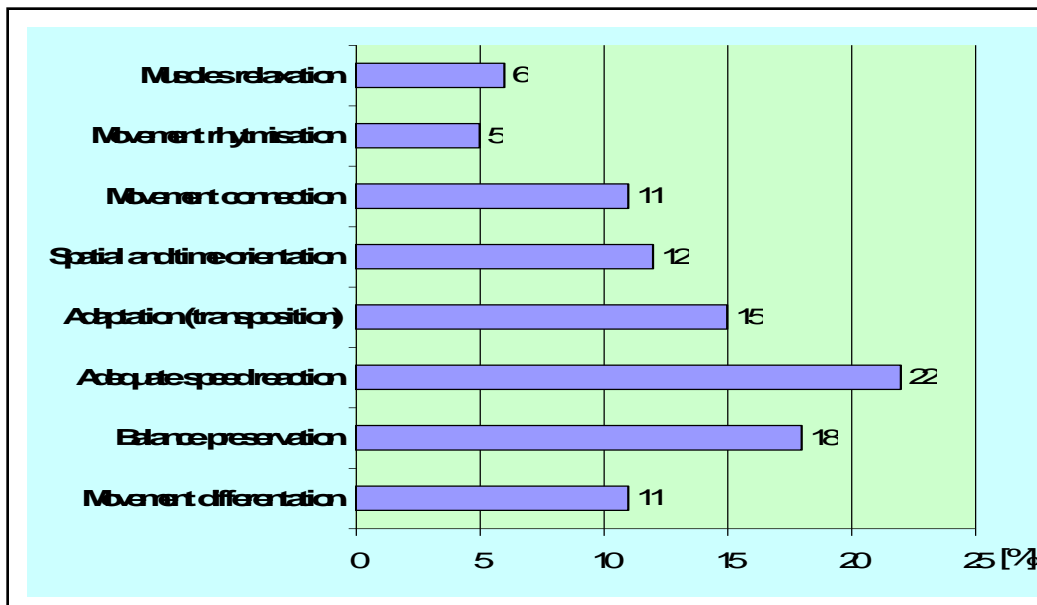


Fig. 5. Hierarchy of coordination motor abilities influencing the process and the result of fighting in the opinion of advanced wrestlers n=24 [Starosta, Augustyniak, 2006]

10. *“Opponent feeling”* and external conditions

The impact of those conditions on changes with respect to feeling was observed by the majority of wrestlers (62 to 67%) and a half of the karatekas. Low ambient temperature lowers the quality of the applied technique, and an optimum one may be advantageous to the appearance of a higher level of *“opponent feeling”* and a better technique. Here are some selected opinions of wrestlers: *“the excessively high or low temperature affects*

adversely the psychical and movement system, while lighting has a smaller impact on the 'opponent feeling', while the type and quality of surfacing affect significantly its level"; "a high ambient temperature and the consequent sweating of the opponent during a fight hinder the ability of anticipating potential actions"; "during a fight on a smooth and resilient mat in a warm and well lit facility the level of the „opponent feeling” tends to increase. It is also manifested in quicker response". As many as 33 to 38% of the wrestlers and 50% of karatekas were of the opinion that external conditions do not affect significantly the effectiveness of the fights. Here are some opinions expressed by wrestlers to justify this standpoint: "on each surface and in all conditions, when an athlete has the 'feeling' it would be likely to be the same"; "for me personally those conditions are of no importance at all; if I am well prepared then the feeling is also at a suitable level".

11. "Opponent feeling" and emotions

Responses to the question concerning the impact of emotions were varied. Many athletes perceived the adverse impact of emotions on the level of the "opponent feeling" (37.5% of classical style wrestlers, 44.4% of free style wrestlers, 40% karatekas). This was further confirmed by statements of some of the wrestlers: "the higher the emotions, the lower is the ability of assessing the situation and the effectiveness of performed actions,"; "under stress the level of the "opponent feeling" is reduced". Less numerous subjects were of the opinion that emotions affect them in a stimulating way (12.5% of classical style wrestlers, 14.8% of free style wrestlers). As many as 60% karatekas confirmed the beneficial impact of emotions on the level of "opponent feeling". This is supplemented by their selected opinions: "the high level of emotions during a fight may release an increasing level of the 'feeling of the opponent'"; "in a good and experienced athlete the 'opponent feeling' affected by emotions becomes better. It is then assumed that such an athlete has achieved a champion level". Medal winners in Olympic games have pointed out to different aspects of the impact of emotions on the level of this feeling: "the more tense is an athlete, mentally blocked, the lower is the feeling" (R.W.); "the 'opponent feeling' is reduced because of a lost fight, irritation, unjust verdict of the referee" (W.Z.); "when I am influenced by emotions during a fight, I tend to be less concentrated, and then this feeling tends to become reduced" (J.T.); "if an athlete is not thinking about the fight, and becomes tense, the feeling is decreased" (P.S.); "this is related to the psyche of each athlete. If he is to fight with a practically stronger opponent, his feeling is most probably also going to decrease (theoretically)" (J.F.).

12. Methods of developing the "opponent feeling"

The vast majority of studied individuals (80% of karatekas, 93% of wrestlers) stated that only contact with an opponent allows shaping this type of feeling, i.e. in natural conditions, which probably means during competitions. It seems that a fight directed at winning does not offer advantageous conditions for focusing on sensations that shape the "opponent feeling". Perhaps the surveyed athletes meant improvement of this feeling once it had been developed during training fights. Few of them were convinced that it would be better formed in the process of the improvement of the technique (20% of karatekas) or during training meetings with a partner, especially during the so-called technical training, i.e. one focused specifically on improving the technique in particular exercises. Few subjects admitted the possibility of developing this feeling through imaginative training, or the possibility of genetic conditions of this feeling and the inability of its development (4.7%). Here are some selected opinions: "The 'opponent feeling' may only be shaped through free style fights, in which the executed technical elements are not directed by anyone"; "fighting with various opponents, of various somatic build types, training level, and abilities". Quite interesting were statements of medal winners in Olympic games: "during training in task related fights (A.W.); "during control fights" (R.W.); "through training and watching fights on the video" (W.Z.); "during a fight with a lighter partner, who has a bigger speed and is flexible" (P.S.).

13. Use of the "opponent feeling" in different variations of sport/fight tactics

Based on the result of a survey conducted on 62 people, including 28 wrestlers of classic style, 10 of free style, 11 women wrestlers and 14 coaches, an attempt was made to determine the magnitude (%) of the use of the "opponent feeling" in 4 different variations of tactics (Fig.6). The highest magnitude in the attack occurred in the classical style wrestlers (35%). Significantly lower were observed in free-style wrestlers (25%) and coaches (26%). In defense, the highest magnitude of the „opponent feeling" were characterized by the opinions of coaches (31%) and women wrestlers (28%). The highest values related to free style wrestlers in the counterattack (32%) and coaches (27%). In the counterattack, these values were similar in the four groups surveyed, but the highest values were characteristic of the coaches (29%). These rather mosaic results obtained from different groups of examined subjects, illustrate the importance of the "opponent feeling" in the different variations of fight tactics. This differentiation was not large, which seems to indicate the importance of feeling in all forms of tactics regardless of sports specialization, and sex. Special attention should be paid to the views expressed in percentage by quite a large group of people.

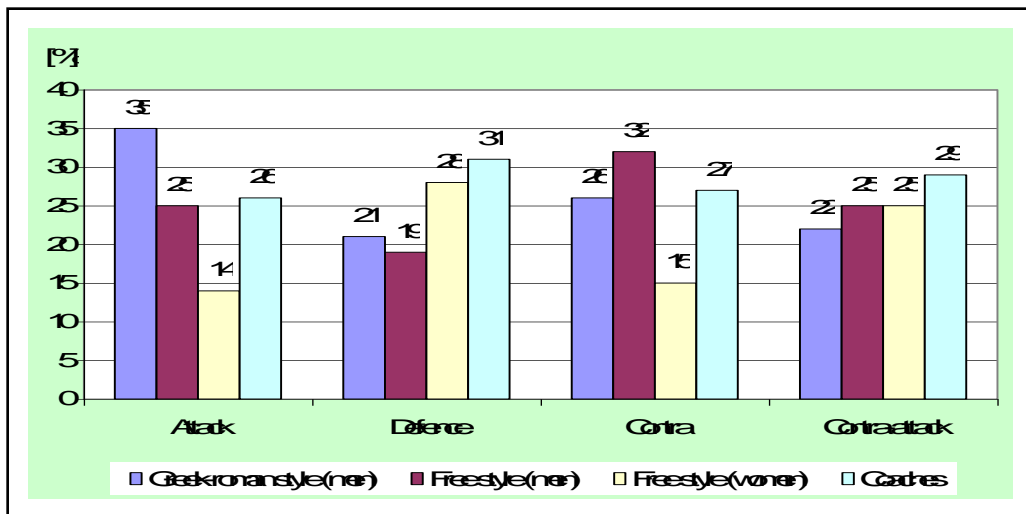


Fig. 6. Utilization of „opponent feeling” in different forms of tactic during fighting in the opinion of women wrestlers, wrestlers of Greek-roman style and their trainers n=63 [Starosta, Daniłowicz, 2006]

14. Effect of different types of sport preparation on fight results

In the next part of the additional survey an attempt to determine, in a precise way (%), the magnitude of the impact of different types of preparation on the final outcome of the fight in wrestling (Fig.7). The study involved 63 people, i.e. the classical style wrestlers and the free style wrestlers, women wrestlers and coaches. Among the types of preparations the following were included: muscle strength, the „opponent feeling”, technique, movement coordination and more. Classical style wrestlers ranked the power (28%) as first, the next was technique (24%) and the „opponent feeling” (21%). In the opinion of the men free-style wrestlers, this hierarchy was as follows: technique (22%), and the next two were equivalent: the „opponent feeling” and tactics (21%). Women wrestlers considered that the greatest impact on the final result of the fight was exerted by: technique (29%), tactics (26%) and the „opponent feeling” (23%). Quite similar hierarchy was identified by coaches: technique (26%), tactics (22%), the „opponent feeling” (19%). In all groups, one of the highest places was given to the „opponent feeling”, which significantly affected the final result of sportsmanship. Surprising is the quite distant, but similar position (fifth), given to movement coordination, within the range of 11-16%. This highest value was given by the coaches.

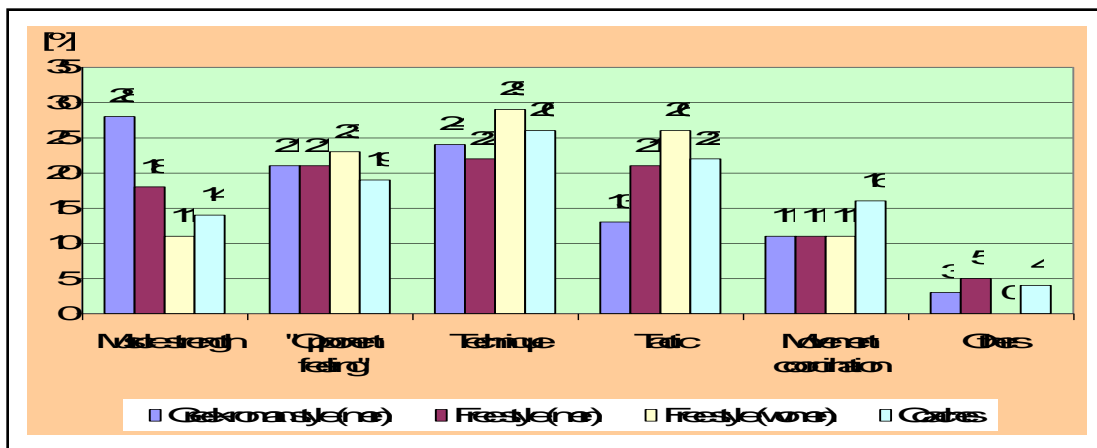


Fig. 7. Influence of particular elements of competitor preparation on the result of the fighting in the opinion of women wrestlers, wrestlers of Greek-roman style and their trainers n=63 [Starosta, Daniłowicz, 2006]

15. Approximate structure of the „opponent feeling”

Based on the results of own studies and of those of the co-authors, as well as of the coaches, an indicative structure of the „opponent feeling” in judo was set up [Starosta, Blady, 1998]. It took into account only five out of 11 co-ordination abilities: kinesthetic differentiation of movements and their rhythmization, spatial indicative, reaction speed, balance maintenance (Fig.8). Despite considering only part of the coordination abilities, its structure included 28 components. Most of them were in the spatial orientation (n = 9) and kinesthetic differentiation of movements (n = 7). This structure was narrowed to judo, but many of its components also apply to other combat sports and martial arts. Nevertheless, this structure should be considered as indicative, since it does not take into account all coordination abilities, and it was developed based on the results of little research and on the experience of a relatively small group of people. But even in this initial form it may become the subject

of a substantive discussion and of further research verifying the option presented. The more so that no other has been presented yet in the available and rich literature.

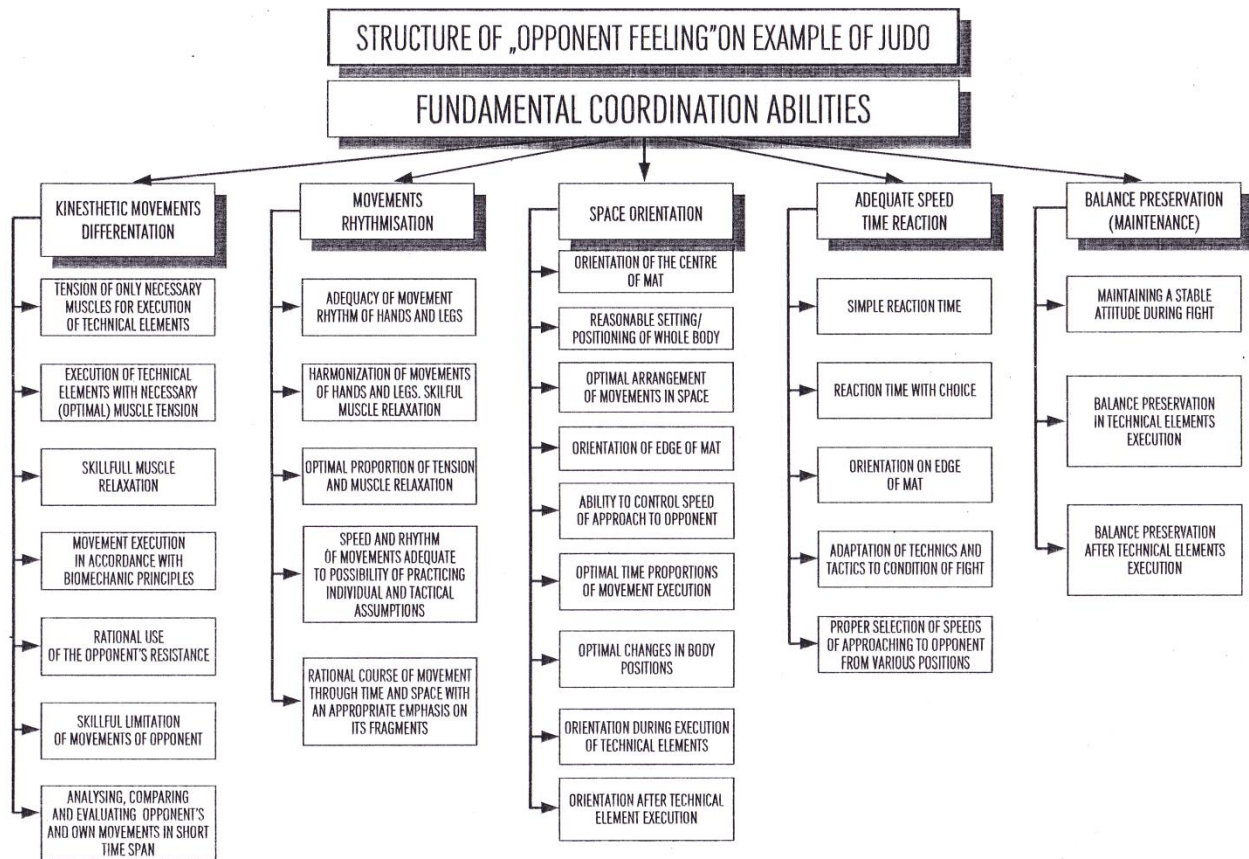


Fig. 8. Structure of “opponent feeling” from judo

DISCUSSION

The conducted surveys allowed the definition of the highest level of “*opponent feeling*” in the competition period, and the lowest one in the transitory or preparatory periods. Similar results were obtained in studies of taekwondo athletes [Blady et al., 1998] and of those practising sport games [Starosta, 1995, 2003]. This trend conformed to assumptions of the sport training. The extensive notion of the “*opponent feeling*” based on opinions expressed by the studied athletes was preliminarily defined, which may be of considerable importance for practice. A high level of this feeling allows the following: ability of foreseeing, “feeling” of the opponent’s movements and immediate reacting to them, ability of performing counteractions with the entire body to an action of the opponent, ability of using the opponent’s strength to one’s advantage, ability of foretelling intentions of the opponent, as well as their full control, ability of quick recognition and reacting to stimuli of the opponent. Those elements determine the effectiveness of the applied technical and tactical solutions during the fight, i.e. winning [Starosta, 1995]. An analysis of results in the discussed survey allowed the determination of a strong relation that takes places between “*opponent feeling*” and the achieved sport result (95 to 100%).

Symmetrisation of movements consists of compensating the fitness in both sides of the body. This requires that the athletes perform exercises with the less fit side of the body (the upper extremity or the lower extremity, or with a turn/rotation), which favours the development of movement coordination and indirectly the higher level a of the “*opponent feeling*” with the dominating side of the body [Starosta, 1975, 1990, 2003]. In the presented material the relation of right-legged wrestlers to left-legged ones was as 5 : 1 (free style) or 7 : 1 (classical style). Only in karatekas it was more advantageous, i.e. 3 : 2. Very few wrestlers pointed to an identical level of feeling in both extremities (6.3% in classical style and 11.1% free style). They constituted a group of wrestlers not only both-legged, but also bilateral – athletes who performed symmetrical exercises. They belong to dangerous opponents owing to the considerable diversity of applied technical options. The group of such versatile wrestlers included, among others, A. Supron, R. Świerad, P. Michalik – multiple medal winners of the most prestigious international

competitions. The process of symmetrisation seems to be underestimated in the training of Polish athletes in some combat sports, despite the fact that for example in Japanese judokas it was and still remains obligatory. This discipline appeared in Poland in such a version, but as time passed it has been completely abandoned. Meanwhile some Polish judokas endeavoured to their technical abilities, which allowed them to have considerable successes in international contests, as for example J. Pawłowski (vice champion in Olympic games in Seoul).

"Opponent feeling", its contents and structure were difficult, but all the same proved to be feasible for initial defining. This feeling acquires a particular significance in technical mastering at champion level. This fact was admitted by the majority of surveyed athletes. Similarly, as the relation that occurs between this feeling and external conditions. Optimum conditions are advantageous for the manifestation of a higher level of *"opponent feeling"* and of the technique. It also depends on the psychical state of the athlete. Excessive emotions may affect it in an adverse way, while optimum ones – in a stimulating way.

Presented results cover a fragment of the penetrated research field. Opinions expressed by the surveyed athletes were formulated in a synthetic way with respect to 12 issues. A lot of them have not been analysed here for lack of available space, even though they present a highly interesting material. Of exceptional value are statements of highly experienced athletes, particularly classical style wrestlers, many of whom belonged to the world elite.

CONCLUSIONS

1. A complex manifestation of a high level of coordination abilities such as *"opponent's feeling"* or *"mat feeling"* depend on a number of conditions: level of sport advancement, training experience, length of training period, part of training session, temperature of the surrounding, level of emotions etc.
2. The majority of the questioned observed in the themselves a higher level of *"opponent's feeling"* during the start training period, rather than during preparatory period.
3. According to the surveyed (45%), the highest level of the *"opponent's feeling"* occurred in the main/ core part of the training session, and the lowest in its further part (31%).
4. The symptoms of the high level of *"opponent's feeling"* include: the correct predicting of the opponent's intentions, proper psychic attitude, the certainty of the fight, the improper of *"opponent's feeling"* is the lack of these symptoms.
5. The vast majority of advanced wrestlers of both styles (65%) understood the term *"opponent feeling"* as: *"the ability to anticipate, to feel the movements of the opponent and to respond to them immediately."* In the same way the feeling was defined based on the opinion of karate athletes: *"the ability to predict the behavior of the opponent during a fight."*
6. An attempt was made to determine the intra-individual factors shaping the *"opponent feeling"*. Athletes of various martial arts listed similar components: innate predisposition, high level of movement coordination, *"muscle feeling"*, and high level of technical training, mental resilience, and ability to tense and loosen muscles, quick reaction, ability to predict the opponent's movements, well-being, intellectual efficiency, experience.
7. In the opinion of a large group of wrestlers of both sexes the *"opponent feeling"* is manifested by: rapid reaction, control of the fighting, appropriate muscle tension, anticipation of the opponent's intentions, the choice of the best moment for the attack, fast and accurate assessment of events on the mat, appropriate position of the body during the fight .
8. The responses to the first two questions from the components, which enable the elaboration of a more correct definition of the *"opponent feeling"*
9. Symptoms of the low and high levels of the synthetic presentation of this feeling in wrestlers and karate athletes were aligned. Differentiation occurred in the opinions of individual wrestlers. The *"opponent feeling"* is manifested by an appropriate reaction and control of the opponent, and low stress, constant muscle tension and late reaction, direct contact with the greatest surface of the opponent's body creates a good feeling, the smaller the area, the worse is the feeling , with a high level of the feeling I sense in my hands the changes of muscle tension of my opponent, and I know when he will attack, I also know when my opponent just simulates an attack, and I also know when he is relaxed. Then I do not get overly tired in simple actions. At a low level of this feeling that I need to be one hundred percent alert and attentive, I cannot predict the opponent's next action, and with the impression that he is weaker, I lose the fight.
10. Wrestlers of both styles mentioned 15 factors influencing the high or low level of the *"opponent feeling"* setting them hierarchically basing on percentages. They were unanimous in the first three: hereditary predisposition, fitness level and movement skills. Karate athletes considered 12 of such factors, some of which have not occurred in wrestlers: the degree of involvement in the fight, weather conditions, health and well-being.
11. The highest level of this feeling in the vast majority of free-style wrestlers (88.9%), classical style (93.7%) and karate athletes (95%) appeared in the starting period. Only for a few respondents, it occurred during the preparatory period (5-20%). Significant dispersion of opinions related to the lowest level of the feeling.

12. In the vast majority of classical style wrestlers (62.5%) and free style wrestlers (92.5%) and also of karate athletes (65%), the highest level of the "opponent feeling" was present in the main part of a training unit.
13. The large majority of wrestlers of both styles and of karate athletes (95-100%) observed the link that exists between the level of the feeling and the sports result achieved.
14. The vast majority of classical wrestlers (87.5%), of free-style (81.5%) and of karate athletes (60%) indicated the domination of the right lower limb, i.e., a higher level of its feeling.
15. Relationship between the level of movement coordination and the "opponent feeling", was observed by the vast majority of wrestlers (96,3-100%) and by half of karate athletes. Such a relationship was not observed by a large group of karate athletes (50%).
16. Influence of external conditions on the changes in the feeling was observed by most of the wrestlers (67%). At the same time, a fairly large group of wrestlers (33%) and 50% of karate athletes thought that external conditions did not have a decisive impact on the effectiveness of the fight.
17. Answers to questions about the influence of emotions were mixed. A large number of participants expressed views on the negative effects of emotion on the level of the „opponent feeling” (37.5% of classical style wrestlers, 44.4% free-style wrestlers, karate athletes 40%). Some respondents thought that emotions affected them in a mobilizing way (12.5% of classical style wrestlers, 14.8% free-style wrestlers, karate athletes 60%).
18. The large majority of respondents stated that only contact with the opponent allows the development of this feeling. Perhaps it related to the improvement of the feeling after shaping it during training fights. A few considered it a better way to develop it during the training with a partner, especially during the "technical training".
19. Based on an additional questionnaire survey carried out on 63 wrestlers of both styles and sex, the magnitude of the use of the „opponent feeling” in various forms of tactics was defined. The highest values related to the offense and defense. These values varied in different groups of respondents.
20. An attempt to determine the hierarchy and the size of the impact of particular components of the preparation of a sports athlete on the sport result was made on a similar group of respondents (n = 63). In this hierarchy, a high place was given to the "opponent feeling" mentioned as the third by different groups of respondents.
21. Based on the results of own and of other authors' research, as well as on coaching experience, an indicative structure of the "opponent feeling" which takes into consideration the five coordination abilities, was set up. It covered 28 elements. It was narrowed to judo, but many of its components also apply to other combat sports and martial arts.

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СТРУКТУРА, ОБУСЛОВЛЕННОСТИ И ФОРМИРОВАНИЕ „ЧУВСТВА ПРОТИВНИКА” ПО МНЕНИЮ ВЫСОКОГО УРОВНЯ БОРЦОВ И СПОРТСМЕНОВ ИЗБРАННЫХ ВИДОВ ЕДИНОБОРСТВА

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Введение

В спортах единоборства достижение значительного успеха зависит от высокого уровня двигательных способностей. При выравнивающимся уровне кондиционных способностей и технико-тактической подготовки ведущее значение имеют координационные способности. Применение соответствующих пропорций в развитии кондиционных и координационных способностей способствует достижению мастерского уровня техники. **Спорты единоборства принадлежат к координационно сложным дисциплинам спорта, т.к. требуют проявления точных и быстрых движений в изменяющихся условиях (рис.1).** Это обозначает их помещение на самом высоком третьем уровне двигательной координации. В иерархии видов спорта причисляемых к этому уровню вместе со спортивными играми занимают ведущее места. Они требуют от спортсменов высокого уровня почти всех координационных способностей. Их высокий уровень способствует мастерскому овладению техникой. **Одним из существенных ее элементов являются специфические кинестетические ощущения называемые „чувством противника”, „чувством ковра”, „чувством татами” и т.п. Эти чувства являются индивидуальным видом синтеза всех видов подготовки спортсмена (рис.2).**

Понятия „чувства мяча” или „чувства воды” давно функционируют в теории [Farfel, 1960; Hirtz, Hotz, Ludwig, 2003; Hirtz, Starosta, 1994; Hotz, Weineck, 1983; Starosta, 1995, 2003; Ulatowski, 1981] и практике спорта. Больше всех посвятили им места представители психологии [Dżamgarow, Puni, 1979; Gagajewa, 1973; Puni, 1956; Rudik, 1959]. Особенно много внимания посвятили они „чувству мяча”. Например, для **Т.Т. Дзамгарова и А.Ц. Пуни** [1979] чувство мяча: „*Это многообразный сложный регулятор двигательной деятельности и проявление сенсорной культуры.* Более ёмкое определение чувства мяча предложила **С.М. Гагаева**: „*Это умение точной регуляции движениями и мышечными усилиями на основе наблюдения по отношению к определенным заданиям и оценки расстояния между игроками, мячом и воротами.*” [1973, 23]. „Чувство мяча”, „чувство противника” и другие специфические их виды относятся к очень важным элементам техники, т.к. их высокий уровень является необходимой составной спортивного мастерства. Отсюда определение содержания этих понятий, их структуры и обусловленности имеет большое теоретическое, но гораздо больше практическое значение. Оно будет способствовать включению до сих пор не использованных резервов и модификации применяемой системы спортивной тренировки в спортивных играх и видах единоборства.

Несмотря на подчеркивание многими теоретиками важности „чувства мяча” узкий круг учёных продолжал исследования этого вопроса по футболу, начатые .Г. Гагаевой [1973] много лет тому назад. Диапазон их расширили на „чувство мяча” в баскетболе [Krawczyk, 1994; Starosta, 1995] и настольном теннисе [Starosta, Felbur, 1998, 2001]. Никогда не подвергалось сомнению огромное влияние „чувства мяча” на эффективность игры, но несмотря на это не много места уделили ему в до сих пор проведенных исследованиях учёные [Gagajewa, 1973; Starosta, 1995, 2003, 2006].

В значительно худшей ситуации находилось **до сих пор мало употребляемое понятие „чувства противника” различное но почти во всех видах спортивной борьбы. Оно занимает особое место с точки зрения его радиуса действия и многоаспектного характера проявления.** Содержанием этого понятия и его обусловленности возможно впервые занялись недавно [Blady et al., 1998, 2003]. Исследования проведенные с помощью опросного листа включающего 21 вопроса проведено на 56 спортсменах сборной команды 5 арабских стран в таэквон-до. Определено, что большинство исследуемых (64%) наблюдала у себя высший уровень „чувства противника” в стартовом периоде тренировки, а самый низкий в подготовительном (31%). По мнению части анкетуемых (45%) самый высокий уровень этого чувства выступил в основной части тренировочного занятия, а самый низкий в его вступительной (33%) и заключительной части (18%). До симптомов высокого уровня „чувства противника” причислено: правильное прочтение намерений противника (35%), соответствующая психическая установка (29%), уверенность поведения во время схватки (21%), определенное положение тела (6%), быстрая реакция на движение противника (4%). Почти половина исследуемых (47%) заметила связь между „чувством противника” и уровнем двигательной координации. На высокий уровень этого чувства в значительной степени влияет уровень тренированности (57%) и качество проводимых тренировок (17%). Результаты этих исследований показали проблему, выступающую в таэквон-до, касающуюся 56 спортсменов высшего

класса 5 арабских стран. Не было уверенности, что исследования проведенные на спортсменах других видов единоборства и более многочисленной группе могут показать похожие результаты. Поэтому **целью нашей настоящей работы было:** 1. Проба определения содержания понятия „чувства противника.“ 2. Поиски элементов структуры этого понятия. 3. Определение уровня „чувства противника“ в зависимости от периода тренировки. 4. Проба определения связи между „чувством противника“ и спортивным результатом. 5. Поиски взаимосвязи между „чувством противника“ и ведущей стороной тела. 6. Проба определения связи между „чувством противника“ и внешними условиями. 7. Определение условий влияющих на высокий или низкий уровень „чувства противника“ и способов его формирования. 8. Определение взаимосвязи между „чувством противника“ и уровнем двигательной координации.

Материал и методы

Исследования провели на 154 высокой квалификации борцах классического (n =50) и вольного стиля (n=70), в том числе 11 женщинах занимающихся борьбой, 14 тренерах по борьбе и 20 спортсменах карате. Возраст обследованных был в пределах 18-40 лет, их спортивный стаж колебался в границах 5-25 лет. Особенно высоким уровнем мастерства отличались борцы, среди которых были чемпионы и призёры олимпийских игр. Большинство исследуемых принадлежала к национальной команде Польши и имела длинный спортивный стаж. Всех обследовано с помощью опросного листа, состоящего из двух частей. Первая касалась личностных данных: спортивного стажа, возраста, спортивного разряда, спортивных достижений, самооценки сторонней дифференцировки верхних и нижних конечностей. Другая часть состояла из 21 вопроса, связанных с понятием „чувства противника“, его структурой и обусловленности. Ответы на 12 вопросов подлежали обработке.

Результаты исследований

1. Понятие „чувства противника“ и его понимание исследованными

Большинство высокой квалификации борцов обеих стилей (65%) под этим понятием понимала: „способность предвидения, предчувствия движений противника и срочного реагирования на них.“ Дифференцированными были их индивидуальные мнения относительно „чувства противника“: „...умение выполнения контрствующего движения целым телом на акцию противника“; „...умение использования силы противника в свою пользу“; „...способность тела чтения преднамерений противника, а также их полный контроль“; „...ощущение каждого фактора каким воздействует на нас противник“; „...способность быстрого различения и реагирования на импульс противника“. В похожий способ определить можно это чувство на основе мнений каратектов „способность предвидения поведения противника во время схватки“. По другому формулировали свое мнение в высказываниях индивидуальных: „Ощущение каждого фактора, с помощью которого воздействует на нас противник“; „...чувство дистанции и умение предвидеть движения противника“; „...умение предвидеть движения противника, создающие возможность подготовки защиты и контратака“.

Предпринято попытку определения внутренних личностных обусловленностей формирования чувства противника. Спортсмены разных видов борьбы перечислили похожие составные: **врожденные предпосылки, высокий уровень двигательной координации, мышечное чувство, высший уровень технической подготовки, психическую сопротивляемость, умение сокращения и расслабления мышц, быстроту реакции, умение предвидения движений противника, самочувствие, ясность ума, опыт.**

1. Способ проявления „чувства противника“

В синтетичном обобщении мнений борцов женщин и мужчин чувство это проявлялось в: **быстрой реакции, контроли протекания схватки, определенным напряжением мышц, предвидение намерений противника, выбором самых лучших моментов для атак, быстрой точной оценкой действий на ковре, соответствующей позицией во время схватки.** Интересные были мнения некоторых борцов: „...получаются мне все запланированные технические элементы“; „...готовностью реакции на действия в соответствующем времени, а также доминирование над ним“; „...напряжение мышц“; „...спортсмен чувствующий противника опережает его действия, не дается захватить в заспloh или избегает фрагмента схватки который ему кажется опасным. Сумеет угадать так называемый атак в другом и третьем намерении.“ Похоже было обобщение мнений каратектов. Интересно было мнение одного из них, что это чувство проявляется: „...определённым контролем схватки (должен чувствовать себя хорошо и расслабленно)“. Сохранено оригинальное содержание мнений иногда приближенное к жаргонным приняты в той среде, т.к. некоторые из них выражали суть понятия „чувства противника“. Ответы на первые два вопроса составляют составные, из которых можно сформировать полнейшее и более точное определение понятия „чувства противника“.

2. Симптомы высокого и низкого уровня „чувства противника“

Анализ симптомов обеих уровней синтетичного определения этого чувства у борцов и каратектов (таб. 1) выявил большое сходство их ответов. Некоторое расхождение появилось в высказываниях отдельных спортсменов. Представляем избранные мнения борцов: „...симптомом низкого уровня этого чувства

является плохое предвидение действий противника”; „...с высшим удивлением этого чувства связывается быстрая реакция и свежесть, а с низким – отяжеление – вялость, отсутствие концепции ведения схватки, плохая выносливость”; „...высокий уровень чувства противника проявляется в соответствующей реакции и контроле действий противника, а низкий со стрессом, постоянным напряжением мышц и запоздавшей реакцией”; „...непосредственный контакт с как можно большей поверхностью тела противника способствует хорошему чувству, чем меньшая поверхность тем это чувство является худшим”; „...при высшем уровне этого чувства чувствую в ладонях изменения напряжений мышц противника и знаю когда он начнет атак, а когда он только производит ложный атак, знаю тоже когда он расслабится. Тогда я не мучаю слишком в простых акциях. При низком уровне этого чувства мне необходимо постоянно на сто процентов быть бдительным и внимательным, тогда не сумею предвидеть следующей акции противника. Имея ощущение, что он слабее меня, проигрываю схватку”.

Спортсмены специализирующиеся в карате повторили симптомы перечисленные борцами. Среди индивидуальных высказываний на внимание заслуживают: „...симптомы высокого уровня этого чувства проявляются тогда, когда меня характеризует хорошая общая подготовка и я нахожусь в состоянии полных сил.”; „...при высшем уровне этого чувства появляется уверенность в себя”; „...при низком уровне этого чувства выступает у меня неумение приспособления к способу ведения борьбы противником”; „...низкий уровень этого чувства проявляется в ошибочных реакциях на атаки и отсутствие чувства дистанции.”

3. Факторы влияющие на высокий или низкий уровень „чувства противника”

Борцы обеих стилей перечислили 15 факторов в иерархическом порядке на основе процентных величин (таб. 2). Были они единогласны в трех первых: **врожденных предпосылок, уровня тренированности и двигательных способностей**. Разногласие мнений выступило относительно технической подготовки, которую борцы классического стиля поставили на 4 месте, а вольного стиля на 5-6 вместе со спортивным стажем. У тех других на 4 месте был уровень двигательной координации, которого борцы классического стиля вообще не учли (возможно перечислили её в уровне двигательных способностей?). Специалисты карате перечислили 12 факторов, часть из которых не учли борцы: **степень увлечения схваткой, атмосферические условия, состояние здоровья, самочувствие**. Интересные условия обуславливающие высокий уровень чувства противника перечислили призеры олимпийских игр: „...от высокого уровня предразположения, общей физической подготовки, скоростной и выносливой, а также от свежести спортсмена.” (Р.В.); „...прежде всего от отношения спортсмена, его увлечения тренировкой и самочувствия в схватке” (И.Т.); „...от самочувствия, температуры среды, уровня тренированности” (П.С.).

4. Уровень „чувства противника” в разных периодах тренировки

Самый высокий уровень этого чувства у большинства борцов вольного стиля (88.9%), классического стиля (93.7%) и каратек (95%) появлялся в стартовом периоде тренировки (рис.3). У немногочисленной группы анкетированных выступил он в подготовительном периоде (5-11%). Появление самого высокого уровня этого чувства уже в подготовительном периоде может свидетельствовать о: применении не адекватных до конкретного спортсмена тренировочных нагрузок, неправильных пропорциях между упражнениями развивающими кондиционные и координационные способности, высоком уровне сенсорной чувствительности спортсменов, а также о их мало меткой самооценке. Значительная дифференцировка мнений касалась также самого низкого уровня этого чувства. У большинства борцов классического (50%) и вольного стиля (59.2-100%), а также каратек (10%) появляется он уже в подготовительном периоде, а у части борцов (22.2-70%) и каратек (90%) в переходном. В свете современной теории тренировки трудно объяснить выступление самого низкого уровня „чувства противника” в переходном периоде, т.е. Когда содержание тренировки должно быть направлено на развитие разных координационных способностей и кинетических ощущений.

6. „Чувство противника” в разных частях тренировочного занятия

У большинства борцов вольного (62.5%) и классического стиля (92.5%), а также каратек (65%) **самый высокий уровень «чувства противника» появлялся в главной части тренировочного занятия (рис.7)**. Удивляло появление этого уровня у многочисленной группы спортсменов (борцов классического стиля — 7.5%, вольного стиля — 25% и каратек — 35% уже во вступительной части. Возможно, они принадлежали к сенсорным лицам, у которых высокий уровень кинестетических ощущений появляется под влиянием короткой разминки. Непонятным было появление самого низкого уровня этого чувства у борцов классического (6%), вольного стиля (11%) и каратек уже во вступительной части тренировочного занятия. Это может свидетельствовать как о слишком интенсивной разминке, так и о недостаточном обновлении сил после предыдущей тренировки. **У большинства борцов классического (87.5%) и вольного стиля (85%) самый низкий уровень чувства появлялся в заключительной части**

тренировочного занятия. От этой тенденции значительно отличались результаты каратек, из которых только 30% наблюдало у себя такой уровень этого чувства в заключительной части тренировки.

7. „Чувство противника” - спортивный результат

Большинство борцов обеих стилей и каратек (90%-100%) заметила связь, выступающую между уровнем этого чувства и достигнутым спортивным результатом. Для немногих борцов (10%) такая связь не существовала. Вот некоторые мнения борцов: „Связь эта проявляется в результативности выполненных технико-тактических действий, с целью достижения бального или технического перевеса.”; „Высокий уровень этого чувства позволяет сберечь силы, выдержать схватку в кондиционном отношении, можно разрешить себе на отдых во время схватки.”; „После неосознанного напряжения мышц в плечах, постановке ног «чувствуя» в ладонях противника можно быстрее реагировать.”; „...если не чувствуем противника, а противник чувствует нас, тогда схватки не выиграем. Он будет опережать и контролировать наши приемы. Спортсмен не чувствующий противника никогда не достигнет значительного спортивного результата.”; „Хорошо чувствуя противника использую его ошибки, что позволяет на выигрыш схватки.”. На другие вопросы обратили внимание некоторые каратеки: „Чувствуя противника можем избежать опасных ситуаций и достигнуть перевеса, а также соответствующим образом распределить силы во время всей схватки.”; „...чем высший уровень «чувства противника», тем лучше стиль проведённых схваток, вызывает меньшую усталость организма и уменьшение количества полученных травм”. Из перечисленных фактов можно сделать вывод, что уровень этого чувства обуславливает достижение благополучного исхода схватки.

7. „Чувство противника” - сторонняя дифференцировка нижних конечностей

В спортах единоборства важную роль выполняют нижние конечности. Их значение особенно возрастает в вольной борьбе и карате. В карате действия, выполненные при помощи ног получают самые высокие оценки (очки). Быстрота движений ног, связанная с силой «ударов», решает результат схватки. Результаты исследований доказали **значительно низкий уровень кинестетических ощущений нижних конечностей по сравнению с верхними** [Starosta, 1975]. Многолетняя спортивная тренировка снижает порог чувствительности, т.е. повышает уровень пространственной, временной и силовой дифференцировки движений. Высокий уровень технического мастерства требует почти одинакового участия в схватке обеих конечностей. **Решительное большинство мнений анкетированных борцов классического (87.5%) и вольного стиля (81.5%) и каратек (60%) свидетельствует о доминировании правой конечности.** У небольшого количества борцов лучшее чувство касалось левой ноги (6.3%) классического и вольного стиля (7.4%). У каратек проявлялось оно у 40% исследуемых. Интересными были мнения, касающиеся причин сторонней дифференцировки конечностей. Вот избранные из них, касающиеся борцов: „...я правосторонний спортсмен, большинство технических элементов выполняю правой рукой и ногой.”; „...потому, что чаще всего на тренировках пользуюсь правой ногой.” По другому обосновали это каратеки: „...правая нога имеет более мощные и точные удары.”; „...в карате предпочтительно положение во время схватки, в котором левая нога отличается высшим уровнем чувствительности, скорости однако есть немного слабее в формировании функционального деления конечностей, в том числе ведущей ноги в следствии более частого её применения в тренировке, что со временем превращается в привычку”. Возможность совершенствования „чувства противника” путём симметричного выполнения технических элементов заметило немного спортсменов — главным образом борцы (6.3-11.1%).

9. „Чувство противника” - уровень двигательной координации

Эту связь заметило большинство борцов (96.3-100%) и половина каратек. Такой связи не заметило 50% каратек. **Подавляющее большинство борцов обеих стилей (96.3-100%) и каратек (95%) считала, что высокий уровень двигательной координации способствует формированию „чувства противника” как составной части технического мастерства.** Интересно по этому поводу высказались призёры олимпийских игр: „Координация имеет большое влияние на уровень «чувства противника»(A.W.); „Двигательная координация и это чувство идут в паре. Движения становятся более простыми для овладения и выполнения.” (R.W); „...способный спортсмен имеет лучшую двигательную координацию и потому его «чувство противника» является более высоким.” (Z.W.); „...способности и двигательная координация способствуют более быстрому овладению техники борьбы в следствии чего наступает улучшение чувства.” (P.S.)

Материал, собранный при помощи опросного листа, пополнено анкетой, которую проведено (проведённой среди) на 24 борцах. Он касался влияния отдельных координационных способностей на протекание схватки во время соревнований. В анкете учли 8 способностей и задачей исследуемых было определение в процентах влияния их на результат схватки (рис.5). В этой иерархии ведущее место заняли следующие способности: быстрота реакции, (22%), сохранение равновесия (18%), приспособление

(адаптация), соединение движений (15%), временно-пространственная ориентировка (12%), дифференцировка движений (11%). Эта ориентировочная иерархия может быть предметом дискуссии.

10. „Чувство противника” - внешние условия

Влияние внешних условий на изменения этого чувства наблюдало у себя большинство борцов (62-67%) и половина каратек. **Низкая температура внешних условий (среды) снижает качество применяемой техники, т.к. оптимальная может способствовать проявлению высшего уровня „чувства противника” и более совершенной техники.** Избранные мнения борцов: „...слишком высокая или низкая температура отрицательно влияет на психо-двигательную систему, освещение меньше влияет на „чувство противника; одновременно вид и качество ковра существенным образом влияют на его уровень.”; „...высокая температура внешних условий и связанное с ними потение противника во время схватки усложняют способность предвидения акции.”; „...в тёплом и хорошо освещённом помещении во время схватки на гладком и упругом ковре повышается уровень „чувства противника”; „Проявляется это также в более быстром «реагировании»”. **Даже 33-38% борцов и 50% каратек считало, что внешние условия не влияют решительным образом на эффективность схватки.** Вот мнения борцов, обосновывающие эту точку зрения: „...на каждом ковре и в каждой обстановке, когда спортсмен имеет чувство, тогда оно будет неизменным.”; „...для меня эти условия не имеют значения, если я хорошо подготовлен и это чувство имею на определённом уровне”.

10. „Чувство противника” - эмоции

Ответы на вопрос, касающийся влияние эмоций был дифференцированный. Много спортсменов заметило **отрицательное влияние эмоций на уровень „чувства противника”**: (37.5%) борцов классического (44.4%) и вольного стиля, 40% каратек. Подтвердили это ответы некоторых борцов: „...чем высший уровень эмоций, тем меньше способность оценки ситуации и эффективность выполняемых действий.”; „...под влиянием стресса снижается уровень «чувства противника»”. Меньше исследуемых считало, что эмоции влияют на них мобилизирующим образом (12.5% борцов классического, 14,8% вольного стиля). 60% каратек отмечало положительное влияние эмоций на уровень „чувства противника”. Дополняют это их высказывания: „...высокий уровень эмоций во время схватки может способствовать возрастанию «чувства противника»”; „...у хорошего и опытного спортсмена «чувство противника» под влиянием эмоций улучшается.”; „...говорится тогда, что он достиг мастерского уровня.”

На другие аспекты влияния эмоций на уровень этого чувства обратили внимание призёры олимпийских игр: „...чем больше спортсмен скован, психически блокирован, тем ниже это чувство.” (R.W.); „Чувство противника» снижается после проигранной схватки, нервного волнения, несправедливого решения судей.” (W.Z.); „...когда я во время схватки нахожусь под влиянием эмоций, я слабо сосредоточен, тогда это чувство снижается.” (P.S.); „Это связано с психикой каждого спортсмена, если будешь бороться с сильнейшим противником, это чувство снижается (теоретически).” (J.F.)

12. Способы формирования „чувства противника”

Подавляющее большинство исследуемых (80% каратек, 93% борцов) утверждало, что **только контакт с противником делает возможным формирование этого чувства, т.е. в естественных условиях и во время соревнований.** Кажется, что во время борьбы (схватки), направленной на победу выступают благоприятные условия для сосредоточения внимания на ощущениях, создающих „чувство противника”. Возможно, спортсмены, отвечающие на этот вопрос, имели в виду совершенствование этого чувства после сформирования его во время тренировочных схваток. Немногие считали **лучшим способом его формирование во время совершенствования техники (20% каратек) или тренировки с партнером во время «технической тренировки», то есть специально направленной на совершенствование отдельных упражнений.** Немногие заметили возможность формирования этого чувства путём идеомоторной тренировки, а также генетическую обусловленность этого чувства и невозможность его формирования (4.7%). Приводится содержание избранных мнений: „чувство противника” можно формировать только путём свободной схватки, в которой исполняемые технические элементы не будут никем режиссированными.”; „...борьба с разными противниками о разной соматической структуре, степени тренированности, умении.”. Интересно звучали высказывания призёров олимпийских игр: „...во время тренировок в схватках со специальной задачей.” (A.B.); „...путём тренировки и анализа схваток по видеозаписи.” (B.J.); „...во время схватки с более лёгким партнёром, который располагает большой скоростью и является эластичным”. (P.S.).

13. Использование „чувства противника” в разных видах тактики

На основе результатов анкеты, проведённой на 62 лицах, в том числе 28 борцах классического, 10 вольного стиля, 11 женщинах, занимающихся борьбой и 14 тренерах пытались определить величину (%) использования „чувства противника” в 4 разных видах спортивной тактики (рис.6). Самые высокие величины для атаки выступили у борцов классического стиля (35%). Значительно ниже они были у борцов вольного стиля (25%) и тренеров (26%). **В защите самые высокие показатели „чувства противника”**

характеризовали мнение тренеров (31%) и борцов — женщин (28%). В контре самые высокие результаты относились к борцам вольного стиля (32%) и тренерам (27%). В контратаках величины были похожие в 4 исследованных группах, но самыми высокими величинами отличались тренеры (29%). Эти мозаикообразные результаты чувства, полученные на разных группах, свидетельствуют о значении „чувства противника” в различных видах тактики спортивной борьбы. Однако эта дифференцировка не была значительной, что кажется указывать на большое значение этого чувства во всех видах тактики спортивной борьбы независимо от спортивной специализации и пола. На особое внимание заслуживают мнения, выраженные в процентах довольно многочисленной группой лиц.

14. Влияние отдельных видов спортивной подготовки на результат борьбы

В очередной части дополнительной анкеты пытались точно (%) определить величину влияния отдельных видов подготовки на конечный результат схватки в борьбе (рис.7). Исследованиям подвергли 63 лица, т.е. борцов классического и вольного стиля, женщин, занимающихся борьбой и тренеров. Среди видов подготовки учтено: мышечную силу, „чувство противника”, технику, тактику, двигательную координацию и другие. Борцы классического стиля на первом месте поместили силу (28%), а на следующих — технику (24%) и „чувство противника” (21%). По мнению борцов вольного стиля иерархия была следующей: техника (22%), а два следующие места заняли одновременно „чувство противника” и тактика (21%). Женщины, занимающиеся борьбой считали, что самое большое влияние на конечный результат схватки имеют: техника (29%), тактика (26%) и „чувство противника” (23%). Похожую иерархию определили тренеры: техника (26%), тактика (22%), „чувство противника” (19%). Во всех группах одно из ведущих мест занимало „чувство противника” как существенным образом влияющее на конечный результат спортивной борьбы. Неожиданно далёкое, но такое же 5 место с 11-16% заняла двигательная координация. Это самая высокая величина относилась к мнениям тренеров.

15. Ориентировочная структура „чувства противника”

На основе результатов собственных исследований и других авторов, а также тренерского опыта составлено ориентировочную структуру „чувства противника” в дзюдо [Starosta, Blady, 1998]. Учтено в ней только 5 среди 11 координационных способностей: кинестетическую дифференцировку движений и их ритмизацию, пространственную ориентировку, быстроту реакции, сохранение равновесия (рис.8). Несмотря на принятие во внимание только части координационных способностей её структура состояла из 28 составных. Самое большое их количество находилось в рамках пространственной ориентации (n=9) и кинестетической дифференцировки движений (n=7). Эту структуру разработано для дзюдо, однако многие из её составных относятся также к другим видам единоборства. Эту структуру надо рассматривать как ориентировочную, т.к. в ней не учтено всех координационных способностей и разработано её на основе немногочисленных исследований и опыта относительно небольшой группы лиц. Однако даже её начальный образ может быть предметом исследований, проверяющих представленный вариант, тем более, что до сих пор не представлено другого в богатой литературе.

Дискуссия

В результате проведенных исследований установлено выступление самого высокого „чувства противника” в стартовом периоде тренировки и самого низкого в переходном и подготовительном. Аналогичные результаты получено в исследованиях спортсменов тэквон-до [Blady i in., 1998] и спортивных игр [Starosta, 1995, 2003]. Эта тенденция была согласной с основными принципами спортивной тренировки.

Объемистое понятие „чувства противника” на основе мнений исследуемых было предварительно определено, что может иметь большое значение для практики. Благодаря высокому уровню этого чувства появляется: способность предвидения, предчувствия движений противника и срочного реагирования на них, умение выполнения контрующих действий целым телом на движение противника, умение использования силы противника в свою пользу, способность чтения намерений противника, а также их полной контроли, способность быстрого распознавания и реагирования на импульс противника. Эти элементы решают о эффективности применяемых технико-тактических приемов во время схватки, т.е. о победе [Starosta, 1995]. Анализ результатов проведенного исследования позволил на определение сильной связи выступающей между „чувством противника” и достигнутым спортивным результатом (95-100%).

Симметризация движений основывается на выравнивании способностей обеих сторон тела. Она требует от спортсменов выполнения упражнений менее „способной” стороной тела (верхней или нижней конечностью, в том числе также с вращением), что способствует развитию, двигательной координации а посредственно повышению уровня „чувства противника” ведущей сторон тела [Starosta, 1975, 1990, 2003]. В представленном материале исследований пропорции борцов право ног до лево ног равнялся как 5:1 (вольный стиль) или 7:1 (классический стиль). Только у каратек был он более выгодный. Немногие борцы указывали на одинаковый уровень чувства обеих конечностей

(6.3% борцы классического стиля и 11.1% вольного стиля). Это была группа борцов не только обу-ножных, но тоже обусторонних, т.е. выполняющих упражнения симметрично. Они принадлежат к опасным противникам, применяющим разнообразные варианты техники. **До группы этих всесторонних борцов принадлежали среди других, А. Супрон, Р. Сверад, Р. Михалик – многократные призеры самых престижных международных соревнований.** Кажется, что процесс симметризации движений недооценивается еще в тренировке польских спортсменов некоторых видов единоборства несмотря на то, что, например, у японских дзюдоков являлся он обязательным. В таком варианте появился этот вид спорта в Польше, однако позже об этом забылось. Несмотря на это некоторые польские спортсмены по собственной инициативе симметризовали свои технические умения, благодаря которым достигали успехов на международной арене, как, например, Е. Павловский (призер Олимпийских Игр в Сеуле).

„*Чувство противника*”, его содержание и структура являлись трудным вопросом, однако оказалось возможным его начальное определение. **Это чувство имеет очень важное значение в формировании технического мастерства. Заметило это большинство исследуемых спортсменов.** Также как связь, выступающую между этим чувством и внешними условиями. Оптимальные условия способствуют проявлению высшего уровня „*чувства противника*” и техники. Зависит оно тоже от психического состояния спортсмена. Слишком большие эмоции могут негативно влиять на него, а оптимальные – мобилизовать.

Представленные результаты охватывают только часть рассматриваемого вопроса. В синтетической форме представлено мнения, выраженные относительно только 15 вопросов. Много из них очень интересны, в связи с отсутствием места не обсуждено. **Исключительную стоимость имеют мнения очень опытных спортсменов, особенно борцов классического стиля, из которых многие принадлежали к мировой элите.**

Выводы

1. Преобладающее большинство борцов обеих стилей (65%) под понятием „*чувства противника*” понимало: „**способность предвидения, чувствования движений противника и молниеносного реагирования на них.**” Похожим способом определено это чувство на основе высказываний каратек: „**способность предвидения поведения противника во время схватки**”.
1. Пытались определить внутриперсональные обусловленности формирования „*чувства противника*”. Спортсмены разных видов единоборства перечислили сходные составные: врожденные предпосылки, высокий уровень двигательной координации, мышечное чувство, высокий уровень технического мастерства, психическую сопротивляемость, умение сокращать и расслаблять мышцы, быструю реакцию, умение предвидеть движения противника, самочувствие, интеллектуальные способности, опыт.
2. В понимании многочисленной группы борцов обеих полов „*чувство противника*” проявляется в: **быстрой реакции, контроле протекания схватки, соответствующим напряжением мышц, предвидением намерений противника, выбором самых лучших моментов для атак, быстрой и точной оценкой событий на ковре, соответствующим положением тела во время схватки.**
3. Ответы на два первые вопроса создают составные, из которых можно сконструировать более полное определение „*чувства противника*”.
4. Симптомы низкого и высокого уровня синтетического сформулирования этого чувства было разное у борцов и каратек. Дифференцировка выступила в мнениях отдельных борцов: „*Чувство противника проявляется в соответствующей реакции и контроле движений противника, а низкий – стрессом, постоянным напряжением мышц и запаздывающей реакцией*”; „*...непосредственный контакт с как можно большей поверхностью тела противника создает хорошее чувство, чем меньше эта поверхность, тем чувство худшее*”; „*При высоком уровне этого чувства чувствую в ладонях изменения напряжения мышц противника и знаю когда он начнет атак, а также когда он делает ложную атаку, знаю тоже когда он расслабляется. Тогда чрезмерно не мучаюсь в простых действиях. При низком уровне этого чувства я должен быть в ста процентах бдительным и внимательным, не сумею предвидеть следующей акции противника, а имея ощущение, что он слабее меня, проигрываю схватку*”.
5. Борцы обеих стилей перечислили 15 факторов, влияющих на высокий или низкий уровень „*чувства противника*” расставляя их иерархически на основе процентных величин. Были они согласны относительно трех первых: врожденных предпосылок, уровня тренированности и двигательных способностей. Каратек перечислили 12 таких факторов, из которых часть не выступила у борцов: степень ангажирования в схватку, атмосферные условия, состояние здоровья, самочувствие.
6. **Самый высокий уровень этого чувства у преобладающего количества борцов вольного стиля (88.9%), классического стиля (93.7%) и каратек (95%) появлялся в стартовом**

- периоде.** Только у немногочисленных анкетированных выступал он в подготовительном периоде (5-20%). Значительное расхождение мнений касалось самого низкого уровня этого чувства.
7. Преобладающее большинство борцов классического стиля (62.5%), вольного стиля (92.5%) и каратек (65%) самый высший уровень чувства противника появлялся в главной части тренировочного занятия.
 8. Подавляющее большинство борцов обеих стилей и кататек (95-100%) заметила связь между уровнем этого чувства и достигнутым спортивным результатом.
 9. Преобладающее большинство мнений борцов классического стиля (87.5%), вольного стиля (81.5%) и каратек (60%) свидетельствовала о доминировании правой нижней конечности, т.е. высшего уровня ее чувства.
 10. Связь между уровнем двигательной координации и „чувством противника” наблюдало преобладающее большинство мнений борцов (96.3-100%) и половина каратек. Связи такой не заметила большая группа каратек (50%).
 11. Влияние внешних условий на изменение чувства заметило у себя большинство борцов (67%). Одновременно, значительно численная группа борцов (33%) и 50% кататек не наблюдало влияния внешних условий на эффективность схватки.
 12. Ответы на вопрос, касающийся влияния эмоции были дифференцированные. Значительное количество спортсменов выразила мнение об отрицательном влиянии эмоции на уровень „чувства противника” (37.5% борцов классического стиля 44.4% вольного стиля, 40% каратек). Часть опрошенных считала, что эмоции на них влияют мобилизирующим образом (12.5% борцов классического стиля, 14.8 вольного стиля, 60% каратек).
 13. Преобладающее большинство исследуемых утверждала, что **только контакт с противником способствует формированию этого чувства.** Возможно речь шла о совершенствовании этого чувства после формирования его во время тренировочных схваток. Некоторые считали, что лучшим способом его формирования является схватка с партнером во время тренировки, особенно в выделенное время на техническую тренировку.
 14. На основе дополнительных анкетных исследований, проведенных на 63 борцах обеих стилей и пола определено величину использования „чувства противника” в разных вариантах тактики. Самые большие величины касались атаки и обороны. Величины эти были разные в различных группах.
 15. На аналогичной группе исследуемых (n=63) пробовано определить иерархию и величину влияния отдельных составных спортивной подготовки спортсмена на спортивный результат. В этой иерархии высокое место заняло „чувство противника”, перечисленные на 3 месте разными группами исследуемых.
 16. На основе собственных результатов исследований и других авторов, а также тренерского опыта составлено ориентировочную структуру „чувства противника”, учитывающую 5 координационных способностей. Состояла она из 28 элементов. Разработано ее для дзюдо, однако много ее составных может касаться также других видов единоборства.

MONITORING OVERTRAINING IN WOMEN WRESTLERS

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INTRODUCTION

As athletes strive to improve their performance, they invariably increase the frequency, volume and intensity of training. In doing so, they invariably experience fatigue. This fatigue ranges from short-term “normal” fatigue when recovery is achieved within hours or days, to longer-lasting “abnormal” fatigue where recovery is prolonged [29]. This latter aspect of recovery can be divided into a number of distinct duration phases, that include functional overreaching (FOR), non-functional overreaching (NFOR) and the overtraining syndrome (OTS) [30]. Recovery accompanying the FOR state typically occurs within two weeks, is a vital part of training and often utilized by athletes during a typical training cycle prior to a period of recovery. It is further hypothesized that FOR stimulates a super-compensation effect and, as a result, increases performance to a level higher than previously attained [7].

With regard to NFOR, however, recovery may take several weeks (i.e., > 3 wks), eventually leading to the OTS [21]. Subsequently, OTS may last months or years, during which time athletes are unable to sustain normal training and have significant decrements in performance, combined with physical and psychological health problems [30]. For both athletes and coaches alike, monitoring pre-competition training is important for determining, and hence, trying to avoid the occurrence of NFOR or OTS. Female wrestling has grown in popularity since being accepted into the Olympic Games in 2004. According to the international wrestling rules, wrestling is a dynamic, high-intensity intermittent sport that requires complex skills and tactical excellence for success. A wrestling athlete has needs to have a high anaerobic capacity as indicated by very high blood lactate values (up to 20 mmol·L⁻¹) after a match [15]. Typically, medalists at a tournament perform five to seven matches during a single-day, with each match having three 2-minute rounds with a 30-second rest between rounds. Consequently, to be successful in international competitions, wrestling athletes need a high level of physical fitness [34]. Wrestling as a sport demands several specific characteristics, including maximal strength, aerobic endurance, and anaerobic capabilities to achieve success in competition.

The incidence of overtraining in different sports has shown wide variation which seems due to the duration of assessment. Lower incidences of ~10% to 20% were derived from single training seasons or cycles [22, 25], whereas higher incidences of around 60% have been observed in studies that assessed entire athletic careers [23]. This suggests that the incidence is positively associated with the duration of participation [20]. With respect to young athletes, approximately one-third of young athletes have experienced NFOR or the OTS, and the incidence was significantly higher in individual sports, low-physical demand sports, females, and at the elite level [20]. To the best of our knowledge, no studies have investigated overreaching in elite wrestlers. The main aim of the present study was to report the incidence of FOR, NFOR, and the OTS in elite female wrestlers, using a retrospective longitudinal 8-yr observation of the Chinese women’s wrestling team during their normal training and competition schedules. A second aim was to explore the utility of markers for the early detection of overreaching.

METHODS

Subjects

One hundred and fourteen women from the national Chinese wrestling team were included in the study. The minimum time for observing each wrestler during the 8-yr monitoring period of the study was 1 yr, and each of the 13 wrestlers ranked in the top three in the World Championships were monitored for more than 4 yr. The number of wrestlers, and the mean (SD) age, height and body mass of the wrestlers in each Olympic weight class, are shown in Table 1.

Table 1. The number of wrestlers and the mean (SD) age, height and body mass for each Olympic weight class and for all 114 wrestlers.

Weight class	n	Age (yr)	Height (cm)	Body mass (kg)
48 kg	31	22 (3)	158.9 (3.5)	52.7 (1.7)
55 kg	30	23 (2)	163.5 (2.8)	60.4 (2.2)
63 kg	32	23 (3)	168.1 (2.2)	67.1 (1.8)
72 kg	21	23 (2)	173.6 (2.5)	74.0 (2.3)
Total	114	23 (2)	165.4 (5.9)	62.7 (7.9)

Classification of FOR, NFOR and the OTS

Classification of FOR, NFOR and the OTS was based on suggestions provided in the European Congress of Sports Medicine Position Statement [21]:

- Functional overreaching (FOR) = the wrestler experienced decreased physical performance, which was followed by full recovery and enhanced physical performance within 2 wk of engaging in an appropriate recovery regimen.
- Non-functional overreaching (NFOR) = if episodes of decreased physical performance lasted 2-6 wk.
- Overtraining syndrome (OTS) = if episodes of decreased physical performance lasted more than 6 wk [2].

The assessment of a decrease in physical performance was completed by experienced coaches based on the wrestler's inability to maintain the scheduled training load and a decrease in the wrestler's combative scoring point. The combative scoring point system is an evaluation of competition performance using a 6-point scale: 0 = the athlete is 'off her game' and performance is significantly decreased; 1 = performance is better than 0, but still lowered; 2 = performance is slightly below normal; 3 = no improvement from the original level; 4 = performance is slightly enhanced; and 5 = performance has improved considerably and the athlete is performing at a high level. Full recovery of a wrestler was confirmed when she reestablished the ability to maintain high-intensity training and her combative scoring point increased. If the two criteria were not met simultaneously, the wrestler was not considered to be fully recovered.

RESULTS

Incidence of FOR, NFOR and the OTS

There were 13 instances of FOR, 23 instances of NFOR and 2 instances of the OTS for the 114 wrestlers during the 8-yr monitoring period. Categorization of FOR, NFOR, and the OTS was mutually exclusive for a given wrestler in a given training period for a competition; for example, a wrestler recorded as experiencing NFOR within a competition training period was not also recorded as experiencing FOR. During the 8-year monitoring period, one wrestler experienced FOR on three occasions, two wrestlers experienced FOR twice, and six wrestlers experienced it once. Two wrestlers experienced NFOR on three occasions, three wrestlers experienced NFOR twice, and eleven wrestlers each experienced it once. Nine (69%) of the 13 athletes who had ranked top-3 in World Championships experienced NFOR at least once. The two instances of the OTS were from different wrestlers. Taking into account the number of wrestlers in the team, and the number of incidences of overreaching and the OTS during a given monitoring period, this gave a prevalence of 3.6%, 6.4% and 0.6% for FOR, NFOR and the OTS, respectively.

Valuable markers and assessment reference thresholds

The overreaching state was concurrent with the fluctuation of HRV parameters. When these elite athletes were in an overreached state, the HRV parameters appeared to have two types of changes. One was a significant decrease, while other wrestlers exhibited a significant increase in HRV indices. Those with a normal response were classified as "normal" and examples of these responses for the time domain indices of rMSSD and SDNN are presented in Figure 1. The time domain indices SDNN and rMSSD were statistically significant for each pairwise comparison (*all*, $p < 0.0001$).

Table 2 shows the frequency domain parameters for heart rate variability (HRV) in normal recovery and overreached women wrestlers. As for TP, HF, LF and VLF, there were significant difference between increased response and normal response athletes (*all*, $p < 0.0001$), but not between those exhibiting a decreased response and those with showing a normal response to training. As for LF/HF, there were significant difference between decreased and normal responders ($p = 0.002$), however, there was no significant difference between the high and normal responders ($p = 0.662$).

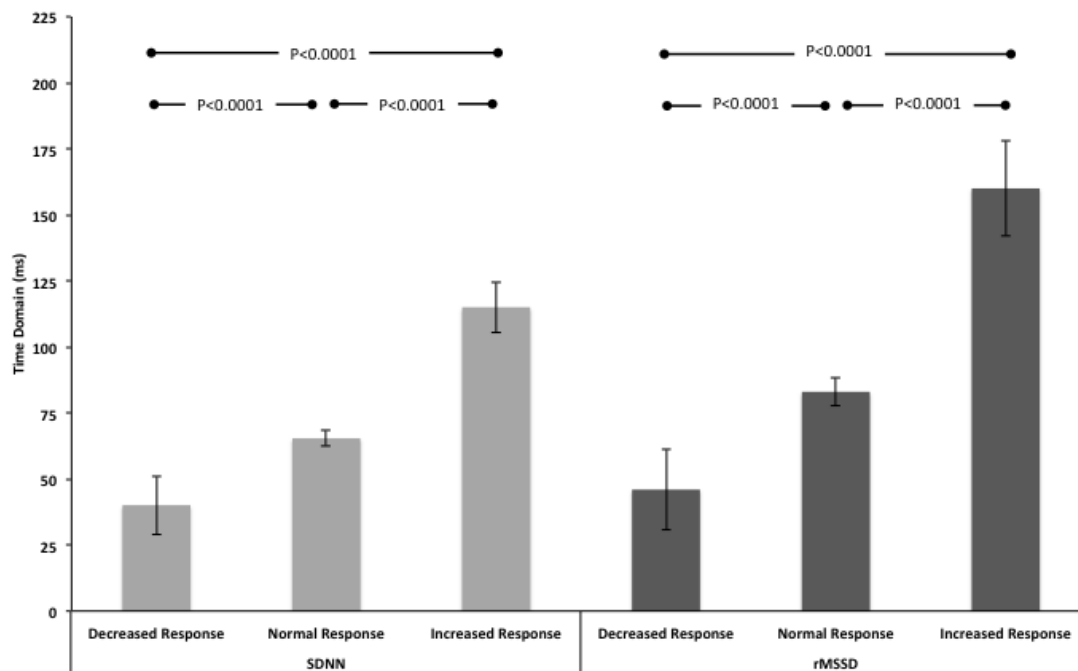


Figure 1: Data are the mean and 95% CI for the time domain indices representing the standard deviation of all normal RR intervals (SDNN) and the square root of the mean of the sum of the squares of differences between adjacent RR (rMSSD). All pairwise comparisons are significant (P<0.0001).

Table2 Frequency domain parameters for heart rate variability (HRV) in normal recovery and overreached female wrestlers

	State	N	Mean	95% CI	
				Lower bound	Upper bound
TP (ms ²)	Decreased response*	29	865.76	258.95	1472.57
	Normal response	216	1655.17	1451.46	1858.87
	Increased response ††	32	5422.59	4427.95	6417.24
LF (ms ²)	Decreased response	29	228.86	65.77	391.95
	Normal response	216	318.26	278.70	357.82
	Increased response ††	32	1052.19	781.33	1323.05
HF (ms ²)	Decreased response*	29	539.59	106.74	972.44
	Normal response	216	1224.37	1039.67	1409.08
	Increased response ††	32	4151.81	3196.84	5106.78
LF/HF	Decreased response*	29	0.7276	0.4511	1.0041
	Normal response	216	0.4079	0.3414	0.4743
	Increased response †	32	0.3656	0.2392	0.4921
VLF (ms ²)	Decreased response	29	97.24	29.13	165.35
	Normal response	216	112.59	100.05	125.13
	Increased response ††	32	218.56	151.35	285.77

Footnote: N means the total number of measurements of all athletes when they are normal recovery or overreaching state accompanying with the decrease or increase of HRV parameters.

*P<0.05 for Decreased response vs Normal response; † P<0.05 for Increased response vs Normal response; **P<0.0001 for Decreased Response vs normal response; †† P<0.0001 for Increased response vs Normal response

DISCUSSION

The main aims of the current study were to establish the incidence rates of FOR, NFOR, and the OTS in elite female Chinese wrestlers during their normal training and competition schedules over an 8-yr monitoring period. And this is the first study, to our knowledge, to report the incidence of FOR, NFOR and OTS in female wrestlers. The primary finding from our current study is that we were able to identify athletes involved in strenuous international competition using HRV to determine FOR and NFOR. Interestingly, these athletes demonstrated either an increase or decrease in several HRV indices examining parasympathetic and mixed nervous system activity. For those athletes experiencing NFOR, the associated change in HRV indices persisted for three weeks or more, each with a concurrent decrease in physical performance. Overall, therefore, periods of excessive training with inadequate rest likely result in autonomic nervous system imbalance. Despite the observation of both an increased and decreased HRV responses, our observations and hypotheses are supported in the literature by studies showing increased exercise induced plasma levels as well as the unstable urinary excretion of catecholamine's in overtrained athletes^[16, 17].

In general, two clinical forms of overtraining have been noted involving sympathetic and parasympathetic changes^[18]. The early stages of overtraining, often referred to as overreaching phase, are characterized by an increase in sympathetic autonomic tone. If overreaching continues, overtraining develops and is marked by a predominance of parasympathetic tone^[18]. Under this scenario, it has been postulated that sympathetic tone increases due to an overstimulation of the sympathetic nervous system secondary to exercise training and/or inadequate periods of recovery. Eventually, this condition evolves into a combination of inhibition, desensitization, and exhaustion of the neuroendocrine system, whereby the parasympathetic modulation then dominates^[1, 5, 18, 33]. Thus, the relative state of overreaching/overtraining reflected by the neuroendocrine system may account for the varied response in HRV indices we observed in our current study.

Unfortunately it is difficult to determine the neuroendocrine contributions of HRV perturbations, as only rMSSD^[1, 6, 24] and HF^[19] can be used to examine parasympathetic activity, while SDNN and LF represent mixed sympathetic and parasympathetic tone. Moreover, while there are no blood values to substantiate the directionality of the HRV changes we observed, the HRV changes we did observe are easy to obtain and non-invasive. Thus, from a practical standpoint, if an athlete did present with persistent increases or decreases in HRV accompanying training, they could then follow up with blood work rather than undertake the cost burden of sequential blood work and analysis.

Overall, it is our opinion that based on our findings and the results of others that HRV can be used as an "early warning system" to detect whether an athlete is overreaching, or more importantly, overtraining. In our study, we found two distinct HRV fluctuation patterns that if exceeded for two weeks, regardless of directionality, impeded recovery time. One pattern is where the HRV indices, rMSSD, SDNN and HF were significantly reduced, and simultaneously, the LF/HF ratio was significantly increased. In essence, if the LF/HF ratio encompasses both sympathetic and parasympathetic tone, then an increase in the LF/HF ratio would be driven by the decrease in HF, which serves as the denominator of the HRV LF/HF ratio equation. This NFOR state appeared to be the consequence of an imbalance between prolonged periods of training, where the training load was too high, with too little time for recovery.

The second pattern is where the HRV parameters were significantly increased. During this increased NFOR state, we observed that athletes were under too much accompanying psycho-emotional stress, such as too many competitions and too many non-training stress factors (social, educational, occupational, economical, nutritional, travel, and time stress). These latter points cannot be ignored as the autonomic nervous system function is associated not only with overreaching/overtraining, but with CVD risk and a number of health-related issues, such as mood, depression, anthropometry, cognitive, executive functioning, and vagal control of the cardiovascular system^[3, 4, 9, 12-14, 31]. Thus, contributors to alterations in HRV can be caused by various physical and psychological stimuli, which can ultimately be "exhausting" and should be given equal consideration when attempting to assess an athlete's health whilst in an overreached or overtrained state. Therefore, it is conceivable that NFOR can be both sympathetically and parasympathetically driven, potentially giving coaches insight into both the physical and psychological components of an athlete's health.

The information about changes in HRV due to overreaching/overtraining is sparse and the findings are inconsistent. Hedelin and colleagues (8) investigated nine canoeists before and after a training regimen corresponding to 50% increase in normal training load applied for six days. No significant differences were found in HRV parameters, and they concluded that the HRV data did not support an altered autonomic balance in these athletes. A case study by the same authors in a junior cross-country skier, showed increased HF and total power in

the supine position compared with before and after, and no significant change in LF power, suggesting an increased parasympathetic activity^[8]. In another study, the HRV parameters, rMSSD, TP, LP, HP and LF/HF of twelve severely overtrained athletes was measured during sleep and when awake. Overtrained athletes had lower HRV especially SDNN and LF component than control athletes after awakening. This difference could not be seen during night sleep; however, overtrained athletes had larger decreases in awakening HRV components than control athletes^[10].

Pichot and co-workers^[26], assessed autonomic nervous system activity in seven middle distance male runners during their usual training cycle (three weeks heavy training, followed by a relative resting week). The HF and HFnu showed a significant decrease from week 1 to week 3 and a significant increase from week 3-4. Their results confirmed that heavy training shifted the cardiac autonomic balance from parasympathetic to sympathetic drive. Uusitalo et al.^[32] studied a study in which 15 endurance-trained women divided into either high or low intensity training groups. This resulted in an overtraining of the former group after a period of 6-9 weeks. The main finding from this group was a significant increase in the LF component in high intensity group when obtained in the supine position, but not in the low intensity training group. Lellamo et al.^[11] studied seven Italian junior rowers during a 20 day period prior to the rowing World Championship. At 100% training load, the LF showed an increase, while the HF component decreased. The work of these two authors^[11, 32] supports the previous work of Pichot et al.^[26]. However, the work of Portier et al.^[28] is contradictory to these three studies^[11, 26, 32].

These authors^[28] tested eight runners twice, after a relative rest period of three weeks, followed by a 12-week intense training period for endurance. They found that the LF was significantly lower in the supine position. In another study^[27], six sedentary men successfully completed two months of intensive cycle ergometer training and one month of overload training followed by two weeks of recovery. During the intensive training period, physical performance increased significantly as did the HRV parameters HF, rMSSD, PNN50, and SDNN. There was also a significant shift in the autonomic nervous system toward a predominance of its parasympathetic arm (LF/HF, LFnu, HFnu). During the overload training period, there were no significant changes in the parasympathetic indices (PNN50, rMSSD, SDNN, HF), which suggest a progressive increase in the sympathetic activity as determined by the LF/HF ratio^[27].

A strength of our study is that we examined a relatively large cohort of international women wrestlers, who showed that an increase and decrease of parasympathetic activity were both accompanied by the occurrence of overreaching. In a practical training environment, the state of OR/OT is caused by the sport-specific stress caused by the periodization of training (physiological stress) or non-training factors (psychological and social stresses), or a combination of the two. This may be manifested by various symptoms of overreaching/overtraining and then fluctuations in a variety of HRV parameters. However, our study is not without potential limitations. Because the subjects were top athletes, the sample was still somewhat small, despite being larger than similar studies from other athletic populations. As to a given athlete, one or two HRV parameter data were not measured during preparing for a given competition because she had changed training plan or had participated in meetings or social activities. It should also be noted that we cannot report on the athletes' body composition and rapid fluctuations in anthropometry may affect HRV. We also do not have any laboratory performance parameters to help substantiate our findings. Still, it must be remembered that wrestling is a complex sport that demands a number of specific characteristics, such as maximal strength, aerobic endurance, and high anaerobic capabilities to achieve success in competition^[15, 34]. Hence, it is difficult to select one or two specific capacity indices, which are related to competition performance, and it is also difficult to design tests that diagnose specific performance under laboratory conditions. We could also be criticized for not accounting for hydration status and acute dietary restrictions that often accompany weight loss practices in wrestlers. However, it is not standard practice for Chinese wrestlers to engage in acute weight loss practices during training, or prior to matches through dehydration or food reduction. Specifically, the athletes are monitored to avoid this scenario. These are, however, points that should be carefully considered when monitoring an athlete when using HRV. Overall, we feel that our results are intriguing as coaches must bear in mind that the elite athlete is also young and does not live in a cloistered environment, but must exist with a number of psycho-social stressors also influencing their lives.

CONCLUSIONS

In the overreaching state, the HRV parameters (SDNN and rMSSD) measured at night and prior to sleep increased or decreased significantly compared with normal recovery in the supine position. While athletes in a FOR state needed only 1-2 weeks to recover, those moving into an NFOR state needed more than 3 weeks to recover regardless of the directionality of the HRV indices we measured.

PRACTICAL APPLICATIONS

Our study provided additional information regarding the assessment of overreaching using the non-invasively derived indices of HRV as a diagnostic criterion. Therefore, HRV may serve as an easily derived “early warning system” that is easily obtainable. When large perturbations in HRV are noted for an athlete that persisted for longer than 2 weeks, this may aid in determining further follow-up testing that is more invasive in nature, such as measuring plasma catecholamine’s, inflammatory markers, etc. Coaches and athletes can utilize the HRV parameters reference thresholds to monitor training and hence avoiding the occurrence of NFOR/OT in preparing for important international competitions.

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SUNRISE TO SUNSET – GROWTH, DEVELOPMENT & MATURATIONAL ISSUES IN THE LIFESPAN OF THE WRESTLER

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Scientists study data and look for relationships in order to make generalizations to explain behavior. We identify specific traits in groups of interest (often differences in means). We are not only interested in the mean, or averages, but also with the “outliers.” These are often the champions who perform far outside the norm. Scientists, coaches and other athletes look to these special people and attempt to mimic the traits that make these champions so special, and apart from the normal distribution.

The techniques, practices and behavior we use to achieve to one’s ultimate performance capacity is primarily through training, but also through a myriad of other influences from the environment, heredity and their interaction. These influences or factors both comprise and shape this capacity over the span of a lifetime. Additionally, the presence, or indeed absence, of these factors and influences at various points on the lifespan can dictate this performance capacity at a distant point in the future.

Allow me to schematically represent in Fig. 1 a hypothetical generalized wrestling performance capacity curve over the lifespan of a wrestler, along with the developmental and life stages. The level of performance needed for a world championship is shown above the generalized and normative performance capacity of most wrestlers. We know that the individual performance capacity curve of some rare wrestlers reach high enough to attain that golden status. It is also well known that there are some athletes who possess the necessary capacity, but never reach it! The work of the coach is to help the athlete reach their ideal performance capacity. If this is achieved, all should be satisfied and proud, regardless of the matches and medals won.

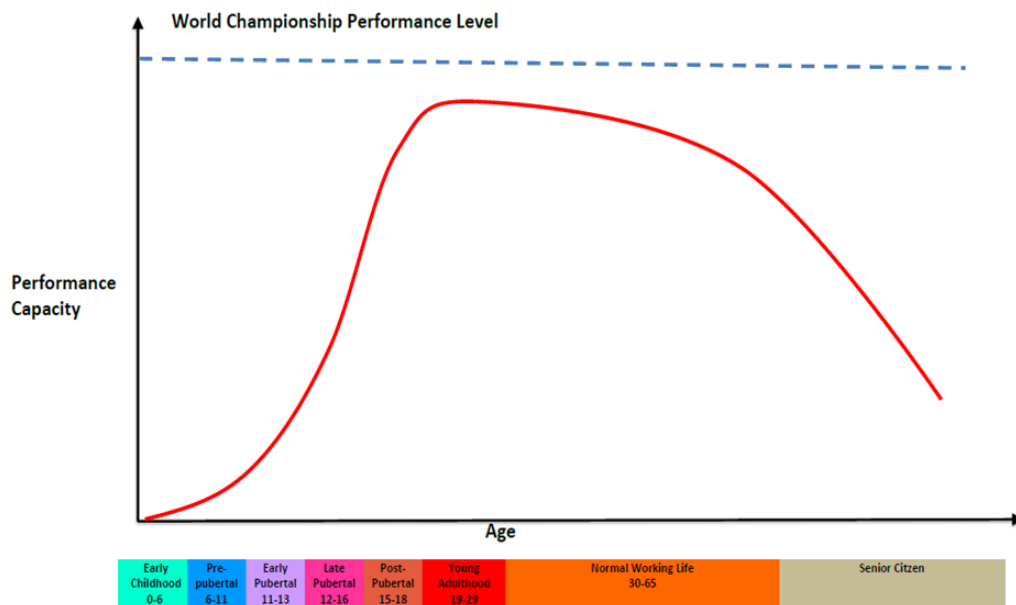


Fig. 1.
Hypothetical and Generalized Wrestling Performance Capacity Curve Throughout a Wrestler’s Lifespan

There has been a recent movement to develop a training model for sport that has been termed Long-Term Athletic Development. It attempts to incorporate the developmental information that we know and apply it in a holistic manner. It is an athlete centered approach that is concerned with a maximization of potential throughout the lifespan of the athlete. Some of the leading contributors to this approach are Tudor Bompa (5) and Istvan Balyi(2). We have learned that what is done at one point on the timeline can have substantial effects, positive or negative, at a later point. This includes whether athletes reach their potential, and even whether a person stays with the sport.

Adopting this long-term perspective is crucial and will possibly lead us to the identification of solutions to some of the problems that we often see in modern sport. The focus for this article will, not be on the special training the

wrestler during times of maximal performance, but will examine the the periods on either side of peak championship performance, both very important if we are concerned with the “total wrestler,” or the “whole person.” It is athlete-centered in that it is designed to serve the best interests of each athlete’s long-term development, encouraging growth in skills and achievement while ensuring each individual remains engaged in sport.

I have been asked by USA Wrestling to be part of a project that will establish a core curriculum for the development of wrestlers from beginning wrestler, to standing atop the podium at the Olympic Games, and beyond. This paper will describe portions of the project.

The intent is to avoid some significant problems that we find within our current procedures. Among these are: 1) a high drop-out rate, 2) having many of our wrestlers coming to our national team lacking a broad physical and technical foundation, 3) not having a common training syllabus that is based upon known growth and maturational factors and 4) address the move to “normal life” after retirement from competition, as well as managing the long-term health effects in the entire lifespan of the wrestler.

The final goals include: assuring that we have a scientific basis for our programs; providing for individual differences of growing youth since individuals grow and mature at different rates and tempos; emphasizing the ultimate benefits of participation in wrestling and providing worthwhile goals for the entire spectrum of wrestlers and not just for the elite; by developing skills through participation in wrestling for the long-term (preventing “burn-out”); and to relieve the pressure on coaches and wrestlers to win immediately, but rather to reward commitment, effort, diligence, courage and determination without the undue physical and psychological pressures of inappropriate competition; and finally to provide necessary medical and career support.

This paper will highlight some key points of interest on the lifespan. The emphasis will not be on the actual organization of high level training during peak competitive years, but rather some important points that a holistic approach can provide for the best outcomes for our wrestlers. Let us begin with some important points on the timeline. **When do wrestlers reach their peak wrestling potential?** The indicator that is used is the mean age of when Olympic gold medals have been won (7). The analysis was done separately for the three disciplines in wrestling and are shown in figures 1 for Greco Roman, while men and women freestyle wrestlers have been combined in figure 2.

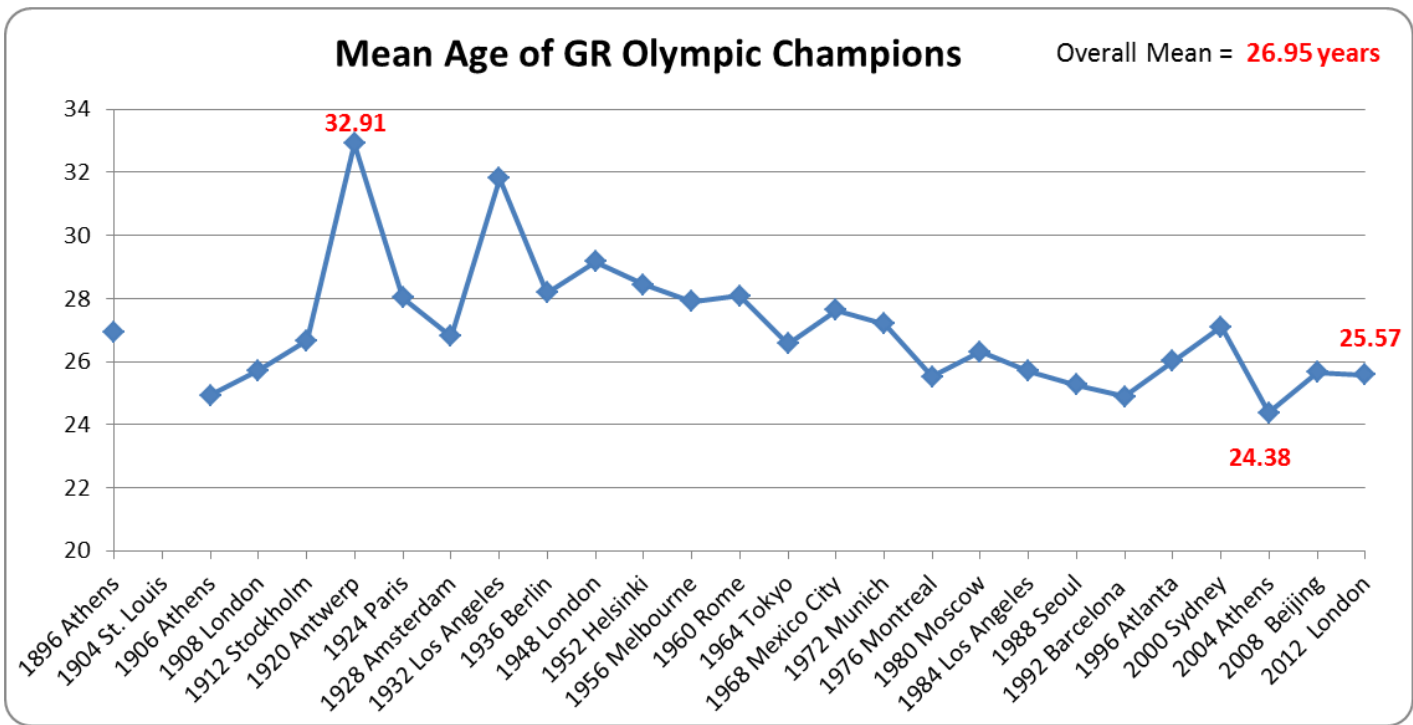


Fig. 1 Mean ages of Olympic champions in Greco Roman wrestling

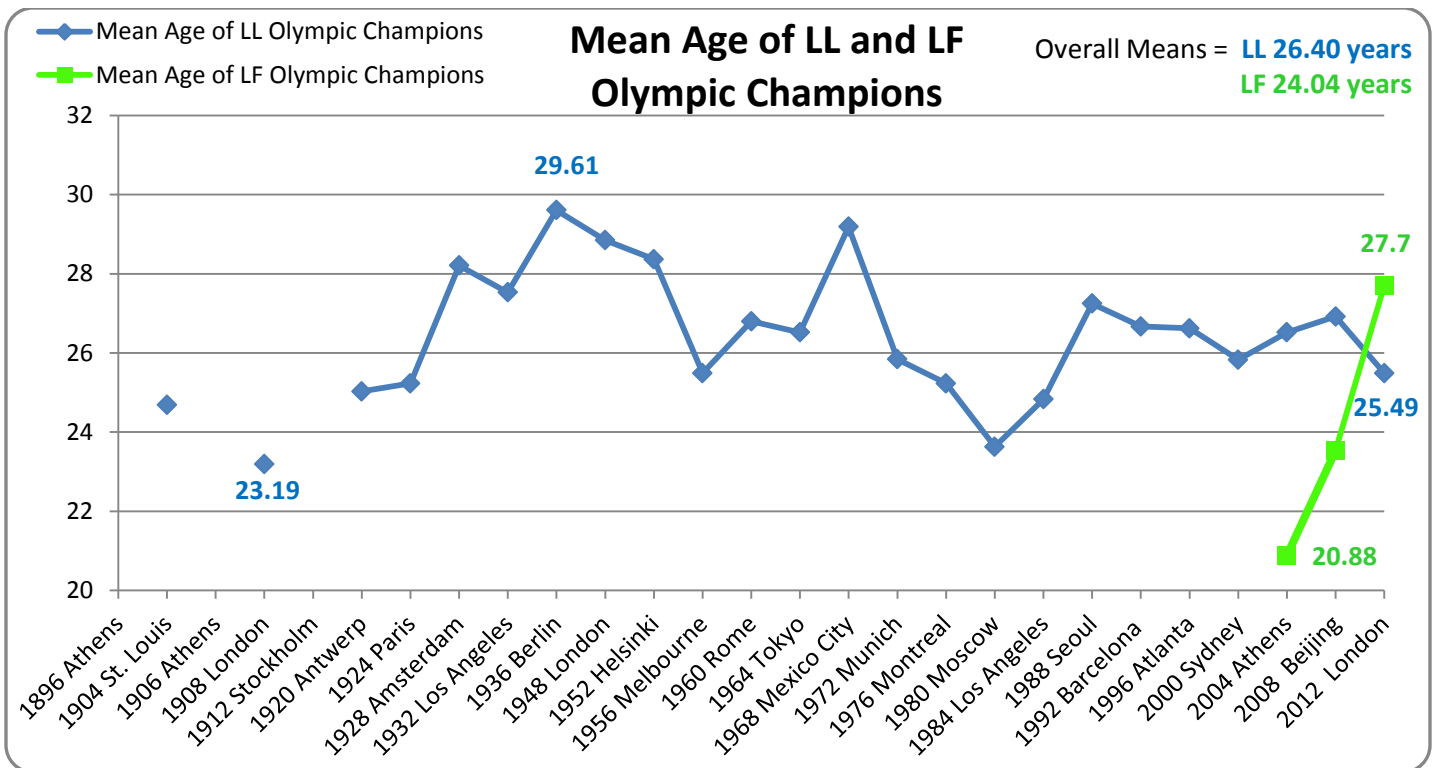


Fig. 2 Mean ages of Olympic champions in Men's and women's freestyle wrestling

The average age of all wrestling champions is 25.8 years. The freestyle average age is 26.42, Greco-Roman is 26.95 and the women's mean is 24.04 years. There is a slight downward trend for Greco Roman wrestlers since the first games. For the men in freestyle no trend seems to be present. The women have increased in age for each Olympiad. This is not a surprise, since two of the four weight classes were won by the same person each time. The champions at London were 27.15 and 25.83 for Greco-Roman and freestyle, respectively.

London Olympic Champions		
Freestyle (25.49)	Weight	Age
Otarsultanov, Dyamal S (RUS)	55 kg	25.32
Asgarov, Togrul (AZE)	60 kg	19.90
Yonemitsu, Tatsuhiro (JPN)	66 kg	26.01
Burroughs, Jordan (USA)	74 kg	24.01
Sharifov, Sharif (AZE)	84 kg	23.75
Varner Jake (USA)	96 kg	26.38
Taimazov, Artur (UZB)	120 kg	33.06
Greco Roman (25.39)		
Soryan, Hamid (IRI)	55 kg	26.95
Noroozi, Omid (IRI)	60 kg	26.46
Kim, Hyeon-Woo (KOR)	66 kg	23.75
Vlasov, Roman (RUS)	74 kg	21.83
Khugaev, Alan (RUS)	84 kg	21.80
Rezaei, Ghasem (IRI)	96 kg	26.96
Lopez Nunez Mijain (CUB)	120 kg	29.96
Women (27.70)		
Vorobieva, Natalya (RUS)	48	21.20
Saori Yoshida	55	29.84
Kaori Icho	63	28.15
Hitori Obaro Sakamoto	72	31.59

Table 1. Ages of the wrestlers in the 2012 London Olympics

The range of ages are shown in tables 2 and 3 which list the oldest and youngest champions respectively. The youngest champion is 18.91 years old and the oldest is 41.52.

Table 2. Oldest Olympic Wrestling Champions by Style

Oldest Olympic Champions			
Freestyle	Games	Weight	Age
Arsen Mekokishvili (USSR)	1952 Helsinki	87+ kg	40.27
Gyula Bobis (HUN)	1948 London	87+ kg	38.81
Valentin Jordanov (BUL)	1996 Atlanta	52 kg	36.51
Kaarlo Maekinen (FIN)	1928 Amsterdam	56 kg	36.21
Greco Roman			
Adolf Lindfors (FIN)	1920 Antwerp	82+ kg	41.52
Anatoli Roschtschin (USSR)	1972 Munich	100+ kg	40.49
Johanes Kotkas (USSR)	1952 Helsinki	100+ kg	37.48
Kaarlo Anttilla (FIN)	1924 Paris	62 kg	36.85
Carl Westergren (SWE)	1932 Los Angeles	87+ kg	36.80
Women			
Hitomi Obara Sakamoto (JPN)	2012 London	72 kg	31.59
Saori Yoshida (JPN)	2012 London	55 kg	29.84
Kaori Icho (JPN)	2012 London	63 kg	28.15

Table 3. Youngest Olympic Wrestling Champions by Style

Youngest Olympic Champions			
Freestyle	Games	Weight	Age
Saban Trstena (YUG)	1984 Los Angeles	52 kg	19.6
Togrul Asgarov (AZE)	2012 London	60 kg	19.90
Sanasar Oganessian (USSR)	1980 Moscow	90 kg	20.48
Magomedgasan Abushev (USSR)	1980 Moscow	62 kg	20.71
Il Kim (PRK)	1992 Barcelona	48 kg	21.02
Greco Roman			
Islambek Albiev (RUS)	2008 Beijing	60 kg	19.62
Suren Nalbandyan (USSR)	1976 Montreal	68 kg	20.13
Yerlikaya Hamza (TUR)	1996 Atlanta	82 kg	20.13
Shazam Safin (USSR)	1952 Helsinki	67 kg	20.30
Alexander Karelin (USSR)	1988 Seoul	130 kg	21.00
Women			
Xu Wang (CHN)	2004 Athens	72 kg	18.91
Kaori Icho (JPN)	2004 Athens	63 kg	20.19
Jiao Wang (CHN)	2008 Beijing	72 kg	20.61

The youngest champions for men seem to be present in the lighter classes, with 7 out of 10 youngest champions were from weight classes less than 70 kg. However, Alexander Karelin, one of the greatest wrestlers and heavyweights of all time, won his first title as the 7th youngest Olympic wrestling champion of all time. What one generally sees is that the oldest competitors come from the heaviest weight classes. Six of the ten oldest champions come from the highest weight class. Togrul Asgarov (AZE) is the most recent addition to the youngest list for men. It is interesting to note that Hamza Yerlikaya won the 1996 GR 82 kg title at 20.13 years of age, and also won a World Championship in 1993 when he was just 17.29 years old! It is somewhat difficult to generalize from the women's results at this time. The youngest Olympic wrestling champion of all time is Xu Wang (CHN), while Kaori Icho is present on both the youngest and oldest lists!

Reasons for Early and Late Success There are factors operating at both ends of the age distribution affecting

the chances for observing champions that are either very young or relatively old. Most young champions are certainly prodigies with a “genius” for wrestling. Some factors that may increase their expression as early champions are:

Growth and Maturation There has been a steady secular increase in growth – an increase in height and weight at all ages from birth to adulthood. There has been a general increase in the height and weight of Olympic athletes during the last generation (20). This has been matched with a concomitant acceleration in the maturation of certain physiological functions in children, especially in the area of sexual maturity. There has been a steady decrease in the age of menarche – from 17 in 1840 to 13.5 in 1960 (24). A similar trend of earlier maturation has been observed in boys who reach their maximum height at an earlier age than a generation ago. **Talent Identification** Systematic identification and selection of young athletes, along with earlier specialized training could also be factors. **Weight Training** The use of weight training is now widespread in the training regimens of most young athletes. Most physiological parameters peak in the early 20's. At the other end of the age spectrum, we know that physiological functional capacity declines with age. There are declines in aerobic capacity, peak strength and power.

Factors that may increase the longevity of wrestling champions are: **Training Programs** that slow the aging process. What may have formerly been considered “normal” deterioration may be forestalled by continuous training. **Preservation of Strength** Many of the oldest champions compete in the heaviest weight class. Is strength more of a factor in this class? Bulgarian research indicates that the competitors in the heaviest weight categories have the longest careers at the international level of 10.7 years (15). **Improved Tactics and Psychological Preparation** Veterans can take advantage of experience. This could be especially valuable in controlling competition stress and application of tactics and strategy. **Improved Sports Medicine** Improved training, which again includes weight training, along with better medical care, may provide athletes the ability to withstand the rigors of training and competition. This includes prevention, better treatment of injuries, and rehabilitation. Surgical repair is an important factor in extending careers. **Professionalization of Sport** This socio-cultural phenomenon has provided athletes with the financial support so an athlete can remain in sport longer, before having to go on to their “real world” career. Some examples are support through sport federations, endorsements, sponsorships, and prize money.

What is the Life Expectancy of Wrestlers?

Sarna (23) has studied former Finnish male athletes and controls to investigate the effects of long-lasting participation in vigorous sports on health, and longevity. He found that former aerobic sports athletes (endurance and mixed sports) in particular have high total and active life expectancy and low risk for ischemic heart disease and diabetes in later years. Overall, the benefits of physically active life-style on health were clearly higher than the adverse effects. Endurance sports (runners and cross-country skiers) had a life expectancy of 77.5 yr; in team games (soccer, ice hockey, basketball, jumpers and sprinters) 75.1 yr; and power sports (boxing, wrestling, weight lifting, and throwers from field athletics) 72.2 yr; and in the non-athlete control group had a lifespan of 70.9 years.

Now we have another empirical data point for our timeline for wrestlers – a lifespan of 72.2 years. These studies no doubt, need to be expanded to include women wrestlers, along with athletes from the rest of the world.

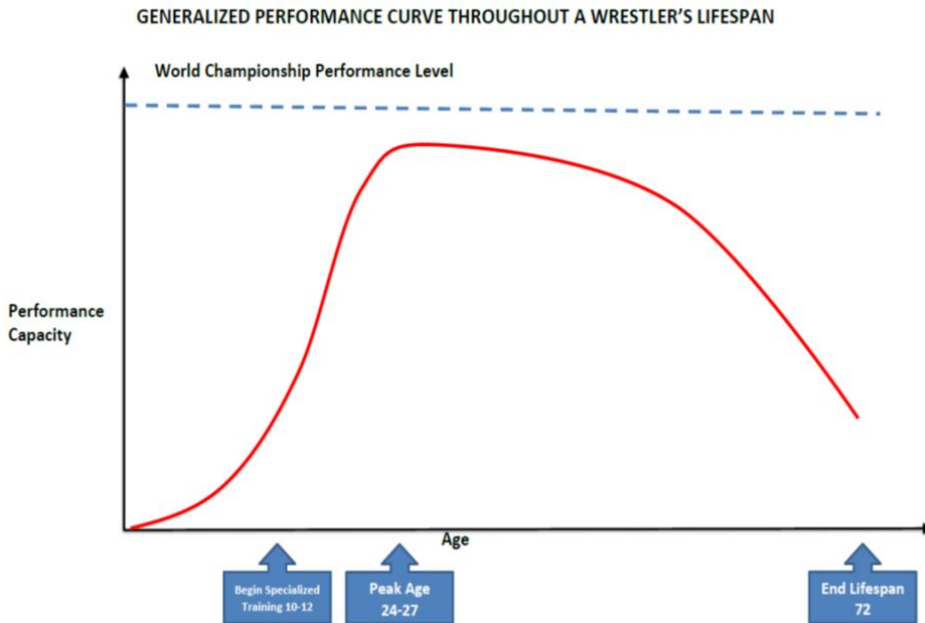
When should wrestlers begin training? This very important question is not as easily settled. We have seen an evolution to starting children in wrestling programs at increasingly younger ages. In the USA and Japan, it is not uncommon to see 6 and 7 year olds in competition. What are the effects for the long-term?

There are several forces at work in sport that are pushing this trend. There are parents, intent upon seeing their children as champions, who believe that they can gain an advantage over others, with an earlier start. Sport organizations compete to attract numbers to their sport, and they feel that early involvement and identification can make these children “theirs.” What does the data show?

Much of the information we find is from expert recommendations. Yuri Shakhmuradov recommends that specialized training begin between 10-11 years of age. Josip Maric in his book "Wrestling freestyle" (17) argues that the best time is between nine and ten years. Tudor Bompa (5) pushes the limits for a year more, and says that the best time is between the eleven and thirteen. Dragan Milanovic in his book "Theory and methodology of training" (19) lists approximate date for the beginning of systematic training in wrestling from eleven to twelve years. Baic (1) has done preliminary work in this area for males and has listed the age reported for wrestling specialization for the Greco Roman champions from Istanbul WC of 2011, European Championships 2012 and the London Olympics

2012, and found a starting range from 9-20 years old, with the majority taking up wrestling between 10 and 12 years of age.

Grigore (13) of Romania has investigated this issue with females and has observed that the average age of females champions taking up wrestling around 12 years, but there was significant variation. The time required to achieve top performance in wrestling female was 10-12 years, thus arriving at the average age of women's Olympic champions.



From this evidence, both from empirical data and expert recommendation, it is safe to say that the optimal time to begin wrestling specialization, for both boys and girls, is from 10-12 years of age.

We now have located three major milestones on the wrestling performance capacity curve shown in fig. 1.

Figure 1. Important milestone ages in wrestlers

A larger question then remains - What happens to a large number of those who started their wrestling specialization at 6-7 years of age? The Japan Wrestling Federation emphasizes guidance from early childhood with their female wrestlers, but stresses that the emphasis is on fun and acquiring a feel for the essence of the sport. (Yukinori MIYABE).

We must identify the important growth and development considerations and specific implications for our sport of wrestling. Many programs do not have a long-term perspective. Many coaches are competent in developing training programs, but in many cases children are specialized at too young of an age. When players specialize too early they can create imbalances in musculature, increase the potential for burn out and cap their athletic potential by not developing a broad base of athletic movement skills. Young athletes who participate in a variety of sports have fewer injuries and play sports longer than those who specialize before puberty. Well-rounded, multisport athletes have the highest potential to achieve. In our current system, training in early years focuses on outcomes (winning) rather than the developmental process (optimal training). Damage done between ages 6-10 and 10-16 cannot be fully corrected (players/athletes will never reach their genetic potential) and national training or sport centers receiving mediocre athletes -- regardless of funding and expertise -- cannot recover from the "damages" of earlier training! (2,10,12)

USE A BROAD BASED, OVER-ALL, OR MULTILATERAL TRAINING

Variety is necessary! Include plenty of gymnastics. Encourage athletes to strive to have at least one to two days off per week from competitive athletics, sports specific training, and competitive practice (scrimmage) to allow them to recover both physically and psychologically. Encourage the young athlete (under 15y) to take at least two to three months away from a specific sport during the year.

AVOIDING HIGH DROP-OUT RATE

Knowing why children participate in sports can provide a good perspective for developing programs. Why children participate? (12) It is important to note that fun is the number one reason for participation.

1. Fun
2. To improve skills
3. To stay in shape

4. To do something one is good at
5. For the excitement of competition
6. To get exercise
7. Affiliation-to play as part of a team
8. For the challenge of competition
9. To learn new skills
10. To win

EARLY VS LATE MATURERS

The concern is not only for the late maturers, but also for the early maturers. Once the average and late maturers catch up, the early maturers are left feeling frustrated as they have always relied on their advanced developmental age and, as a result, some did not develop the necessary skills or fitness. Unfortunately, the early maturers can often leave the sport around the age of 14 or 15 due to frustration.

“Unfortunately, in developmental sport programs, we often don’t allow late maturers the time to let their physical maturity catch up and their skills develop. Instead, children often leave the sport early because of lack of success and extreme frustration. This seems to hit the late maturing boys the hardest because they are at an extreme disadvantage. Ironically, they could have the potential to be better athletes, but we have to keep them involved in quality sport programs at the younger ages to make sure they continue with their skill development” (Lawrence, M. (1999). US Swimming Sport Science Summit. Colorado Springs.).

USE PEAK HEIGHT VELOCITY and OTHER MEASURES

Peak height velocity is a key reference point for sport readiness. Age at peak height velocity refers to the age when the rate of increase of height reaches its maximum. In order to use this measure effectively, regular anthropometric monitoring is required. The recommended frequency of measurement is every three months. In order to effectively monitor the rate of change, it is very important that the frequency of measurement is consistent, and started at an early enough age to identify important PHV changes at pre-puberty ages. One must use precise standardized technique (2)

SUCCESS?

The bottom line is that it takes an enormous amount of work to become an elite athlete. This is done through a diverse sports movement and sports skills background. Once this foundation is laid, it takes years of deliberate practice to develop an elite performer at the highest level. This approach is supported by The Path to Excellence, which provides a comprehensive view of the development of U.S. Olympians who competed between 1984 and 1998. The results reveal that U.S. Olympians begin their sport participation at the average age of 12.0 for males and 11.5 for females. However, their true success should be in noting the number of wrestlers who are still part of the sport 8-10 years later! We are well aware of the programs who are poorly done, or youngsters who are not ready. (12)

As we move forward in the the further development and growth of the sport of wrestling, we must acknowledge the value of all of our wrestlers, and not merely focus on the champions. We must be careful that our talent identification and selection processes are appropriately administered, so we do not create many cast-offs, but athletes who love the sport. We must view techniques such as genetic testing with caution, as they could take the drama and anticipation from sport.

TRAINING NEEDS OF THE MATURE ATHLETE

Prolonging the careers of our wrestlers is generally desirable. We can individualize their plans and emphasize some important areas:

- ✓ REDUCE COMPETITIONS
- ✓ DECREASE VOLUME
- ✓ RESTORATION
- ✓ VERY INDIVIDUALIZED PLANS
- ✓ MAINTAIN BASIC FITNESS
- ✓ REHABILITATE INJURIES

Strength

Studies indicate that peak muscular power exhibits a considerably less rapid rate of decline with age than maximal aerobic capacity and appears to decline less rapidly in the upper limbs compared with the lower limbs.

Reaction Time

Simple reaction time shortens from infancy into the late 20s, then increases slowly until the 50s and 60s, and then lengthens faster as the person gets into his 70s and beyond.

Flexibility

It decreases. The good news is that some studies, but not all, show improvements in function when individuals engage in exercise programs that involve stretching exercises. Wrestlers must take measures to regain total flexibility following injury.

A special recommendation for Veterans wrestling comes in light of an occurrence when an American competitor, 52, collapsed during his opening round match of the 2009 Veterans World Championships in Kouvola, Finland. He received immediate medical assistance, but those providing care could not revive him. The wrestler was competing at 130 kg/286 lbs. in Div. D (51-55 years old). A. Pre-participation Cardiovascular Screening of Elderly Wrestlers is the recommendation of researchers who screened veterans competitors in Iran and found

POST RETIREMENT FROM COMPETITION

This portion of the hypothetical wrestling performance curve could be renamed as the capacity for good health. We know the value that sport participation can add to life. We state the health benefits, but we are often caught in the dilemma famously stated by the German philosopher Bertolt Brecht, "Great sport begins where good health ends." The body pays a toll for the great amount of stress that wrestling can cause the body. There are important issues that must not be ignored! These include:

MUSCULO-SKELETAL PROBLEMS (OSTEOARTHRITIS)

We must create training structures that can minimize damage. This includes identification of exercises that can be replaced by those that do not cause problems for the future. Diezemann (8) has identified certain "traditional" bridging exercises that could be modified in order to prevent cervical damage. Other vulnerable areas are knees, hips, back and shoulders.

FITNESS MAINTENANCE AND BODY WEIGHT MANAGEMENT

As wrestlers move out of competitive wrestling they must be counseled regarding the necessity of maintaining a healthy body weight and include appropriate activity into their lives. An increased incidence of overweight, obesity and indicators of chronic disease among ex-collegiate wrestlers has been reported in the US. (Gunderson)

Repeated cycles of weight loss and regain appear to enhance subsequent weight gain and may predispose to obesity. (21)

CARDIOVASCULAR CONCERNS

Cardiovascular adaptations to exercise have been systematically defined and differ with respect to the type of conditioning: endurance training (sometimes also described as dynamic, isotonic, or aerobic) such as long-distance running and swimming; and strength training (also referred to as static, isometric, power, or anaerobic) such as wrestling, weightlifting, or throwing heavy objects. Sports such as cycling and rowing are examples of combined endurance and strength exercise (16,18)

There is no evidence at present showing that athlete's heart remodeling leads to long-term disease progression, cardiovascular disability, or sudden cardiac death. The wall thickening that is seen in power/static/resistance trained athletes is seen by some to be seen as undesirable consequence of training, since it mimics a the hypertrophy seen in some heart disease. While that possibility may exist, there is at present no evidence to support it.

Endurance athletes possess a greater proportion of slow twitch (type 1) muscle fibers which correlates positively with a favorable lipid profile in relationship to remaining free of cardiovascular disease. Power athletes, such as sprinters and weight lifters have a high proportion of fast twitch (type II) muscle fibers with low oxidative capacity. unfavorable lipid profile, a high proportion of fast twitch fibres has been associated with obesity, hypertension, and insulin resistance. Athletes with ability in power sports seem to have a higher risk of developing cardiovascular disorders than those with in endurance sports. While wrestling certainly has a large power component, it is most often classified as a "mixed" sport along with boxers, basketball, rowing and soccer. (16) (Kujala)

Elastic artery stiffness and large artery wall thickness are major indicators of arterial health and risk of age-associated cardiovascular disease. Masters athletes for whom training and competitive sport require primarily or exclusively intensive resistance muscle activities exhibit a less favorable arterial function-structure profile than their endurance-trained peers.(18)

There are limited data defining the adaptations of athlete's heart in females, in modestly trained individuals in youth sports programs, and in blacks and other minorities. This needs to be addressed.

PSYCHOLOGICAL ISSUES

Former wrestlers do not seem to be at a greater risk for psychological issues. Research has shown that athletes who had participated in power/combat sports and team sports were more extroverted than referents. Endurance, power/combat, team and shooting sport athletes were more satisfied with their lives than were the referents. (4). This does not mean that wrestling governing bodies should ignore issue such as depression, alcoholism and drug abuse in their former wrestlers. A very sad case in wrestling occurred in 2004 when Mikael Ljungberg of Sweden, 34, died at the psychiatric clinic in Mölndal, when he hanged himself with a sheet in the bathroom. He was one of Sweden's greatest wrestlers of all time and one of our most beloved athletes. His brother Jonas told me, " the difficulties of adjusting to a life outside the Championship stadiums baffled him. The dark forces began to tear everything harder. Now it is our duty to remember you. And it is our duty to help those athletes who find it difficult to find meaning after his career has gone out and it's getting darker."

SUMMARY

It is important that we study the entire wrestling experience, from beginning to end, so that we may best serve the total athlete and total person. Include selection and comments on genetic testing. We have learned from the IOC challenge of 2013. In the words of one of our leading wrestling administrators, Georgiy Byrusov (6), this is where we must focus:

"Wrestling is part of the harmonious development of the individual. This traditional sport is very tightly woven into the culture of many countries. The primary task for FILA – is to bring wrestling to the Olympic masses. Make it more accessible, popular and spectacular. To do this, of course, have a lot to work with. We need to provide for young people to go into schools and clubs and have the opportunity to engage in this simple, very harmonious and rewarding sport. Without this, we will not be able to compete for the younger generation. "

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WRESTLER'S PERFORMANCE ANALYSIS THROUGH NOTATIONAL TECHNIQUES

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INTRODUCTION

The coaching process is about enhancing performance by providing feedback about the performance to the individual athletes or team (James, 2009). In any sporting situation, especially sports with opposition presence, it is difficult, if not impossible, for coaches to notice and remember all the key events occurring within a training session or match, equipped only with their knowledge of the sport in question and their innate powers of observation (Coleman, 1998). In this regard, Tünnemann pointed that "The key question for the further enhancement of performance in combat sports is the increase in training efficiency (...). Starting point for an effective training control is the description of a target performance, a performance structure which corresponds with performance prognosis" (1996).

The techniques associated with measuring sports performance are often referred to as Performance Analysis (PA) and usually take the form of video analysis, using either hand or computerized systems both during and post-event, from either a technical, tactical or movement analysis perspective (James, 2009). Essentially, PA is about creating a valid and reliable record of performance by means of systematic observations that can be analyzed with a view to facilitating feedback. The practical value of performance analysis is that well-chosen performance indicators highlight good and bad techniques or team performances. They help coaches to identify good and bad performances of an individual or a team member and facilitate comparative analysis of individuals, and teams (Hughes & Franks, 2008).

Performance analysis consists of two complementary types of analyses:

- **Notational Analysis** (also called "Match Analysis"), which uses means to record critical events (movements, situations, interactions, techniques and tactics, even intervention of referees) in that performance can be quantified in a consistent and reliable manner, usually to build a database of such events.
- **Biomechanical Analysis**, concerned of quantitative assessment of spatial and temporal parameters of body movements, in order to determine fine details about individual sports techniques in comparison to notational analysis.

Both notational as biomechanical analysis provide an evaluation of several aspects which could not be accurately or objectively assessed through simply watching the performance when it happens (Alderson, Fuller & Treadwell, 1990, mentioned by Tenga, 2010) The present lecture has the aim of exposing the applications Wrestling Performance Analysis can have based in notational analysis, showing concrete recent results of stood out wrestlers, as well as different options and requirements to execute these studies.

MATCH ANALYSIS: TYPES AND USAGE

PA is an integral part of the coaching process (Figure 1). Technological advances and declining costs have given coaches access to laptop computers, digital cameras and analysis software, even smartphones, making the whole process of PA simpler and less arduous.

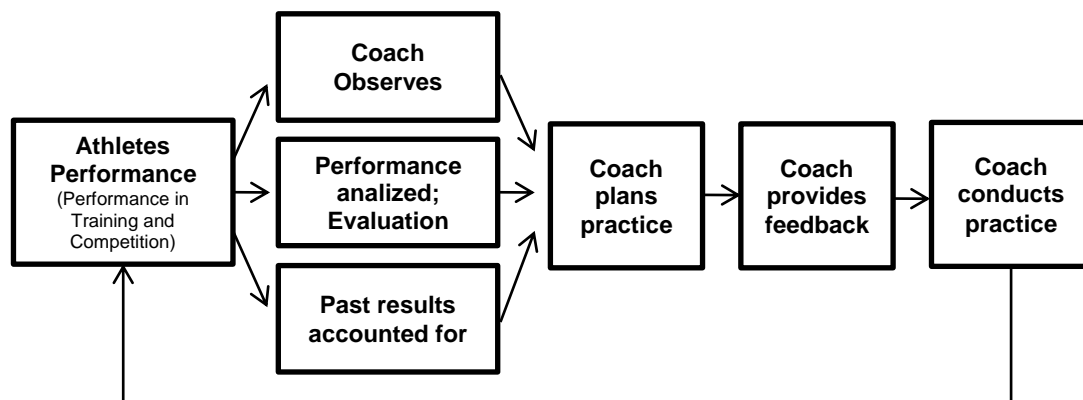


Figure 1. Scheme of coaching process (modified from Franks et al, 1983).

In literature different kind of analysis are found, based in the notational technique, whose differences strive in the quantity of registered and analyzed information, all of them with important applications for the wrestler's preparation as well as the evaluation of their performance. These types of analysis are:

- a) Score analysis
- b) Technical-Tactical Characterization
- c) Time motion analysis (López-González & Miarka, 2013).
- d) Technical-Tactical performance analysis

Their main characteristics are summarized in the table 1.

In strict sense the match analysis comprehends the first three types (score, technical characterization and time motion analysis). The last, the technical-tactical performance analysis was implemented and used recently to analyze the best wrestler's performance in the World Championship 2011 in freestyle and female wrestling through 8 quantitative indicators (López-González, Alonso-Rodríguez, Bárcenas & Rodríguez-Alonso, 2012), and based on more recent analysis made in Greco-Roman style, has been added one more indicator. For the huge quantity of information that it provides, the procedure will be deeply explained, variants and indicators of technical-tactical performance analysis, starting for its mains applications, they can be part of different training process phases of the wrestler's:

Table 1. Some variants of Notational Analysis in Wrestling.

Analysis Type	Main interest	Usage (applications)	Variables
Score analysis (live and after competition)	Technical Points	Know general acting tendencies	- Technical Points - Wrestling Position - Technical Group - Total Bout Time
Technical-Tactical Characterization (after competition)	Technical and Tactical Features of specific TTC	Consequences of technical-tactical interactions in a bout.	Previous ones plus Technical-Tactical Characterization Model:Socio-Motor role - Technical Classification (a. Lafon's Technical Body-Movement; b. López-González Technical Classification) - Set-Up type (Distance) - Tactical Proactivity - Execution Structure - Tactical Risk
Time Motion Analysis (live and after competition; the second one have higher accuracy)	Development of a particular bout	Analyze the time spent in different conducts and situations considered in classification.	- Time Motion Analysis (López-González & Miarka's 11 categories model)
Technical-Tactical Performance Analysis (after competition)	Performance through bouts	Consequences in a tournament. Causal relationship of a result. Comparison with opponent's performance.	The same used in Score analysis and Technical-Tactical Characterization , plus: - Passivities - Challenges - Cautions With the intention to calculate: - 9 Technical-Tactical Performance Quantitative Indicators

- **Target Parameters.** To determine quantitatively the technical-tactical values of the wrestler's "Peak Athletic Shape", and help establish performance profiles for modeling.

- **Scouting.** To elaborate a profile of the best wrestlers in the world and other wrestlers of interest (i.e. specific opponents), and study their weakness and strengths.
- **Evaluation of Training Efficiency.** To assess the impact of training programs.
- **Wrestler's selection criteria.** To provide objective criteria for evaluating the performance of athletes during the national teams selection processes, even taking into account specific aspects of concrete opponents.
- **Performance Prognosis.** To facilitate performance forecasting, based on longitudinal analysis of the performance of the athletes themselves and their opponents and to design intervention strategies for major competitions.

Numerous examples will be described in the 4th and 5th sections.

REQUIREMENT AND PROCEDURES TO DO MATCH ANALYSIS

Requirements It is necessary to have in mind several aspects in relationship to the video and software to use, depending of the type of analysis to execute. On the opposite side, characteristics of software are available and the stored videos limit the studied possibilities.

a) VIDEO. In order to perform after-competition analysis. This type of analysis is useful to build a database and video archive with multiple applications and can be an essential tool for a club or national team.

- **Type of file:** due to the huge quantity of information and storage space needed to perform the exhaustive analysis, it is recommended to use compressed formats like MP4 or WMV (Windows Media Video).
- **Frames per second (fps):** not less than 25 fps (european format).
- **Storing video files.** Is recommend to store the videos on a computer dedicated solely to match analysis. They can also be stored on a hard disk just for that function.
- **Zoom:** the frame around wrestlers must allow to observe plentifully technical actions and their details. Therefore, zoom cannot be so wide or close (Figure 2). The videos recorded by Videoteam FILA are the best example.
- **Official decisions:** if the analysis is made with competency videos, it is indispensable the video to be registered in certain way the OFFICIAL DECISION of the referees, to avoid subjectivity, for example, if the resultant indicators will be used as selective criteria to integrate a team. It is especially important for the control of cautions. Ideally, scoreboard must appear on the screen, or at least that video shows the confirmation from the judge or the mat chairman.
- **Official time:** Except for the technical analysis, it is indispensable to observe the official time in order to calculate the different indicators.

SOFTWARE: the software to analyze the video must ideally offer the following features:

- **Video recording** (it is usually required an additional device, except if there is a smartphone).
- **Video playing:** As many formats of video are compatible, the better. It is preferably should have slow motion feature (frame by frame).
- **Tagging system:** The most complexity and options of tagged system, the most detailed information that can be analyzed at once.
- **Real time analysis.** To make a quick control, with a few variables, like Score Analysis or Time-Motion Analysis.
- **Results report generator (tables and graphics):** Always depend on tagging possibilities.



Figure 2. Amplitude of frame rounding wrestlers in video for analysis used by FILA Videoteam. a) Wrestlers are centered, their heads are below but not too close of the integrated score board. b) and c) lateral space around wrestlers is a good range in case of a suddenly action. d) Frame by Junior World Championships webcast, with the official scoreboard in a corner. Zoom is constantly changing, but could be possible made most of analysis, except technical or biomechanical when zoom is too close or too open.

In the Table 2 the types of analysis are related with the minimum essential characteristics of video and software. In the table 3 are listed some software and apps for smartphones as well, their characteristics and the type of analysis where they can be used. Although there are more software in the market, the listed ones were chosen by its accessibility regarding their price.

Match Analysis Procedure

It is described, in a general way, the general procedure for the accomplishment of the Match Analysis after bout, considering the software Longomatch version 0.18.13 as the best available software to perform it.

Phase 1: Analysis preparation (tools: video files, computer equipment or smartphone, analysis software, software for video edition).

- Determine the **type of analysis** that is required to perform. As already mentioned the example will be done for the Technical Tactical Performance Analysis.

Table 2. Types of Analysis and minimum requirements of video and software.

Type of Analysis	Video content		Software Features				
	Official decision	Official time	Video recording	Video playing	Tagging system	Realtime analysis	Inform generator
Score Analysis	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Technical-Tactical Characterization	Not necessary	Not necessary	Suitable	Indispensable	Suitable	Suitable	Suitable
Time Motion Analysis	Not necessary	Suitable	Suitable	Indispensable	Indispensable	Suitable	Indispensable
Technical-Tactical Performance Analysis	Indispensable	Indispensable	Suitable	Indispensable	Indispensable	Not necessary	Indispensable

- Determine and if necessary design the **variant templates** (software) or the **printed format** (manual capture).
- **Video preparation:** For a simple practice, a video of only one bout is enough, for a more serious analysis of a group of wrestlers (for instance, a complete weight category in a championship), it is recommended to create an only video file made of all the involved bouts. It is done with any software video such as Windows Movie Maker or Corel Video Studio. When the video files do not contain the data of beginners, the round or outcome, it is really useful to include signs with this data in each bout.
- **Create the project** in the software. The variables template and the prepared video as well should be uploaded.

Phase 2: Search and labeling (tools: analysis software, uploaded video)

- **Searching sequences, actions or behaviors to analyze.** Depending on the type of analysis, it is necessary that the analyst stay alert to stop the video as soon as the behavior to observe appears. If it is possible with the software the video should be seen slowly forward and backward so as to pause in the right moment that the analyst considers to start the video sequence.
- **Tag the behavior.** The button that corresponding to the behavior, situation or detected sequence is pressed. A sub- categories template can be used to register the behavior's detail. When the program does not let establish as many categories as the needed ones, only the essential ones can be configured, so as to do the complete characterization in a manual way in the phase 3.
- **Delimit the sequence (only possible in Longomatch).** In the Longomatch software, it is possible to delimit in a graphic way the beginning and the end in each sequence, using the "Timeline widget".

Phase 3: Database creation (tools: analysis software, uploaded video, spreadsheet or print to make manual record).

- **Characterizing each sequence.** Working simultaneously with Analysis software and spreadsheet or scoring print, the corresponding characteristics will be scored in each sequence. Database as long as the different characteristics that need to be controlled.
- **Generate summary tables.** Depending on the analysis type, summary tables will be generated with the data that need to be studied. Some tables are done by different software. If other different are required or needed, they could be done in spreadsheets.

Phase 4: Data utilization (indispensable tools: summary tables; in case of detecting any inconsistency, it could be necessary to check the initial database, and the video sequences in the analysis software).

- **Data Analysis and Report Elaboration.** According to the type on analysis that is being done, it could be necessary to elaborate some graphs to illustrate more effectively the relationship among the different indicators. The preparation of reports from tables and graphs will depend on the analyst experience and the purpose of the analysis.
- **Presentation of results.** Although the results, conclusions and recommendations can be conserved for a selected group of people members of the closest staff to the couch or managers, if they are wanted for the feedback and the athletes study, it is very useful to make a presentation with the selected videos. Longomatch can generate playlists to order.

It is recommendable to delegate a technic staff member, within each national wrestling government body, who should be specialized in these kinds of analysis.

Table 3. Recommended Software for Match Analysis in Wrestling

Software (Price)	Operative System	Device (Hardware)	FEATURES						Analysis type
			Video recording	Video playing	Tagging system	Real Time Analysis	Reports generator	Other features	
Longomatch (Free software)	Windows, Mac, Linux	Desktop Computer, Portable computer	Yes (additional device)	Yes	Yes (powerful)	Yes	Yes (in .csv file, and quick graphics and tables)	Slow motion, video format converter, drawing tools, playlist, and more.	<ul style="list-style-type: none"> • Score Analysis • Technical-Tactical Performance Analysis • Time-Motion Analysis
FILA DartfishTV (Free, videos uploaded by FILA)	On-Line	Desktop Computer, Portable computer (internet conection)	Video On-Line	Yes (video on-line)	Yes (simple by text notes)	No	No (Manually)	Allowed print the still shots with notes. Slow motion. Option to download the video	<ul style="list-style-type: none"> • Score Analysis • Technical-Tactical Performance Analysis (with spreadsheet) • Time-Motion Analysis
Dartfish Express (Around \$6.00 USD)	iOS	Smartphone, Tablet	Yes	Yes	Yes (simple by text notes)	No	No (Manually)	Allowed upload (by a price) to Dartfish TV. Slow Motion	<ul style="list-style-type: none"> • Score Analysis • Technical Analysis • Technical-Tactical Performance Analysis (with spreadsheet) • Time-Motion Analysis
Dartfish Easytag (Free app)	iOS, Android	Smartphone, Tablet	No	No	Yes (4 to 40 customizable tags)	Yes	Yes (in .csv file and brief tables)	Allowed create many templates to different analysis.	<ul style="list-style-type: none"> • Score Analysis • Time-Motion Analysis
Platosport (Around \$1.0 USD)	iOS	Smartphone, Tablet	No	No	Yes (1 to 11 customizable tags, with two layers each)	Yes	Yes (export graphics and .sql files)		<ul style="list-style-type: none"> • Score Analysis • Time-Motion Analysis
TimeMotion (Free App)	iOS	Smartphone, Tablet	Yes	Yes	Yes (1 to 6 customizable tags)	Yes	Yes (export tables in image format, text and e-mailed tables)		<ul style="list-style-type: none"> • Score Analysis (just score or actions, not both at the same time) • Time-Motion Analysis

CHARACTERIZATION MODEL OF THE TECHNICAL-TACTICAL COMBINATIONS (TTC)

The conducted and published studies during the last olympic cycle 2009 - 2012 (López González, 2011a, 2011b, 2013a, 2013b; López-González & Alonso-Rodríguez, 2011; López-González et al, 2012) have helped to conceptualized and to perfect a set of variants so as to make the technical-tactical analysis that have been useful to determine a set of tendencies whose knowledge could get great relevance for the general wrestling development in the world, and particularly to strengthen our sport around the opportunity of growth that has implied "12F" (the IOC recommendation to drop wrestling from the 2020 Olympic Games, released early this year on February 12).

Specifically, there are six technical-tactical characteristics conceptualized to study what Lafon called "Technical-Tactical Combinations", hereinafter TTC (2008), a concept that encompasses the relationship between the different phases of moves to make technical points. These phases and its characteristics are shown in Figure 3 and are described as follows

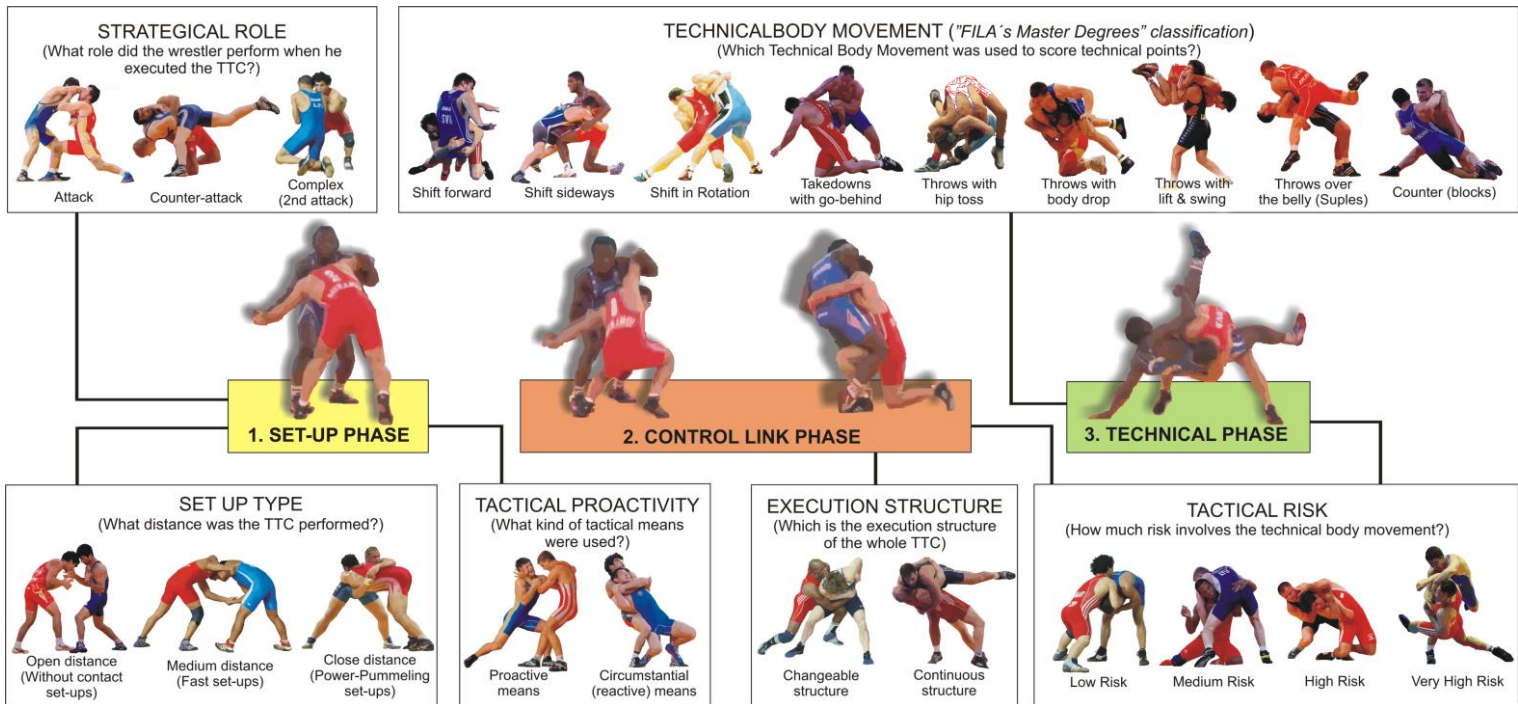


Figure 3. The Six Categories of Technical-Tactical Features Characterization Model (López-González, 2013).

Socio- Motor Role

- **Concept:** A set of behaviors associated to a specific socio-motor status in a sports activity (Parlebas, 2001, p. 399). In the case of combat sports, the roles are mutually exclusive.
- **Classification (types, scales):** three nominal categories:
 - 1) Attack
 - 2) Counterattack
 - 3) Complex (functional complex or second attack)
- **Background:** When analyzing combats in function of the timing sequence interaction, it can be seen that some combats are won by marking technical points almost exclusively by counterattacks. It is generally about encounters where a wrestler makes deficient attacks, executed under no ideal conditions to succeed or with a significant physical capability declined. Unpublished combat analysis among promising wrestlers in youth category that did not succeed in the senior category show that several of these cases corresponded to wrestlers whose opponents made deficient attacks, developing in the first ones counteroffensive skills but not offensive skills.

Technical Body Movement

- **Concept:** "Fundamental biomechanics actions (...) whose (...) can be (...) characterized by the system of forces used (nature, direction, and the ways of used forces) and by the center or axis of rotation around which the unbalance will be produced. (...) can be associated by the categories according to their general characteristics" (Lafon, 2008 , p. 21).
- **Classification (types, scales):** 15 nominal categories, grouped by wrestling position and common bio mechanical characteristics (Table 4):

Table 4. Body Movements classification (Lafon, 2008).

WRESTLING POSITION	Standing Position		Par-Terre Position	
GROUPS	Shifts	Throws	Turning over exposures	Lifts
TECHNICAL BODY MOVEMENTS	1) Shift forward 2) Shift sideways 3) Shift in rotation 4) Take down	5) Body drop 6) Hip toss 7) Lift and swing 8) Suplex	9) Forward roll 10) Turn 11) Backwards tilt 12) Bridging 13) Arched	14) Lift and tilt 15) Lift and suplex

- **Background.** The wrestling technique is characterized by its complexity and its bio mechanical richness. One of the aspects where this characteristic is reflected is in the different classifications of the wrestling technique that can be found in the literature. In this sense, FILA published in 2008 the program "FILA´s Master Degrees", in which was established a complete framework for the study of the wrestling technique. The concept "Body Movement" refers to the specific execution movements whose "correct" realization is awarded with technical points by the refereeing body, and that are distinguished by starting when the wrestler has an execution hold by which takes down the opponent or exposes the opponent back to the mat. The execution hold is obtained in the previous phase to the Body Movement.

Set-Up Type (Distance)

- **Concept:** synergy between the height if standing stance (high, medium or low stance), distance (open, medium or close distance) and seized attack areas (arms, head and torso) by the wrestler before starting the execution of the TTC. The characteristic that mainly determines the rest is the distance.
- **Classification (types, scales):** 3 ordinal categories, originally named because of subjective assessment of the time and the energy expenditure that helps to get ideal conditions to execute the technique:
 - 1) Non contact
 - 2) Fast set-up
 - 3) Power set-up.

As criteria and procedures were not able to be determined yet to objectively measure the spent time in the preparation of different actions, new denominations were implemented, more operational, based on the distance and Tie- ups:

- 1) Open distance (non-contact) set-up
- 2) Medium distance (palm contact) set-up
- 3) Close distance (Power- Pummeling) set up

Published studies from 2009 to 2012 considered a fourth category: "unprepared", only used for the actions in the standing position from the ordered hold or "clinch" in the free style .

- **Background:** This characteristic and its classification scale, first mentioned in a published study in early 2011, had its origin in a set of comparisons from informal observations to the japanese wrestlers' technical arsenal among others. S. Yoshida, the sisters K. and Ch. Icho, and S. Yamamoto. This comparison was made with mexican and central american wrestlers. This exercise let us realized that the japanese wrestlers made contact just prior most of their attacks execution, different from the Latin-American that were looking for Tie-ups in short distance. With the aim of monitor more objectively this characteristic, the scale previous mentioned was created.

Tactical Proactivity

- **Concept:** tendency towards tactical initiative or the tactical opponent's mistake in order to obtain a right change to engage a TTC.
- **Classification (types, scales):** dichotomic classification:
 - 1) Proactive
 - 2) Reactive (formerly "circumstantial")

In turn this classification comes from the group of seven Tactical Means found in a published study in the year 2011 (Figure 4).

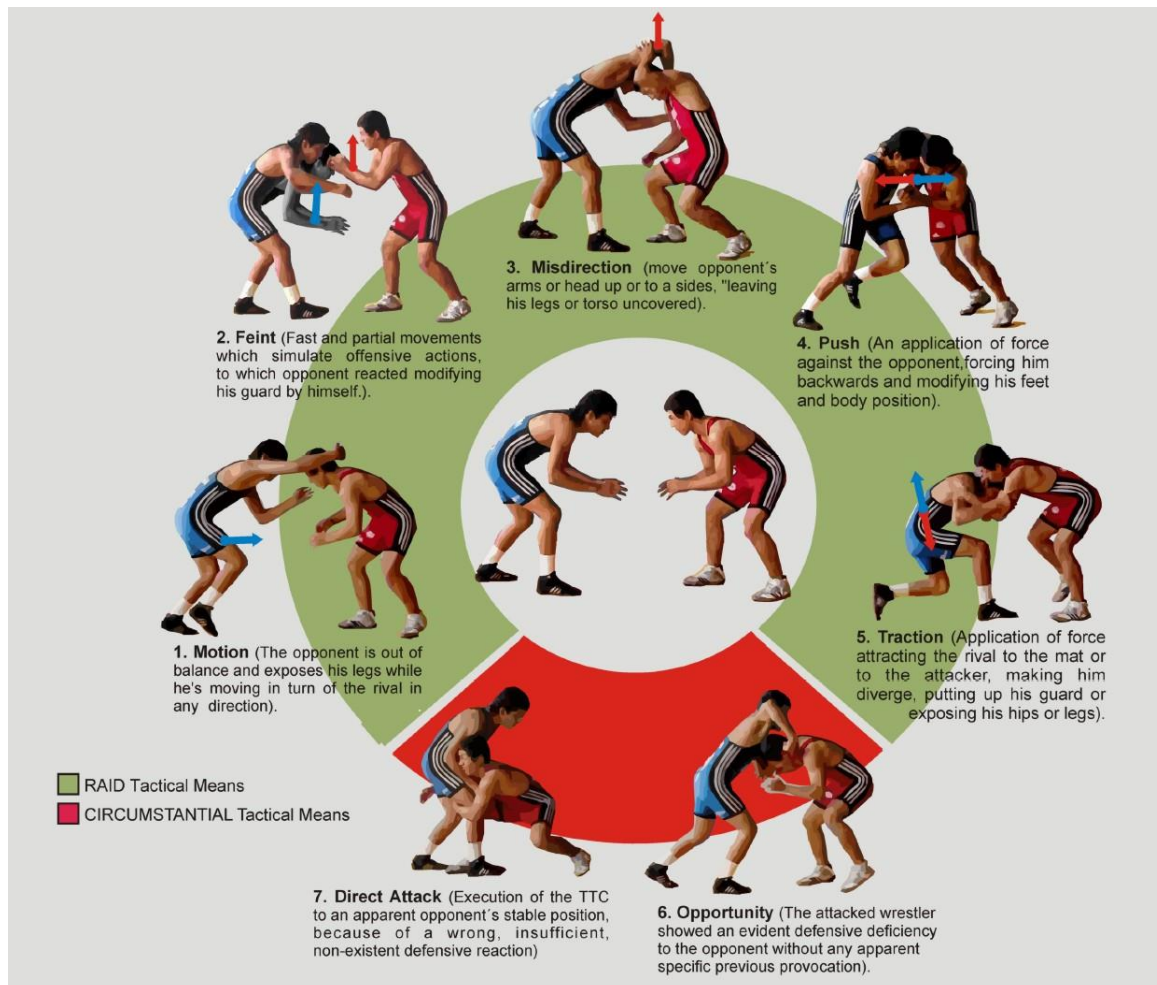


Figure 4. Tactical Means classification (López-González, 2011a).

- **Background:** In a comparative analysis in cadet and junior age categories in Mexico, it was observed that many of the best wrestlers in Mexico got several technical points "directly", without a conventional preparation phase. It was observed that many of these cases were explained by defensive deficiencies made by the opponents more than the attackers' offensive skills. This gave basis to formulate the notion of "tactical proactivity"

Years later a Wrestling classification of Tactical Means was made, that was published in the end of 2011. The corresponding study consisted of registering all technical effective actions executed by free-style wrestlers in World Championship 2010, for further revision of each action in two rounds: the first one aimed to describe in detail the preparation phase or precedent situation in the beginning of technical movement; and the second one appointed to refine the description to the minor quantity of possible terms. Resulting classification released 5 Tactical Means where the executant takes the the initiative to get ideal conditions for technic (proactive Tactical

Means), and 2 more Means that describe given opportunities by the opponents which the wrestlers that scored technical points reacted to take advantage of them and sum opportunities (reactive Tactical Means).

Execution Structure

- **Concept:** Complexity of movement sequence to score technical points, from preparation phase until getting the take down, go-behind or back exposure.
- **Classification (types, scales):** Two dichotomic categories:
 - 1) Continuous structure (composed by two phases a-preparation and b-body movement)
 - 2) Variable structure (composed by three phases a-preparation, b-control link movement and c-body movement).
- **Background:** When preparing the method of making characteristics analysis of World Championships Senior 2009, 2010 and 2011; there were used simultaneously two technical classifications. The one proposed by Lafon for "body movements" considers apart the "control link movements" as well as a back arch throw is classified as "throw with suplex", but does not describe the way to obtain the execution hold. For example, even the execution hold was gotten during preparation phase or the wrestler executed before an aimed waist shot to control it. Both possibilities imply different preparation phases and tactical risk. For this reason it was recently implemented during current year the concept of execution structure.

Tactical Risk

- **Concept:** Possible disadvantage when executing certain body movement regardless of effectiveness or not.

Classification (types, scales): 4 Ordinary categories:

- 1) Low risk
- 2) Medium risk
- 3) High risk
- 4) Very high risk

For parterre position wrestling there were proposed 3 categories, but the characteristics of the third one in this position are equal with the 4th one in standing position wrestling.

Background: It is widely known in wrestling world that some techniques represent a higher risk than others in case of failure. Most of them are as well spectacular when resulting successful. A common example is cement-mixer, or "front headlock rolling". Some wrestlers lose combats when trying that technique. It is obvious that these high risk actions imply considerations from tactical and strategic type. This reasoning headed to create a classification of tactical risk in order to evaluate its relationship with competitive results of wrestlers.

QUANTITATIVE INDICATORS OF WRESTLER'S TECHNICAL AND TACTICAL PERFORMANCE

In search of setting high informative indicators of wrestler's performance, that cover the fundamental requirements of sport methodology, pointed by Tarakanov (1986, in Kalmykov et al .2007, p.45), there were set 8 quantitative indicators of wrestler's technical and tactical performance (López-González et al, 2012) to evaluate the performance on 140 wrestlers in World Championship Senior 2011, held in Istanbul, capital of Turkey. The informative value of conceived indicators was set by factorial analysis and correlation coefficients, considering variables frequencies of characterization model technical-tactical, the value of technical points of executed TTC, as well as the result of wrestlers (1st to 10th places in 7 weight categories of each free and female styles). A 9th indicator was conceived and used in early 2013 to describe technical characteristics of executed TTC in standing position wrestling Greco-Roman style during London Olympic Games 2012.

Calculation of that set of 9 quantitative indicators is objectively interpreted in accordance to executed factorial and correlation analysis, and used formulas are relatively simple, in that way an expert wrestling trainer can calculate the values of a wrestler with affordable devices like cellphone with video camera, or notational analysis apps, and simple calculator. Analysis can be even more precise and efficient by using tools like excel sheet. These indicators can have among others applications:

- Analysis of **performance profile** of best wrestlers in the world.
- Determination of arrival to the **sporting (peak) shape** specific to the wrestler.
- Making of **performance forecast** on tournament, based on longitudinal base of performance of athletes and their opponents, and subsequent strategies modeling to participate in most important championships.
- **Valuation of effects of training programs** in technical and tactical performance.
- **Criteria setting** in valuation of performance of wrestlers during selective processes (i.e. to form a national team).

Each indicator will be described next, as well as variables and formulas for its calculus.

Average Indicators (Activity per Minute)

Diversity

- **Concept:** Quantitative manifestation of technical-tactical arsenal (variants or different TTC) that the wrestler is able to use in a particular competitive unit (combat, tournament, season training cycle).
- **Units of measurement:** Quantity of technical variants (in both wrestling positions) per minute of combat in a tournament.
- **Data to make calculation:**
 - 1) Total time of wrestled decimal minutes
 - 2) Sum of distinct technical variants (it has been valued as necessary to consider the characterization of the variant by describing 3 to 4 key elements, according to the case: a) Preparation hold, b) Tactical Means, c) Control Link Movement, and d) Body Movement (Lafon, 2008; López González, 2013b). On par-terre position is not considered the Control Link Movement. In standing position wrestling, continuous structure actions do not have control link movement.
- **How to calculate it:** Dividing sum of technical variants by decimal wrestled minutes.
- **Relationship with wrestler's performance:** Diversity indicates the quantity of TTC different than the wrestler can execute. In empiric way it has been observed different types of diversity, in can be related to totally different TTC, or a same control link movement ending in distinct body movements, or a same group and type of body movements prepared with different Tactical Means and preparation holds. This last way was described by Shakhmuradov under the concept of "law of variability and stability of attacking moves":

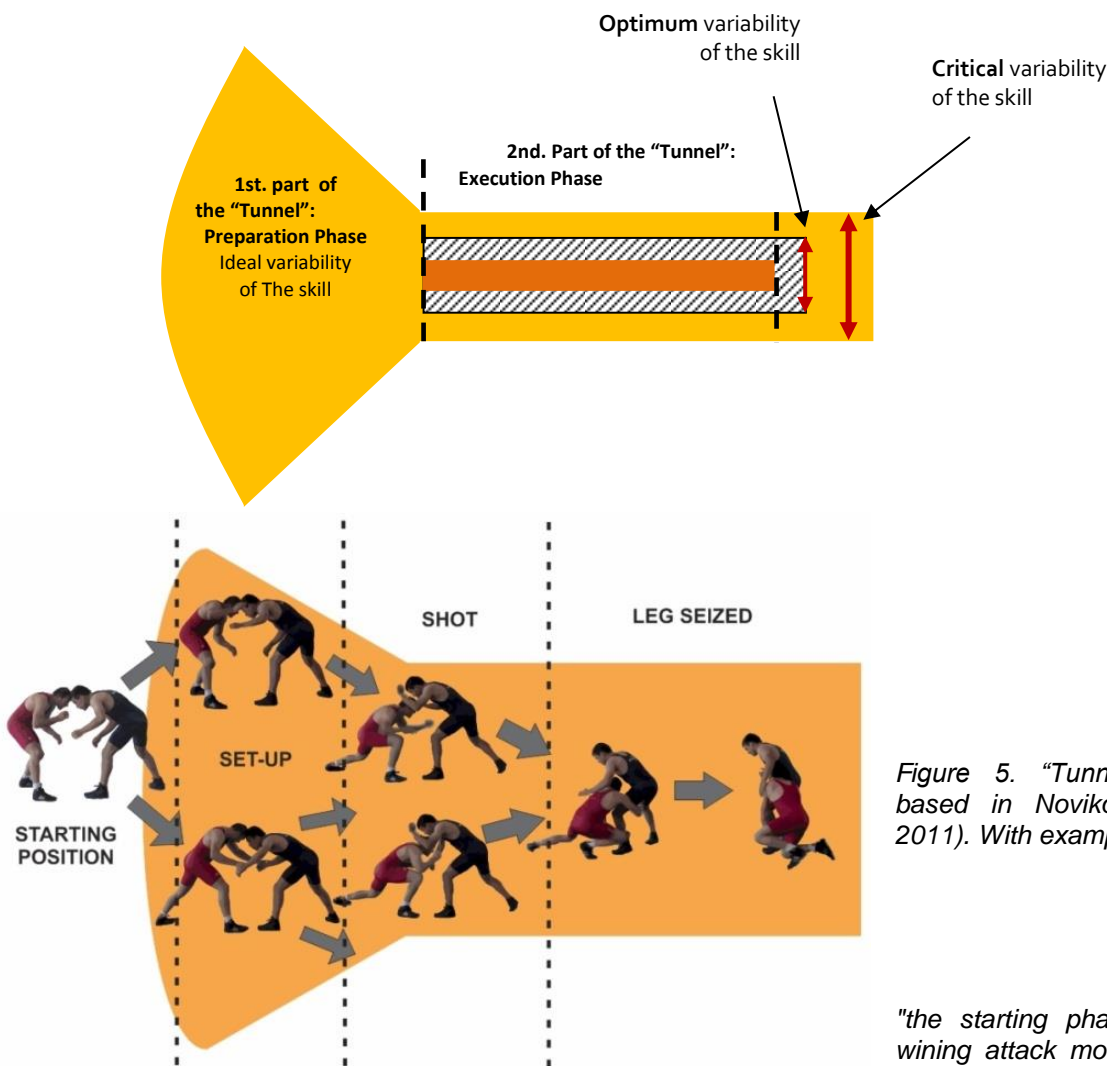


Figure 5. "Tunnel Scheme". Scheme based in Novikov (in Shakhmuradov, 2011). With example with a single leg.

"the starting phase of the wining attack move, that is the strategy of distracting

the rival, must be as variable as possible, in other words, the athlete should master as many

techniques of distracting the rival as possible. But at the same time, the key component of the winning attack should be as invariable as possible, that its main parameters, such as time, space and force, should be stable within the optimum variation range. A. Novikov compared the effect of this law with a tunnel" (Shakhmuradov, 2011, p.8).

Novikov's "Tunnel Scheme" (Figure 5) provides that the first section of the tunnel is wider, representing the many possible variations to reach the second section: the effective body movement, which rivals and fans already known as a typical technique of a particular wrestler. This second section of the tunnel is the part that is considered to be as stable as possible, while the first section corresponds to the tactic and strategy.

Generally, high values of diversity would indicate a superior ability to apply a few possible body movements with a high variety of means. In a unpublished study about the diversity differences of leg attacks between medal winner wrestlers (1st to 3rd place) and non medal winners (5th to 7th place) of World Championship Senior 2011 it was found, in the free style, a significant difference favorable to medal winners (Figure 6) such as value per minute (0.21) is pointed to a technical and tactical arsenal and an enough experience to execute more than one different leg attack each 6 minutes, what suggests a major difficulty to anticipate defensively to the medal winners. Non medal wrestlers, did not average a depreciable score in fact. An average of 0.15 variants per minute, theatrically were able to execute almost a different attack every 6 minutes. Even medal or non medal winners female wrestlers averaged very close scores like male, with slight superiority of medal winner females.

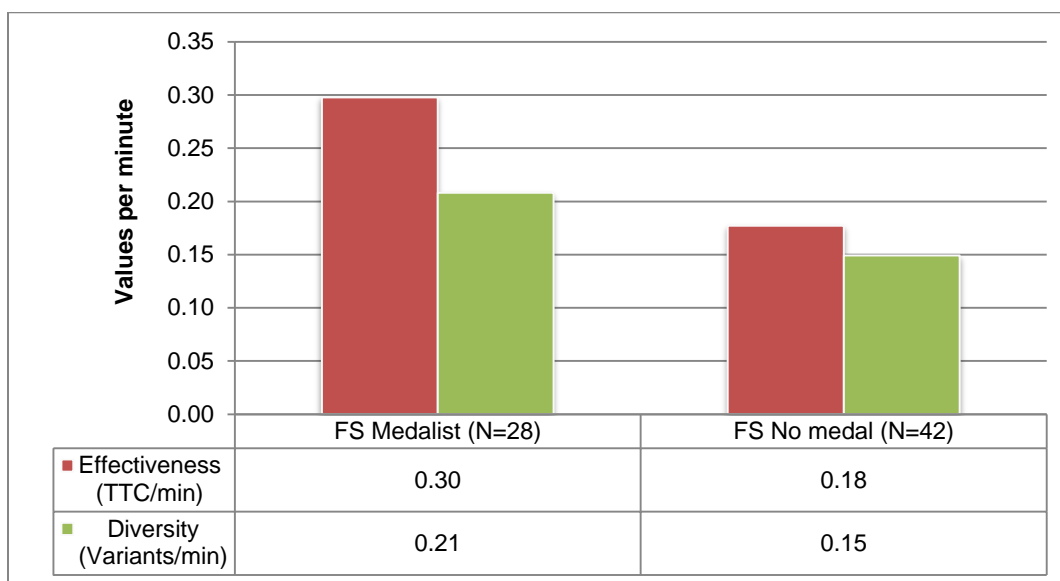


Figure 6. Mean of 2 quantitative performance indicators (Diversity and Effectiveness) of two groups of freestyle wrestlers (medal winner and no medal winner).

Effectiveness

Concept: Average of effective TTC performed per wrestled decimal minutes.

- **Unit of measurement:** TTC effective per wrestled decimal minutes
- **Data to make calculation:**
 - 1) Total time of wrestled decimal minutes
 - 2) Sum of frequencies in effective TTC either on standing position as well as par-terre position (regardless of diversity)
- **How to calculate it:** Divide the sum of frequencies of TTC by wrestled decimal minutes.
- **Relation with wrestler's performance:** The effectiveness per minute has been significantly related in positive way with wrestlers ranking of free and female style (López-González, 2011b). For example in study of performance of attacks to legs of winner and non winner medal wrestlers in World Championship Senior 2011, winner medal male averaged 0.30/min effective leg attacks (Figure 6); even the combats lasted maximum effective regular time established in such a regulation (6min per bout as a product of 3 periods in 2 minutes). The medal winners' performance in translated into almost 2 effective leg attacks per bout, being habitual to wrestle 4 to 6 bouts to get a medal. The significant difference from previous groups regarding non medal

wrestlers indicates a considerable minor effectiveness of them, 0.18/min effective leg attacks, slightly over 1 effective attack per bout. Referring to female wrestlers, even not finding statistically significantly difference, there is a clear superiority in effectiveness of the medal winners group (1.5 effective leg attack/6min). Regarding female wrestlers that scored in final classification between 5th and 10th place (slightly less than an effective attack/6min) when translating effectiveness into technical points, it is clear that the most effective wrestler can aspire to reach scores that secure the win every time his defense is enough to get the advantage.

Productivity

- **Concept:** Average of scored technical points per decimal minutes
- **Unit of measurement:** Average of technical points scored per wrestled decimal points
- **Data to make calculation:**
 - 1) Total time of wrestled decimal minutes
 - 2) Sum of all scored technical points by TTC either in standing position as well as par-terre position (points by caution are not counted, confirmed challenges nor passivities)
- **How to calculate it:** Divide the total of technical points scored by decimal minutes.
- **Relationship with wrestler's performance:** Tünnemann findings through several olympic cycles have shown the importance of cumulating technical points to succeed in wrestling. However, the indicator of productivity conceptualized by López-González et al (2012) is looking to highlight the capability of the wrestler to obtain as many as technical points as possible in relationship to the effectiveness indicator. In other words: wrestler in a certain action, is looking forward the danger position each time he has the opportunity, besides scoring the extra point for 5 sec retention, and each opportunity in offensive par-terre wrestling scoring points.

An outstanding example of high productivity in World Championship 2011 is featured by multi World Champion, three times Olympic Champion and Guinness Record, S. Yoshida (Japan), getting a productivity register of 2.51 pts/min only with technical action, the highest cypher in this indicator among 7 champions. Taking into account that her effectiveness in same tournament was 1.45 TTC/min, those numbers indicate that Yoshida was able to score an average of 1.73 technical points per each effective TTC, thanks to a noticeable ability in both wrestling positions to maximize her productivity.

To get an idea of how effective is the Japanese wrestler, in the same event J. Burroughs, champion of 74Kg category free style reached 1.25 pts/min in the same indicator. This difference of 1.26 pts/min favorable to Yoshida is explained because she scores 3 to 6 technical points in a single attack sequence starting from standing position, even the back exposure of her opponents, usually gets the retention and scores 2 more points with spins from the same legs control that used to defeat her opponents (i.e. "ankle laces"), meanwhile Burroughs did not stand out in World Championship in 2011 with his defensive on mat.

Defense Efficacy

- **Concept:** Average of negative technical point (against) per decimal minutes.
- **Unit of measurement:** Average of negative technical points (against) per wrestled decimal minutes.
- **Data to make calculation:**
 - 1) Total time of wrestled decimal minutes
 - 2) Sum of all scored technical against points, including passivities, confirmed challenges and cautions.
- **How to calculate it:** Divide the total of against points by the wrestled decimal minutes.
- **Relationship with wrestlers performance:** When setting quantitative performance indicators technical-tactical in the study of performance of the 1st 10 qualified in free and female styles in World Championship 2011, only the defensive efficacy was significantly related with the final ranking in both analyzed styles (female wrestling $r_s=.402$, $p<.01$; wrestling, $r_s=.482$, $p=.00$). Besides, when checking the indicators of 7 champions of free style, it was found that 5 of them reached very high scores in this parameter (0.10 and 0.35 negative pts/min, equivalent to yield between 0.6 and 2.1 technical points in a 6min bout). In free style, none average indicator showed a marked technique. In case of female wrestling, the tendency of defense was similar for olympic category champions (between 0.00 and 0.40 negative pts/min), but it was detected a clear tendency in other indicators of medal winners. That data means that in Istanbul, the defense was a basic condition for victory in free style, but in female style, the offensive had a key role.

In greco-roman style this characteristic was found, in a brief recent study, made with data of the weight category 60Kg in recent World Universiade in Kazan, then, with the promulgated rules in May 2013. In a further section of this conference, it will be mentioned with more detail the topic of defense.

Technical-Tactical Indicators, Rate-Coefficient Type

Standing-Parterre Coefficient

- **Concept:** Percentage of effective TTC made in standing or par-terre position. It was described by Podlivaev (2010).
- **Unit of measurement:** a decimal value, ranging from 1.0 (any effective par-terre TTC) to 0.0 (all effective TTC in parterre position).
- **Data to make calculation:**
 - 1) Amount of TTC performed in standing position;
 - 2) Amount of TTC performed in par-terre position.
- **How to calculate it:** The amount of TTC performed in standing position divided by the sum of both positions frequencies.
- **Relationship with wrestler's performance:** The coefficient foot-mat is an indicator that points out in a very practical way the position which wrestler was more effective. Podlivaev (2010) refers a range from 0.50 to 0.70 for the best free style wrestlers in Russia. Those ranges near 1.0 indicate that the wrestler did not score any point in the bout on the mat (that means: 100% of successful TTC were executed in standing positions). The coefficient of champions in free and female style in World Championship Senior 2011 coincide with such ranges: the 7 males averaged 0.82, and female of olympic weights 0.69, that can be interpreted like a major cooperation of the actions on the mat with female competitors. The exception in this championship was the Ukrainian G. Vasylenko, gold medalist in 59Kg (non olympic weight category); her coefficient foot-mat was 0.14, which means a rare activity in standing position wrestling but noticeable on mat. Vasylenko had a high effectiveness executing counterattacks to leg attacks, mainly from the head and arms holdings in front over, that means, depending from her opponent's mistakes.

It is evident that the range suggested by Podlivaev, in the practice, it lets the wrestler to obtain an effective resource balance in both wrestling positions, fundamentally to take advantage of different opportunities that can occur through the whole tournament.

Standing Tactical Proactivity Coefficient

- **Concept:** In standing position, wrestler's tendency towards the active creation of favorable conditions for the offensive or taking advantage of opponent's mistakes.
- **Unit of measurement:** A decimal value, ranging from 1.0 (all TTC started from proactive means) to 0.0 (all effective TTC executed taking advantage of opponent's pitfalls).
- **Data to make calculation:**
 - 1) Amount of standing TTC prepared by proactive means;
 - 2) Amount of TTC not prepared but taking advantage of opponent's pitfalls.
- **How to calculate it:** The amount of standing TTC with proactive tactical means divided by the sum of total frequencies of TTC in such position.
- **Relationship with wrestler's performance:** It has been found a close relationship between tactical proactivity and some technical groups and concrete body movements. I. e. Standing Tactical Proactivity was positively correlated with Double leg and Bridging Technical Groups (i.e. gut-wrenches, ankle laces), and without contact set-ups. These technical features are similar to those reported by Tünnemann in 2010 World Senior Championships, but now we have tactical features to explain their preferred usage (López-González et al, 2012). Most champions in 2011 in Senior World Championship had values above average in this indicator, as the Japanese champions in female wrestling (Obara-Sakamoto, Yoshida and Icho), and american Burroughs, all of them reaching values above 0.80.

In freestyle, low values of proactive tactical means were related to actions of the group of projections executed as counterattacks, as well as push-outs, blocks and actions from the holding position to a leg (clinch). In other words: those wrestlers that get a low percentage of prepared actions depend of a favorable tournament or of opponent's mistakes. The exception can be in 120Kg division, where it is common that almost all competitors are distinguished by major quantities of actions that started in circumstantial conditions; the analysis performed to the videos in World Championship Senior 2010 and 2011 in freestyle suggested such a thing (López-González and Alonso-Rodríguez, 2011; López-González et al, 2012).

Effective Standing Distance Average

- **Concept:** Average of set-up distance by the effective TTC in standing position.
- **Unit of measurement:** Statistical mean between 1.0 (open, non-contact distance set-ups) to 3.0 (close distance of power-pummeling set-ups). With current international regulations before May 2013, TTCs from holding position in one leg do not belong to this indicator.
- **Data to make calculation:** Frequencies of TTC prepared from
 - 1) Open distance,
 - 2) Medium distance,
 - 3) Close distance
- **How to calculate it:** First, frequency of each set-up distance must be multiplied by their corresponding value in the scale (open distance frequencies for "1", medium distance by "2", close distance by "3"). The resulting values must be summed, and the resultant amount must be divided by the total frequency of effective standing TTC.
- **Relationship with wrestler's performance:** The effective standing distance average is one of the most descriptive and informational indicators in order to characterize wrestlers technically and tactically.

The distance is strongly related with the technical group, giving the athletes and coaches a quick panorama of wrestler's tendencies. For example, low values (below 2.0) indicate high effectiveness in open distance; great examples of this way of wrestling in standing position in 2011 Senior World Championship are Burroughs (1.82) in FS and Yoshida (1.35) in FW. In GR in 2012 Olympic Games, Iranian champion Omid Noorozi reaches 1.75, product of 3 TTC from medium distance and 1 more in open distance. An important inference about high usage of open and medium distance set-ups in such performance requires a low spending of time to obtain ideal conditions to attack, due to outstanding power, speed, strength, capacity and a great success attacking with shots (even in GR like Noorozi showed in London 2012), whose can be finished in many ways.

Values close to 3 indicate a tendency to wrestle in close distance. This kind of performance is typical of "throwers", like Georgian Olympic silver medalist Lashki (the only one wrestler who executed a 5 technical points throw-in in London olympic tournament) and the Hungarian World silver medalist Sastin in WC 2011 who performed 4 throws, 1 block, 1 push-out, 2 takedowns and even 2 leg attacks, all of them in close distance.

Mean values around 2.5 are typical in well balanced wrestlers in respect to the usage of 3 distances, like the values in WC 2011 obtained by Japanese female wrestlers and 2011 World champions H. Obara-Sakamoto (2.77) and K. Icho (2.20), or the Russian freestylers V. Lebedev (2.20) and B. S. Kudhukhov (2.17), both also world champions. In Greco-Roman style an example of balanced effective distance can be found in 2012 Olympic silver medalist T. Loerincz (Hungary) reached 2.33 in London.

Standing tactical risk average

- **Concept:** Tendency towards making most "low risk TTC" or "very high risk TTC" in standing position. The phase considered to characterize its risk is the NEXT TO PREPARATION PHASE (it can be a control-link or a body movement, Figure 3).
- **Unit of measurement:** Statistical mean between 1.0 (low risk) to 4.0 (very high risks).
- **Data to make calculation:** Frequencies of TTC executed with
 - 1) Low risk,
 - 2) Medium risk,
 - 3) High risk,
 - 4) Very high risk.
- **How to calculate it:** The frequency of TTC executed in each tactical risk multiplied by their corresponding value in the scale ("1" to "low", "2" to "medium" "3" to "high" and "4" to "very high"). Then, the values must be summed and the resultant amount must be divided by the total frequency of effective standing TTC.
- **Relationship with wrestler's performance:** In our different researches, "Tactical risk" had significant correlation with technical groups: in the Senior World Championship 2009 we analyzed the Tactical Risk in standing TTC performed in female wrestling, resulting that 100% of the attacks to both legs and 89.7% of projections, 70% of obstructions with leg and 100% of counter attacks. The low risk was the tendency in 100% of blocks and push-outs and 93.4% of takedowns.

The individual values of this indicator in a tournament describes in the same way, the tendency of each wrestler. If the value is close 1. like 1.47 reached by K. Icho in WC 2011, expresses the major usage of attacks through takedowns and counter offensive actions of low risk like defense of legs passing back. Values close 4, rarely frequent, indicate preference for projections with arching, hip hit and high risk counter attack, likewise Venezuelan M. Caripa (3.0). In fact, it can be considered that there are a few wrestlers in Senior World Championship that obtain a medal majorly wrestling with a high risk or very high risk.

Structural Variability Coefficient (SVC)

- **Concept:** Percentage of effective TTC in standing position made with changeable structure, expressed in decimal value.
- **Unit of measurement:** A decimal value, ranging from 1-0 to 0.0. The obtained value describes wrestler's tendency in the usage of both structures, continue and changeable: the higher value, close 1.0, the highest usage of changeable execution structure and vice versa.
- **Data to make calculation:** Frequencies of TTC executed with
 - 1) Changeable structure,
 - 2) Continuous structure
- **How to calculate it:** The structural variability coefficient results from dividing the frequency of technical-tactical combinations performed in standing position with changeable execution structure by the total frequency of successful technical- tactical combinations in the same position.
- **Relationship with wrestler's performance:** This indicator was conceptualized in the beginning of this year when analyzing the TTC in standing position executed in Olympic Games of London in Greco-Roman style. Due to low registered frequency of technical successful actions, it was necessary to look for the implementation of any other variable that revealed tendencies and explained the performance based on standing position. The results of using this indicator shoed evident difference in finalist wrestlers (gold and silver medal) in comparison with those competitors that participated in the repechage phase. The first group had a coefficient of structural variability significantly different from the other group (gold and silver = 0.81, bronze and 5th place = 0.44). It is inferred that using changeable execution structure of TTC helps to reaches successfully the completion of the technical movements attempted, evading and using opponent's defensive reaction, resulting in higher efficiency.

This indicator has not been used in the performance analysis with freestyle and female wrestlers. However, as leg attacks are the most frequently used TTC, is almost certainly that the more effective wrestlers on the offensive also record high values of SVC.

Specific Interrelationship among indicators

So as to evaluate integrally a certain wrestler's performance, it is indispensable to take into account specific relationships among indicators. In the previous works, three key relationships have been found:

Technical Quantitative Potential

This relationship refers to the potentiated of the wrestler's motion activity during the execution of his TTC. Theoretically, if the wrestler is able to execute only one variant, for instance, "underhook, shot,double leg, shift forward", he is expected to be able to execute it more than once during the tournament if he pretends to get a medal. In the same manner, it is better that in each double leg the wrestler could get, the most possible quantity of points. That way the expected relationship is the numeric potentiation of the previous indicator. In the Figure 7 it is shown the ideal relationship in the S. Yoshida's performance (Japan) in the female style and R. Yazdani (Islamic Republic of Iran)in freestyle during the WC 2011. The first graphic possesses an almost exponential tendency. The second shows an almost linear tendency. A third graphic, that corresponds to the I. Kuylakov (Russia) performance during the World University 2013 in Kazan in the Greco-Roman wrestling, shows a very light growth from the first to the second indicator, to later increase noticeably form the second to the third. These three athletes won the events previously mentioned.

The Figure 8 shows the performance of the same athletes, adding the values on the winners of the 2nd and 5th places who were defeated in the referred tournaments. Yoshida as well as Yazdani were defeated in diversity by a wrestler in each case: H. Maroulis and Jake Varner, respectively. However, the champions potentiated more their activity from the diversity per minute in each bout. In contrast, athletes such as T. Verbeek (Canada) and S. Balci (Turkey) both sub-champions, potentiate to a lesser extent their indicators.

This relationship has started to be studied recently in Greco-Roman style. The analysis in the 60 kilograms category in Kazan shows a tendency practically constant among the first classified wrestlers when their diversity is potentiated in effectiveness: there was a bare difference. This suggests that in the Greco-Roman wrestling is

not common that one solely variant is repeated several times, overall in the standing position wrestling. But the productivity was really potentiated, mainly in the cases of A. Kebispayev (Kazakhstan) and T. Turkishvili (Georgia), both winners of the bronze medal. The champion I. Kuylakov although potentiated his effectiveness, he did not do it in the same scale as the two previous wrestlers. It can be inferred that potentiate the technical quantitative indicators is a characteristic of champion wrestlers. But the highest possible potentiation is not a warranty to obtain a gold medal.

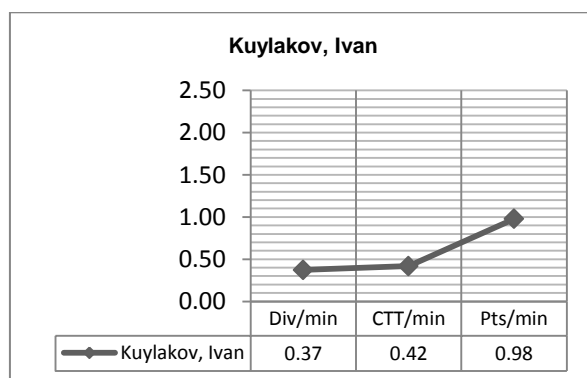
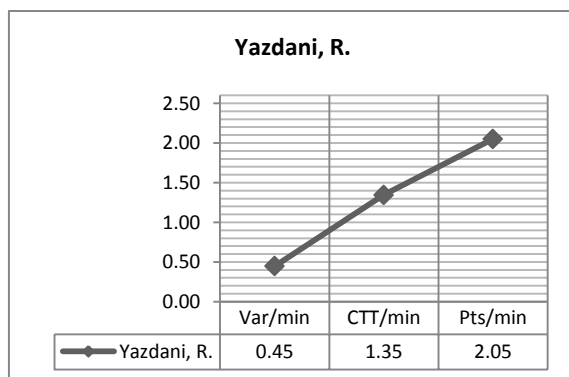
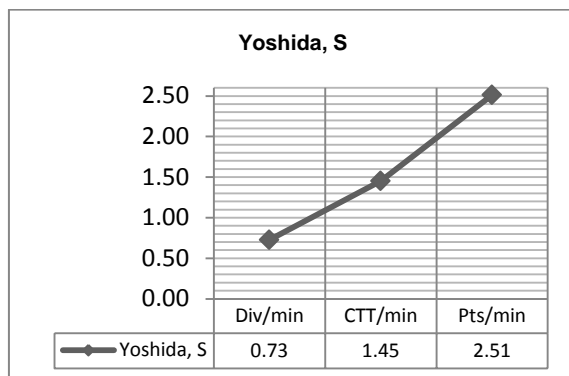
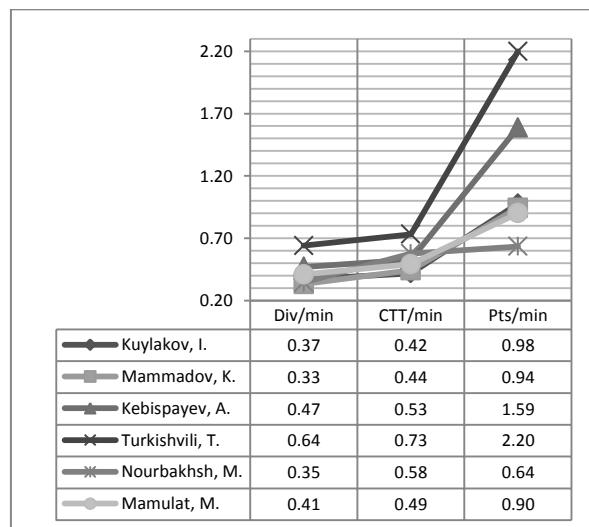
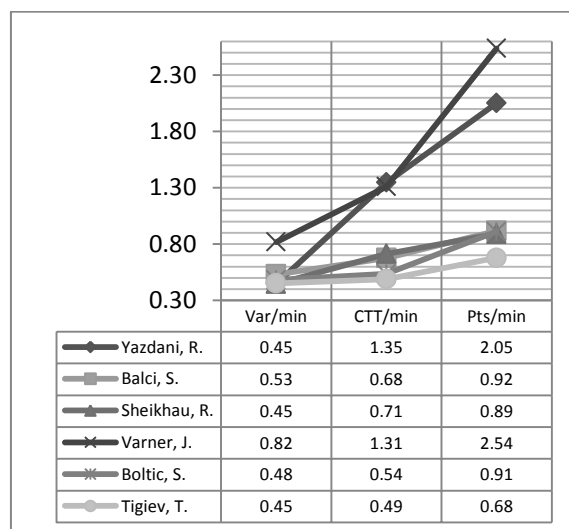
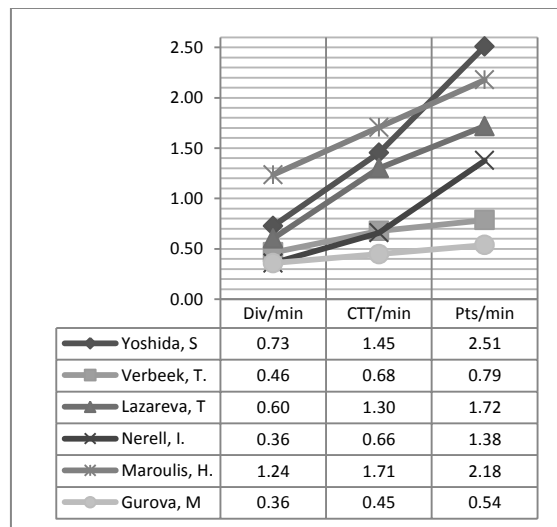


Figure 7. Relationship among values of Diversity (Div/min), Effectiveness (TTC/min) and Productivity (Pts/min) as part of wrestlers' performance. Left: S. Yoshida, Champion, Female Wrestling, WC2011. Center: R. Yazdani, Champion, Freestyle, WC2011. Right: I. Kuylakov, Champion, Greco-Roman, World Universiade 2013.



WC2011, FW, 55 kg. WC2011, FS, 96 kg. WU2011, GR, 60 kg.
 Figure 8. Relationship among values of Diversity (Div/min), Effectiveness (TTC/min) and Productivity (Pts/min) as part of 1st to 5th place performance. Left: Female Wrestling (FW) WC2011, 55 kg. Center: Freestyle (FS), WC2011, 96 kg. Right: Greco-Roman (GR), World Universiade (WU) 2013, 60 kg.

Defensive Weakness Profile

As mentioned before, the defensive effectiveness is the only variant that was significantly related with the obtained place in both wrestling styles. An exhaustive revision to database of the referred investigations could show that the exposed cases in the previous section could be explained by the defense as well. The importance that only one indicator can have in the final wrestlers' performance as is the defensive efficiency has led us to consider complementary indicators to deepen in defense performance.

The solution was implemented, putting into practice with the analysis of the 60 kg category in Greco-Roman style in Kazan 2013 was the elaboration of what was called "Defensive Weaknesses Profile". This consists in the comparison of the negative technical points per minute assigned in the following situations:

- Tec.Pts. by Effective TTC which the opponents scored pts. against the studied wrestler, classifying by the strategic role: attack, combinations and counterattacks.
- Passivities.
- Faults.
- Confirmed challenges (lost).

The profile was graphed adding the productivity values and the total negative points, so as to be able to analyze the possible relationships. In the Figure 9 it can be appreciated that Kuylakov had the best defensive efficiency among the six wrestler, - 0.05 points per minute. (in fact he only gave a point in all the tournament), as a result of a caution for passivity. The fact that the Kuylakov's defensive weakness in the World Universiade 2013 consists only in a passivity that lets deduct that, besides his defensive level in the intended TTC by his opponents, his offensive attitude was sufficiently good to avoid a mayor caution by the refereeing body regarding the cautions for passivity. On the contrary the five remaining wrestlers in this comparison were penalized in more occasions per minute in bout. The profile shows as well that the sub-champion in this event, K. Mammadov (Azerbaijan) assessed several technical points in the attacks from his opponents. A. Kebispayev (Kazajastan) gave points in four different occasions (attacks, complex, passivities and overall counterattacks) contrasting in his productivity. The other bronze medalist T. Turkishvili (Georgia), 5th place, is in a similar situation, having in the passivities is biggest defensive weakness. M. Nourbakhs (Islamic Republic of Iran), further having given points in three different situations, he got a global defensive performance that exceeds in negative points his own productivity. Finally, Mamulat (Moldova) was the weakest wrestler in this group in the defense of attacks against him. With these data, at least for the studied wrestlers' group in Greco-Roman style, the productivity is not as important as the defense to achieve the best outcome in the final classification, and the Defensive Weakness Profile is used to determine the most concrete issues around defensive errors.

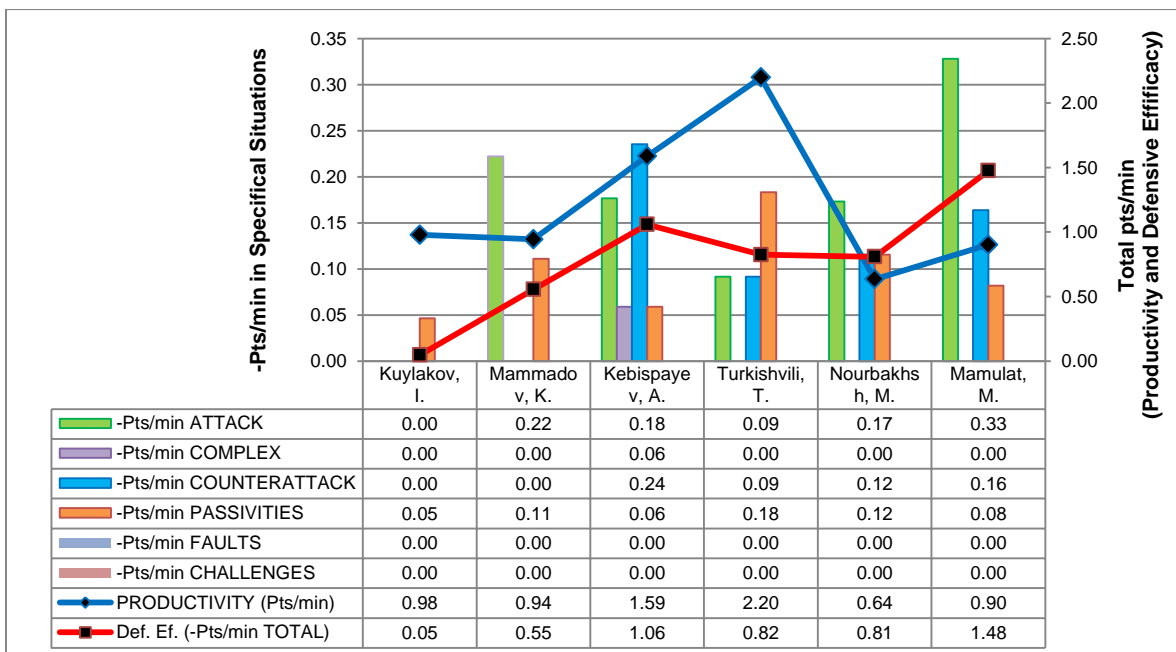


Figure 9. Defensive Weakness Profile among 1st to 5th place in Greco-Roman 60 kg. at World Universiade 2013 (Kazan)

Wrestler's Technical -Tactical Characterization

The third type of relationship is the one that appears among the qualitative characteristics and its indicators: the coefficients "standing-parterre", "Tactical Proactivity" and "Structural Variability" as well as the averages in "Effective Distance" and "Tactical Risk". Except the first one, the rest of the positions correspond to the standing position, and the relationships among them can show us useful information for coaches and athletes, with scouting purposes as well as expression of the strategy itself, and to establish synergic models of these tactical characteristics. To graph together these indicators, the coefficients are shown in columns, in so far as the averages are reflected with dotted lines. The lowest value in the scale averages is not "0.00" but "1.00", in the scales of Effective Distance and Tactical Risk the first value is precisely 1.

The Figure 10 complements the performance analysis done to the first six classified 60 kg. weight class Greco-Roman wrestlers in Kazan 2013. The champion in this weight category, I. Kuylakov achieved almost the half of his TTC in each wrestling position (standing- par terre coefficient: 0.44), preparing proactively in standing wrestle a similar quantity of TTC that he performed reacting to his opponents spontaneous defensive errors (Tactical Proactivity coefficient : 0.50). Together with the Iranian M. Nourbakhsh reached the highest value of TTC of variable structure (Structural Variability Coefficient: 0.50). The average effective distance of the Russian wrestler was similar to the rest: 3.0 value that suggests that the promulgated rules the last month of May 2013 have increased the wrestle in full contact, situation had never been seen during the last years in this wrestling style. Finally regarding to the Tactic Risk, Kuylakov averaged 1.75, that can be called a moderate risk taking. The relationship among all these values describes the way this athlete wrestles in the Universiade 2013 as dangerous in both wrestling positions, tending to avoid risks but keeping an important proactive activity; his main technical arms are found between the low risk (through takedowns, defensive, defensive blocks, area removals) and medium risk with variable structure attacks as the "duck under" that preceded an spectacular "behind waist lock, back duplex" executed against Mammadov in the bout to get the gold medal.

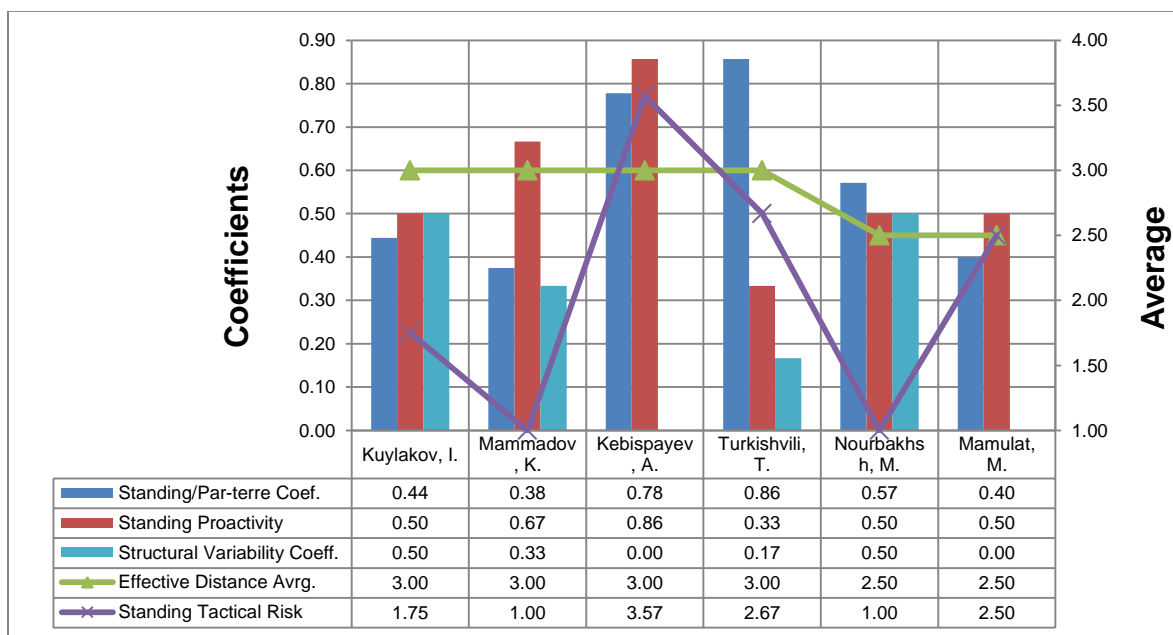


Figure 10. Individual Technical-Tactical Characterization, comparative among 1st to 5th place in Greco-Roman 60 kg. at World Universiade 2013 (Kazan)

The technical tactical characterization of A. Kebispayev contrasts with the one of the champion of the category. The Kazakh wrestler was by far the most spectacular wrestler in the studied group, thanks to his aggressive standing position wrestling and his abundant productivity through projections. His numbers so indicate it (Standing-ParTerre Coefficient 0.78, Standing Tactical Proactivity 0.86, Tactical Risk Average 3.57 and Structural Variability Coefficient 0.00, all of them extreme values, not reached by the rest of the wrestles that contested the medal). However, and retaking the Defensive Weaknesses Profile (Figure 9), the high risk taken by him and the absolute utilization of continuous structure TTC, can explain perfectly the low defensive efficiency of this wrestler.

The combination of technical tactical aspects of the sub- champion K. Mammadov (Azerbaijan) contrasts with the one of the two previous described competitors in this section. The combination of close distance (distance average 3.00), low Tactical Risk (average 1.00) and low Structural Variability (0.33) indicate this wrestler

executed attacks to go behind or to take the opponent off. It is logical to think that this tactical style influenced to the passivities against him (Figure 9). His Standing-Par terre coefficient (0.38) reveals that most his effective TTC were done in the mat wrestling; the database of the analysis has registered as his: 2 takedowns and 1 push-out; in par-terre: 4 gut wrenches and 1 lift and suplex. It can be considered a modest set of techniques in comparison with Kebispayev and Turkishvili, but was the second best defender in this tournament, therefore he went to the final. The graph of technical-tactical characterization contributes with comparative data easy to interpret once the indicators are comprehended.

PERFORMANCE ANALYSIS PERSPECTIVES

Thanks to the current devices, accessible software and the on-line video services (including FILA-Dartfish WebTV), the Match Analysis is within reach the coaches, athletes and sport scientists. Considering the above and adding this to our sport, it now is in a new stage of evolution, the following possibilities may arise in application and development of the PA.

- **Adaptation to the Wrestling Rules.** The described video analysis can be a valuable help in the purpose to take the best and most varied strategies to achieve victory with the current rules
- **Show Improvement.** With these tools it is possible to combine effective actions that, while involving a moderate risk to achieve victory, the bouts should be spectacular and attractive to further promote our sport and help to get new fans.
- **Formation, Training and Updated knowledge.** It is a fact that several nations are still lagging behind in the wrestling development in their regions. The wrestlers from several countries with little tradition in international podiums are now demonstrating the potential of their fellow men and women, but in several cases this happens because these outstanding athletes train in other countries or are trained by top foreign coaches, but not necessarily by technical development within their territory. The database generation with actions and interrelationships of the best wrestlers in the world can serve as performance model to design a wrestling curriculum; a project that is already being addressed by the Scientific Commission of FILA.

The quantitative indicators usage in the technical tactical performance can help to avoid the stagnation of both content preparation as well as specific performance that often appears at different levels of preparation (club, state, national team).

- **Multidisciplinary studies.** With highly informative indicators that let quantify even qualitative aspects in the wrestlers' performance, it is plausible to make studies triangulating physiological, psychological and anthropometric data, and other manifestations of psychomotor potential of the wrestler. For instance a lot has been described in the literature about the potency and speediness as a peculiarity of the best wrestlers; probably these athletes use that potency in actions with specific characteristics such as the attack proactive preparation in open distance. In par-terre position, it is known that the most effective executing *gut-wrenches* have high strength levels, but in our database consists that the high frequency in this technique in male senior category is related with specific Tactical Means.

With the new rules, resistance gets more importance. How will the endurance be related with the characteristics and indicators of the technical -tactical performance?

- **Improvement of the Defensive Performance Study.** Although the proposed profile in this document gives new data, it has not been used in a large scale, and it has not been applied in female and free style yet. It is a matter of time and work to get the highly informative data in this sense.

These are only some of the possibilities. We hope this work helps to exhort the reader to apply these procedures, variables and indicators in the unstoppable evolution in our sport.

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LA LUTTE TRADITIONNELLE AFRICAINE

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INTRODUCTION GENERALE

LES ORIGINES DE LA LUTTE TRADITIONNELLE AFRICAINE

IL SERAIT DIFFICILE, VOIRE IMPOSSIBLE, DE POUVOIR REMONTER OU DONNER UNE DATE AUX ORIGINES DE LA LUTTE TRADITIONNELLE CAR ELLE EST PRATIQUEE DEPUIS TRES LONGTEMPS EN AFRIQUE AU SUD DU SAHARA ET CE, DANS TOUS LES PAYS DE CET ESPACE. CHAQUE PAYS A SES PROPRES SPECIFITES DANS LA FAÇON DE LUTTER. AUTREFOIS, LES EVENEMENTS ETAIENT ORGANISES A L'OCCASION DE CIRCONSTANCES PRECISES.

EN EFFET LA LUTTE SE PRATIQUAIT EN GENERAL SOUS UNE FORME LUDIQUE SOIT AVANT, SOIT APRES LES TRAVAUX CHAMPETRES OU APRES LES RECOLTES SOIT LORS DE CEREMONIES ORGANISEES POUR DES RAISONS PARTICULIERES. IL FAUT PRECISER QUE LA PECHE ETANT EGALEMENT UNE ACTIVITE TRADITIONNELLE, LA LUTTE EXISTAIT AUSSI DANS LES VILLAGES DE PECHEURS. DANS TOUS LES CAS, IL FAUT CONVERTIR QUE LA LUTTE REPONDAIT A DES BESOINS SPECIFIQUES S'IMPOSANT ALORS EN TANT QU'PRATIQUE PHYSIQUE AUSSI ANCIENNE QUE L'ON PEUT REMONTER DANS LA MEMOIRE DES HOMMES EN GENERAL ET DES AFRICAINS EN PARTICULIER. DANS CETTE AFRIQUE LA LUTTE EST PROFONDEMENT DOMINEE PAR LE RITUEL QUI PEUT A LA FOIS ETRE FESTIF, EXPIATOIRE ET PREPARATOIRE

1. LA LUTTE TRADITIONNELLE AUTREFOIS

a) Distraction après les récoltes

AU SENEGAL ELLE ETAIT PRATIQUEE DANS LES VILLAGES APRES LES TRAVAUX CHAMPETRES ET APRES LES RECOLTES, OU APRES DE BONNES PARTIES DE PECHE, PARCE QUE LES PRODUITS VIVRIERS ETAIENT DISPONIBLES ET LES VILLAGEOIS ETAIENT ASSURES DE POUVOIR SUBVENIR A LEURS BESOINS NUTRITIONNELS AVEC DES GRANGES REMPLIES DE CEREALES ET AUTRES PRODUITS VIVRIERS POUR LEUR ASSURER DE LA NOURRITURE JUSQU'À LA SAISON DES PLUIES SUIVANTE. CETTE CONTINGENCE ETANT REGLEE, ILS POUVAIENT PENSER A LA DISTRACTION SAINTE A TRAVERS DES COMBATS DE LUTTE ENTRE LES JEUNES GENS D'UN MEME VILLAGE D'ABORD, ENSUITE ENTRE CEUX DE VILLAGES VOISINS ET ENFIN AU SEIN D'UNE MEME CONTREE.

LA LUTTE CONSTITUAIT POUR LES JEUNES UN DE LEURS PLAISIRS FAVORIS ET ELLE SE PRATIQUAIT SURTOUT LA NUIT, A LA BELLE ETOILE, AU RYTHME DES TAMBOURS PARCE QUE DANS LA SOCIETE TRADITIONNELLE LA LUTTE ETAIT L'EXPRESSION NATURELLE D'UNE COMMUNAUTE ETHNIQUE, TRIBALE OU CLANIQUE.

MAIS IL S'AGISSAIT AUSSI DE TESTER LA ROBUSTESSE ET LA FORCE DES JEUNES VILLAGEOIS QUI SERAIENT EN PREMIERE LIGNE POUR DEFENDRE LEUR COMMUNAUTE EN CAS DE CONFLIT ARME AVEC D'AUTRES VILLAGES. DANS UNE SITUATION OU L'ISSUE DE TOUTE BATAILLE ETAIT LE CORPS A CORPS, LES « ARMEES » AVAIENT PLUS QUE BESOIN DE SOLDATS ENDURANTS ET COURAGEUX ET LA LUTTE ETAIT, A CET EGARD, UN BON « BAROMETRE ». C'EST POURQUOI LA LUTTE AVAIT UN ROLE DE PREMIER PLAN EN TANT QU'ACTIVITE PUISIQUE PREPARATOIRE POUR UN FUTUR « GUERRIER ». CES COMPETITIONS PERMETTAIENT EGALEMENT DE DETERMINER LES CLASSES D'AGE DE CES JEUNES POUR, EVENTUELLEMENT, SCHELLER DES UNIONS AVEC LES JEUNES FILLES DU VILLAGE CAR UN JEUNE COMBATTANT QUI FAISAIT MONTRE DE COURAGE ET D'ARDEUR AU COMBAT ETAIT SENSE ETRE UN GROS TRAVAILLEUR QUI POUVAIT, A LEURS YEUX, ETRE UN BEAU PARTI POUR LEURS FILLES.

b) Concurrence entre villages

DES JOUTES ETAIENT EGALEMENT ORGANISEES ENTRE VILLAGES VOISINS POUR LES MEMES RAISONS MAIS AUSSI POUR ETABLIR ET RENFORCER LES RELATIONS ET PREVENIR TOUT RISQUE DE RELATIONS HEURTEES ENTRE EUX ET, EVENTUELLEMENT FAVORISER DES MARIAGES ENTRE LES JEUNES DE CES VILLAGES. CES COMPETITIONS ALLIAIENT LA CULTURE, LE FOLKLORE ET LE MYSTICISME TRADITIONNEL AFRICAINS, C'EST TOUJOURS LE CAS DU RESTE.

LE VAINQUEUR DE CES COMPETITIONS CONSTITUAIT UNE FIERTE POUR LA FAMILLE, LE CLAN, OU POUR TOUT LE VILLAGE DANS LE CAS DE TOURNOIS ENTRE VILLAGES. LES RECOMPENSES VARIAIENT ENTRE DES TETES DE BETAIL, DES ANIMAUX DE TRAIT, VOIRE LA MAIN DE JEUNES FILLES EN AGE DE SE MARIER.

2. EVOLUTION DE LA LUTTE TRADITIONNELLE

2.1 LUTTE SANS FRAPPE

a) Au niveau national

DANS TOUS LES PAYS QUI LA PRATIQUENT, LA LUTTE A CONNU UNE EVOLUTION SIGNIFICATIVE QUI L'A MENE A PRENDRE EN CHARGE D'AUTRES PARAMETRES QUI NE CORRESPONDENT PLUS AUX MOTIVATIONS PREMIERES EN CE SENS QU'ELLE EST DEVENUE PLUS MATERIELLE AVEC DES RECOMPENSES BEAUCOUP PLUS IMPORTANTES EN TERMES FINANCIERS OU MATERIELS CONTRAIREMENT A AUTREFOIS OU LE BUT ETAIT D'OBTENIR UNE CONSECRATION POUR L'HONNEUR, LA REPUTATION ET LA RECONNAISSANCE SOCIALE EN SE MESURANT AUX JEUNES D'UN MEME VILLAGE, DE VILLAGES VOISINS OU D'UNE REGION.

b) Au niveau international

LA LUTTE ETANT PRATIQUEE PARTOUT EN AFRIQUE MAIS SELON DES REGLES DIFFERENTES, LES TECHNICIENS DE LUTTE AFRICAINS, SOUS L'IMPULSION DE LA CONFERENCE DES MINISTRES DE LA JEUNESSE ET DES SPORTS DE LA FRANCOPHONIE (CONFEJES) SE SONT CONCERTES POUR HARMONISER LES DIFFERENTES REGLES DE LUTTE ET ELABORER UN CODE DE LUTTE AFRICAINE CONSENSUEL HOMOLOGUE PAR LA CONFEDERATION AFRICAINE DE LUTTES ASSOCIEES (CALA) ET LA FEDERATION INTERNATIONALE DES LUTTES ASSOCIEES (FILA), APPLICABLE DANS TOUTES LES COMPETITIONS INTERNATIONALES (CHAMPIONNATS D'AFRIQUE, TOURNOIS SOUS REGIONAUX ET RENCONTRES INTERNATIONALES AMICALES). LORS DE CES COMPETITIONS INTERNATIONALES SONT REMISES DES MEDAILLES EN OR, ARGENT OU BRONZE, PARFOIS ACCOMPAGNEES DE RECOMPENSES EN ESPECES. DANS CE CADRE IL CONVIENT DE SIGNALER QUE LA COMMUNAUTE DES ETATS DE L'AFRIQUE DE L'OUEST (CEDEAO) QUI REGROUPE QUINZE (15) PAYS A PRIS DEPUIS L'ANNEE 1986, LA DECISION POLITIQUE DE FAIRE DE LA LUTTE LE SPORT DE LA COMMUNAUTE POUR LE RAPPROCHEMENT DES PEUPLES. C'EST AINSI QUE DES TOURNOIS REGULIERS SONT ORGANISES DEPUIS PLUSIEURS ANNEES A NIAMEY (NIGER) ET DAKAR (SENEGAL) MAIS EGALEMENT, CETTE ANNEE A BANJUL (GAMBIE). CES COMPETITIONS SE DEROULENT DANS CINQ (5) CATEGORIES DE POIDS : MOINS DE 66 KG, MOINS DE 75 KG, MOINS DE 85 KG, MOINS DE 100 KG ET PLUS DE 100KG (AVEC UNE LIMITE FIXEE A 120 KG). LES CHAMPIONNATS D'AFRIQUE, A L'INSTAR DES AUTRES DISCIPLINES, PEUVENT ETRE ORGANISES DANS N'IMPORTE QUEL PAYS DEMANDEUR AYANT SATISFAIT AUX CONDITIONS DU CAHIER DE CHARGE.

3. LA LUTTE AU SENEGAL

a) Lutte traditionnelle sans frappe

LA LUTTE TRADITIONNELLE EST TRES PRATIQUEE AU SENEGAL AVEC PLUS DE LA MOITIE DES 4.350 LICENCIES (TOUTES FORMES DE LUTTE CONFONDUES) QUI SONT ADEPTES DE CETTE FORME DE LUTTE. COMME DANS LES AUTRES PAYS QUI LA PRATIQUENT, CETTE FORME DE LUTTE EST DEVENUE PLUS « MATERIELLE » DANS LA MESURE OU LES MOTIVATIONS D'ORIGINE ONT GLISSE DE L'HONNEUR DU VILLAGE A LA RECHERCHE DE GAINS FINANCIERS OU MATERIELS. EN EFFET LES RECOMPENSES SONT, DE NOS JOURS, CONSTITUEES PAR DES SOMMES D'ARGENT, DES MATERIELS DE CONSTRUCTION, APPAREILS ELECTROMENAGERS OU DU CHEPTTEL. AU SENEGAL PAR EXEMPLE LES MISES EN ARGENT PEUVENT SOUVENT ATTEINDRE CINQ (5) MILLIONS DE FRANCS CFA (SOIT ENVIRON 7.600 EUROS). C'EST POURQUOI DE PLUS EN PLUS DE JEUNES FONT DE LA LUTTE LEUR ACTIVITE PRINCIPALE AU DETRIMENT DES ETUDES OU DE L'APPRENTISSAGE D'UN METIER, CE QUI EST REGRETTABLE.

b) Lutte traditionnelle avec frappe

AU SENEGAL EXISTE UNE FORME DE LUTTE TRADITIONNELLE QUI NE SE TROUVE NULLE PART AILLEURS EN AFRIQUE. IL S'AGIT EN EFFET D'UNE COMBINAISON DE LUTTE TRADITIONNELLE AFRICAINE ALLIEE A DE LA BOXE ANGLAISE A MAINS NUES. L'OBJECTIF PREMIER RESTANT TOUJOURS DE TERRASSER L'ADVERSAIRE AVEC UNE TECHNIQUE DE LUTTE PURE MAIS AUSSI AVEC LA POSSIBILITE DE LE BATTRE AVEC LES POINGS (KO). TOUTEFOIS, LES ASPECTS CULTURELS, FOLKLORIQUES ET TRADITIONNELS TELS QUE LE MYSTICISME QUI EXISTENT DANS LA LUTTE TRADITIONNELLE SANS FRAPPE SONT CONSERVES.

CONTRAIREMENT A LA LUTTE SANS FRAPPE QUI DATE DE TRES LONGTEMPS, LES ORIGINES DE CETTE FORME DE LUTTE PEUVENT ETRE, SELON DES RECHERCHES ENTREPRISES PAR DES SOCIOLOGUES, SITUÉES VERS LA FIN DES ANNEES 1920 A DAKAR. EN EFFET, ELLE NE SE PRATIQUAIT A L'ORIGINE QU'A DAKAR MAIS ELLE A PROGRESSIVEMENT GAGNE TOUTES LES REGIONS DU PAYS AU POINT DE DEVENIR AUJOURD'HUI UN VERITABLE PHENOMENE DE SOCIETE. CETTE FORME DE LUTTE BIEN SENEGALAISE A CONNU UN ESSOR EXPONENTIEL CES DIX (10) DERNIERES ANNEES

4. APPARITION ET ROLE DES MEDIA DANS LA LUTTE MODERNE

IL EST VRAI QUE LA LUTTE AVEC FRAPPE A TOUJOURS ETE REMUNERE MAIS L'APPARITION DU SPONSORING DANS LA DEUXIEME MOITIE DES ANNEES 1990 ET, SURTOUT L'EXPLOSION MEDIATIQUE, A JOUE UN TRES GRAND ROLE. EN EFFET ILS ONT PRIS EN COMPTE L'ENGOUEMENT DES SENEGALAIS POUR LA LUTTE QUI DRAINE DES FOULES QUE LES AUTRES DISCIPLINES SPORTIVES NE PEUVENT PAS REUNIR POUR Y JETER LEUR DEVOLU EN Y INVESTISSANT BEAUCOUP D'ARGENT POUR GAGNER EN VISIBILITE AU SENEGAL ET DANS LES AUTRES PAYS GRACE AUX CHAINES DE TELEVISION QUI SONT SUR LE BOUQUET.

a) Enjeux financiers

LA LUTTE ETANT SURTOUT UNE AFFAIRE DE PROMOTEURS DE SPECTACLES PRIVES AVEC DES MOYENS FINANCIERS ASSEZ LIMITES, L'ARRIVEE DE CES NOUVEAUX BAILLEURS DE FONDS, SURTOUT DES COMPAGNIES DE TELEPHONIE MOBILE, A ENTRAINE UNE ENVOLEE DES CACHETS PAYES AUX LUTTEURS, CACHETS QUI PEUVENT ETRE TRES IMPORTANTS ET ATTEINDRE DES MONTANTS DE PLUS DE CENT (100) MILLIONS DE FRANCS CFA, SOIT ENVIRON PLUS DE 150.000 EUROS PAR LUTTEUR POUR UN SEUL COMBAT. LA COURSE EFFREINEE ET LA CONCURRENCE ENTRE PROMOTEURS ET SPONSORS DANS LA FINANLISATION DES CONTRATS EST A L'ORIGINE DE LA FLAMBEE DES CACHETS.

b) Enjeux économiques et sociaux

LE GAIN RAPIDE D'ARGENT ET LA RECONNAISSANCE SOCIALE QUI S'EN SUIVIT ONT EU POUR CONSEQUENCE QUE PLUSIEURS ATHLETES ONT FAIT DE LA LUTTE UNE PROFESSION AVEC TOUTES LES INCERTITUDES QUI SONT LIEES A L'ACTIVITE (RISQUE DE BLESSURE, INCERTITUDE DE DISPUTER DES COMBATS,.....).

COMPTE TENU DES ENJEUX FINANCIERS TRES IMPORTANTS, DE LA RECONNAISSANCE ET DE LA REUSSITE SOCIALE DES LUTTEURS RECONNUS COMME CHAMPIONS, UNE FRANGE NON NEGLIGEABLE DE LA JEUNESSE A TENDANCE A S'IDENTIFIER A CEUX CI AU DETRIMENT D'AUTRES APPROCHES PROFESSIONNELLES OU ACADEMIQUES

4. EVOLUTION DES MENTALITES ET COMPORTEMENT DES LUTTEURS

a) les athlètes

COMME INDIQUE PLUS HAUT LES LUTTEURS PEUVENT, DU JOUR AU LENDEMAIN, SE RETROUVER AVEC BEAUCOUP D'ARGENT ET DEVENIR POUR LE PUBLIC DES EXEMPLES DE REUSSITE SOCIALE. . IL EST FREQUENT DE CONSTATER CHEZ LES PRATIQUANTS UN GAIN DE POIDS EXTREMEMENT RAPIDE CE QUI DONNE A PENSER QUE L'UTILISATION DE PRODUITS ILLICITES EST DEVENUE LA REGLE.

b) Le public

AVEC LE TEMPS LE PUBLIC EST PASSE D'AMATEURS DE LUTTE A DES FANS CLUBS QUI SONT D'UN CHAUVINISME PATENT A L'ORIGINE DE DEBORDEMENTS REPREHENSIBLES ET DES COMPORTEMENTS CHAUVINS QUI SONT SOUVENT SOURCES DE VIOLENCE COMME LES HOOLIGANS DANS LE FOOTBALL IL Y A QUELQUES ANNEES. CEPEBDANT UNE NETTE AMELIORATION A ETE NOTEE DEPUIS DEUX ANS GRACE A LA SENSIBILISATION ET A LA LUTTE CONTRE LA VIOLENCE EN COLLABORATION AVEC LES AUTRES SECTEURS DE LA LUTTE (MANAGERS, ENTRAINEURS, ASSOCIATIONS, LUTTEURS, SECURITE...) POUR BOUTER LA VIOLENCE HORS DES STADES.

5. LES REGLEMENTS DE LA LUTTE

LE COMITE NATIONAL DE GESTION DE LA LUTTE (CNGL) A ETE INSTALLE EN MARS 1994 AVEC POUR MISSIONS DE GERER ET DE DEVELOPPER LA LUTTE SOUS TOUTES SES FORMES. DANS CE CADRE, IL A ELABORE DES REGLEMENTS GENERAUX, STATUTS, CODE DE DISCIPLINE, REGLES DE LUTTE AVEC FRAPPE, REGLES DE LUTTE SANS FRAPPE QUI SONT APPLICABLES SUR TOUTE L'ETENDUE DU TERRITOIRE NATIONAL.

POUR POUVOIR OBTENIR UNE LICENCE DE PRATIQUANT, LES LUTTEURS SONT OBLIGATOIREMENT MEMBRES D'ASSOCIATIONS DENOMMEES ECURIES OU ECOLES DE LUTTE QUI SONT RECONNUES PAR LES AUTORITES ADMINISTRATIVES ET AFFILIEES AU COMITE NATIONAL DE GESTION DE LA LUTTE.

6. LA LUTTE TRADITIONNELLE, VIVIER DE LA LUTTE OLYMPIQUE

CETTE LUTTE TRADITIONNELLE PEUT, DANS UNE LARGE MESURE, CONSTITUER UN VIVIER POUR LA LUTTE OLYMPIQUE DANS LA MESURE OU TOUTES LES TECHNIQUES DE LUTTE DEBOUT SONT UTILISEES. IL NE RESTE DONC QU'A FORMER LES LUTTEURS EN LUTTE AU SOL POUR LEUR PERMETTRE D'ASSIMILER TOUTES LES TECHNIQUES DE LA LUTTE OLYMPIQUE. C'EST D'AILLEURS POUR CETTE RAISON QUE DANS LES COMPETITIONS DE LUTTE OLYMPIQUE, BEAUCOUP DE PAYS, DONT LE SENEGAL, NE PRESENTENT DES ATHLETES QUE DANS LA LUTTE LIBRE QUI EST, QUELQUE PART, PROCHE DE LA LUTTE TRADITIONNELLE AFRICAINE. LE SENEGAL A REMPORTE PLUSIEURS TITRES DE CHAMPION D'AFRIQUE EN LUTTE OLYMPIQUE. IL FAUT SOULIGNER A CET EGARD QUE, CONSCIENTE DU POTENTIEL QUI EXISTE EN AFRIQUE, LA FEDERATION INTERNATIONALE DES LUTTES ASSOCIEES (FILA) A OUVERT, DEPUIS SEPT (7) ANS DEJA, UN CENTRE INTERNATIONAL DE LUTTE QUI ACCUEILLE DES ATHLETES ORIGINAIRES DE PLUSIEURS PAYS AFRICAINS POUR LES FORMER ET LES PREPARER

AUX COMPETITIONS INTERNATIONALES (JEUX OLYMPIQUES ET CHAMPIONNATS DU MONDE). CE CENTRE EST IMPLANTE A THIES, A 70 KM DE DAKAR

7. ROLE DE LA SCIENCE

NOUS AVONS FAIT LE CONSTAT QUE BEAUCOUP D'ASSOCIATIONS (ECOLES ET ECURIES DE LUTTE) NE DISPOSENT PAS EN LEUR SEIN, DE PERSONNES RESSOURCE DE QUALITE TANT AU PLAN ADMINISTRATIF QU'AU PLAN TECHNIQUE POUR UNE BONNE PRISE EN CHARGE ET UN BON ENCADREMENT DES ATHLETES.

EN EFFET IL S'AGIT SOUVENT D'ANCIENS LUTTEURS RECONVERTIS EN ENTRAINEURS QUI, BIEN QU'AYANT UN VECU DE PRATIQUANTS, NE POSSEDENT NI LES APTITUDES NI LES CONNAISSANCES TECHNICO-TACTIQUES POUR UN ENCADREMENT DE QUALITE DES SPORTIFS. ELLES MANQUENT EN EFFET DE TECHNICIENS DE QUALITE BIEN FORMES CAPABLES DE PRENDRE EN CHARGE CERTAINS ASPECTS LIES A :

- LA PREPARATION SCIENTIFIQUE ET TECHNIQUE DES ATHLETES
- L'ENCADREMENT ET AU SUIVI MEDICAL DES LUTTEURS
- LA DIETETIQUE
- LA FORMATION DES ATHLETES DANS LES AUTRES STYLES DE LUTTE.

8. CONCLUSION ET PERSPECTIVES DE DEVELOPPEMENT

LE COMITE NATIONAL DE GESTION DE LA LUTTE A DEJA INITIE DES SESSIONS DE FORMATION DESTINEES AUX TECHNICIENS (ENTRAINEURS ET ARBITRES) ET ENVISAGE D'ETENDRE TRES PROCHAINEMENT LA FORMATION AUX CADRES ADMINISTRATIFS CHARGES DE LA GESTION DES ASSOCIATIONS AFIN DE LEUR PERMETTRE DE MIEUX S'ACQUITTER DE LEURS TACHES ET D'ASSUMER LEURS OBLIGATIONS.

DE CE POINT DE VUE, LE SYMPOSIUM SCIENTIFIQUE POURRAIT OUVRIR DES PISTES DE REFLEXION OU PROPOSER DES SOLUTIONS POUR LA PRISE EN CHARGE DES ELEMENTS PRECITES SURTOUT EN CE QUI CONCERNE

- LE CONTROLE DE LA TRANSFORMATION PHYSIQUE TROP RAPIDE DES SPORTIFS,
 - L'ELABORATION D'UN REFERENTIEL TECHNIQUE POUR LEUR ENCADREMENT (PREPARATION PHYSIQUE ET TECHNIQUE PENDANT LES SEANCES D'ENTRAINEMENT),
 - LEUR SURVEILLANCE MEDICALE (DIETETIQUE ET CONTROLE ANTI DOPAGE),
 - LA FORMATION DES PERSONNES CHARGEES DE DIRIGER LES ASSOCIATIONS
- ET BIEN D'AUTRES ASPECTS QUI PERMETTRONT DE MIEUX SECURISER LES ATHLETES.

EVOLUTION AND ADJUSTMENTS FOR THE NEW RULES IN WRESTLING

Prof. Dr. Harold Tünnemann

ABSTRACT

Competition rules and their changes have a significant impact on training and competition strategies. Urgently necessary rule changes has been made by FILA with other changes during international competitions in May 2013. As a result of the application of the new rules can be stated that the introduction of the new rules were crowned principle of success:

- The new rules lead in all three disciplines in a significant increase in victories with technical superiority (ST , SP) at the expense of point victories.
- You caused an improvement of the performance index and the effectiveness of attack, which is reflected in the increase in activity and an enormous improvement in the attack oriented combat behavior.
- The number of realized technical points per bout increased in all three disciplines of the rule changes. The formal appreciation of 2-point ratings lead to a reduction of the 1-point ratings but not to increase the 3 - and 5 - point votes values or to an increase of the pins what cannot be seen as an increase of attractiveness . This is also the occasion for further reflection and for an extensive evaluation of the Senior World Championships in Budapest.

INTRODUCTION

The complex influence of competition rules to the individual technical and tactical competition behavior is obvious and therefore also constantly the subject of discussions and debates. Rule changes have been the subject of several studies in the past. In 1994 the impact of rule changes on the training and competition design of the seventies, eighties and nineties were shown in a scientific paper. Rule changes and their influence on the competition strategy were also studied in the annual Coaches Clinics of FILA. After significant losses of the attractiveness particularly in Greco- Roman wrestling FILA made 2005 ultimate rule changes. This first by focusing on lift techniques led to spectacular actions and overall to a significant increase in attractiveness of the bouts (fig.1,2).

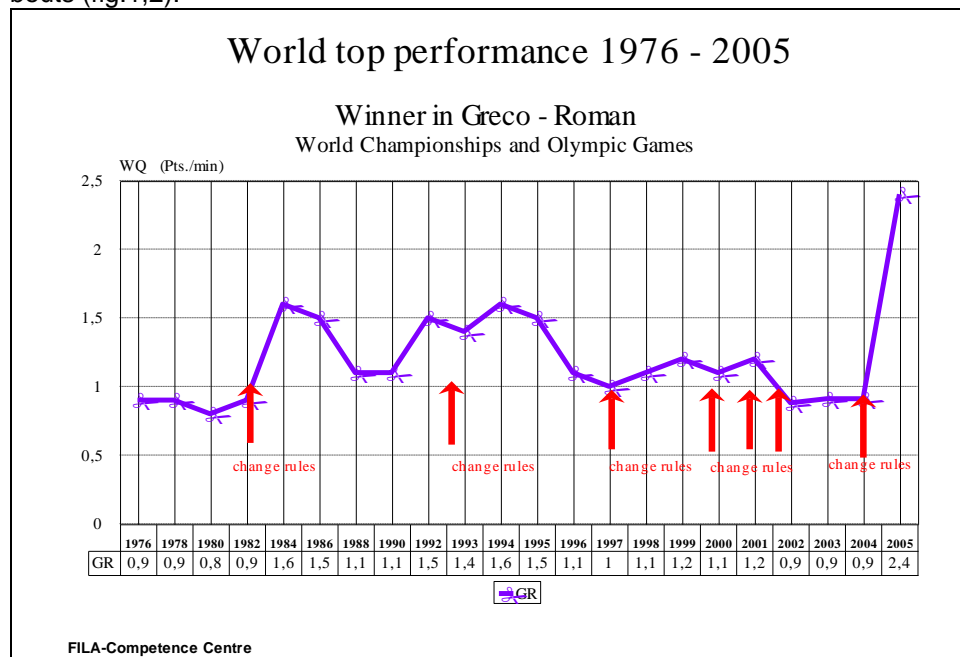
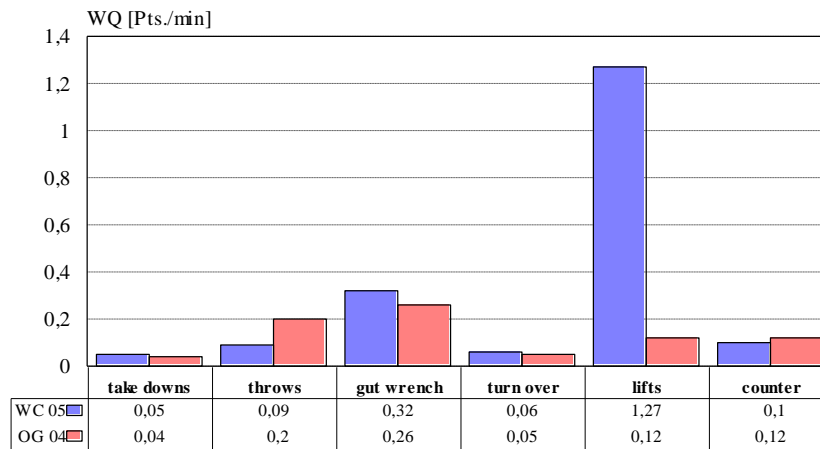


Figure 1 Development of world top performance in Greco - Roman wrestling

Technical structure/Attack efficacy

WC 2005 and OG 2004 **GR** (winner)



FILA-Competence Centre

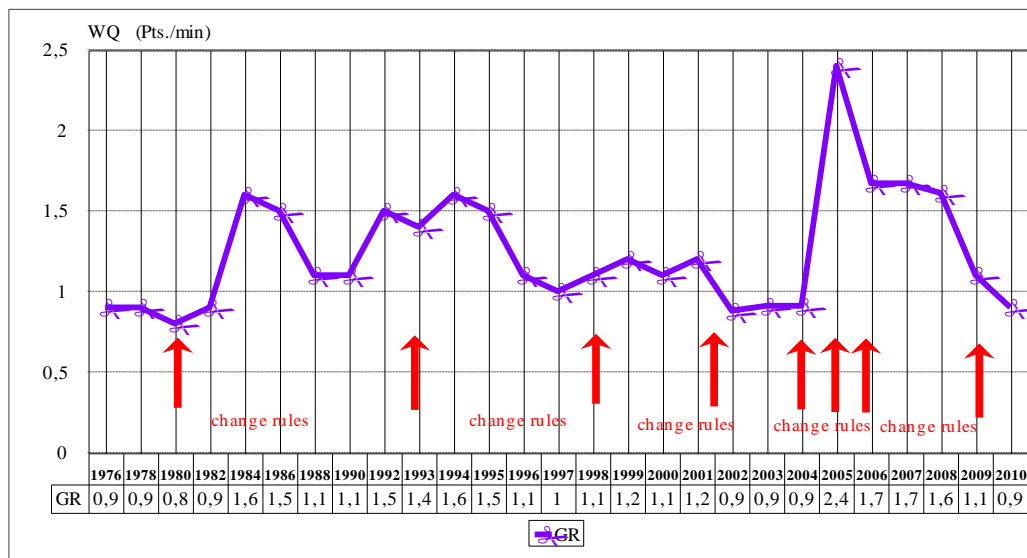
Figure 2 Technical structure of the OG 2004 and the WC 2005

In 2010 we were again on the bad technical level as 2004 before the rule changes.

World top performance 1976 - 2010

Winner in Greco - Roman

World Championships and Olympic Games



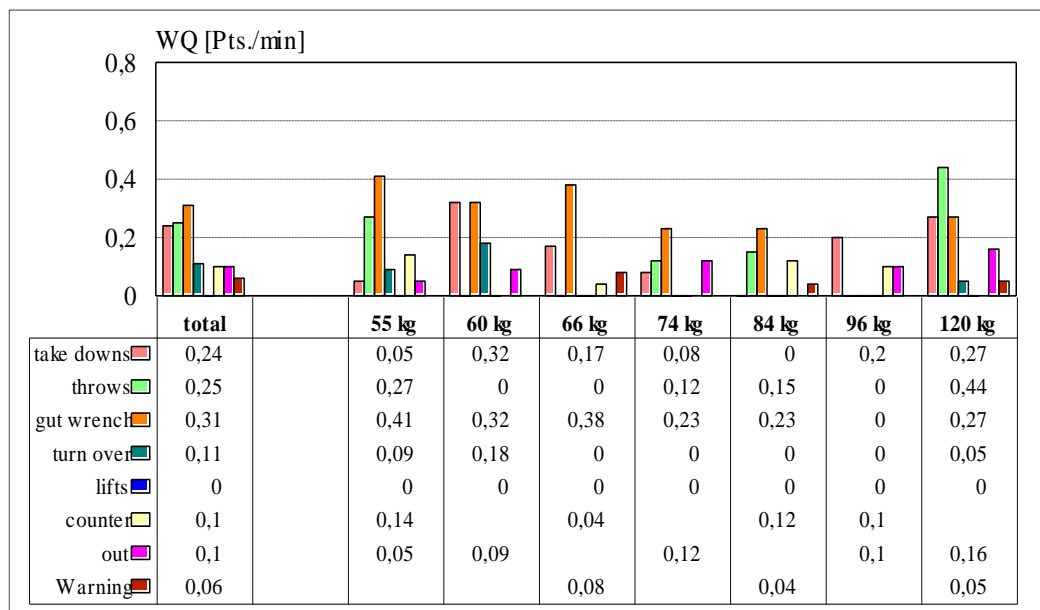
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Figure 3 Development of the points per minute made by the winner since 1976

In Moscow we have had not only less technical points but the attractive lift techniques had disappeared completely in 2010.

Technical structure/Attack efficacy

WC 2010 GR (winner)



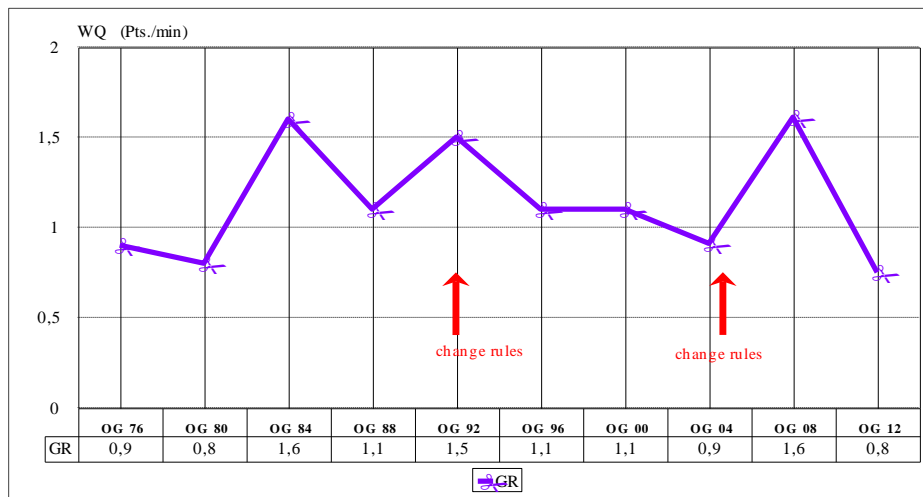
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Figure 4 Technical structure of the winner WC 2010

After 2010, the image of the Greco-Roman wrestling had deteriorated dramatically. The adjustment process of coaches and athletes led to victory oriented defensive strategies with the guidance of defensive action in the parterre position. The negative peak in terms of attractiveness wrestling we have then seen at the Olympic Games in London in 2012, when we have had Olympic champions with an average of less than one technical point per minute and this ensured the win with defense actions.

World top performance 1976 - 2012

Winner in Greco - Roman



FILA Competence Centre

Figure 5 Development of the points per minute made by the winner since 1976 (Olympic Games)

The Figure 6 shows that the negative development of the Greco -Roman wrestling in the freestyle disciplines (men and women) were not as evident.

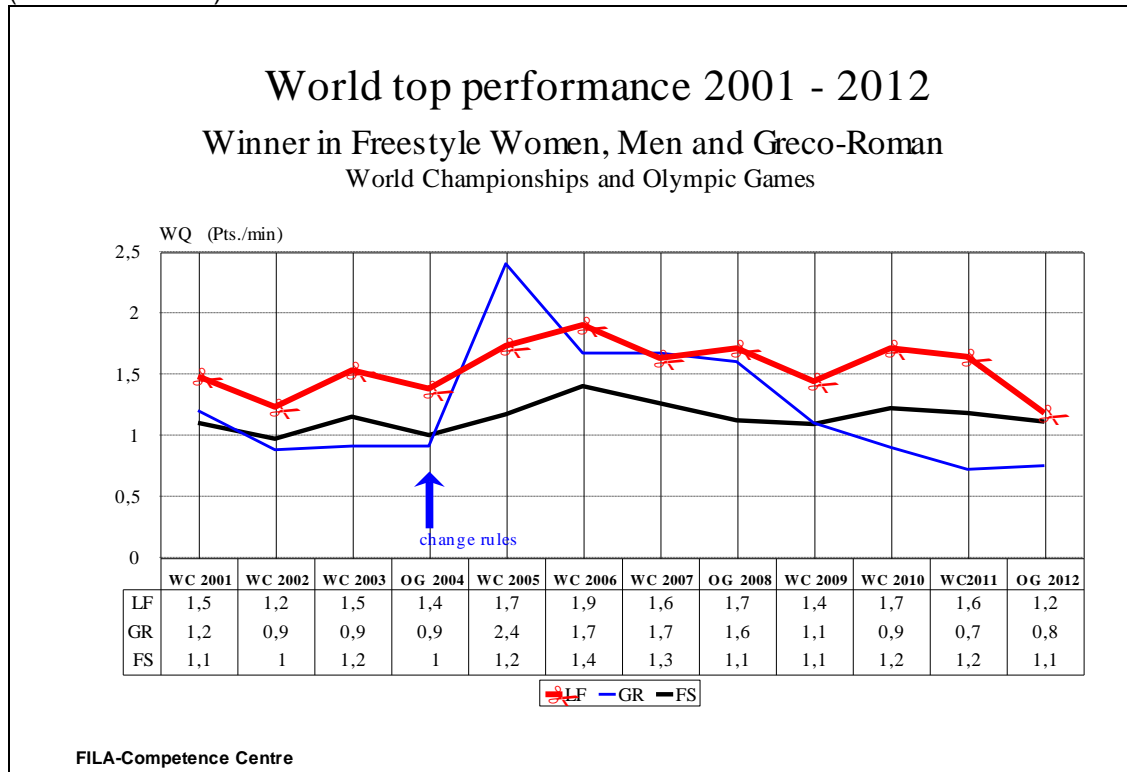


Figure 6 Development of the three wrestling disciplines since 2001

Given this situation, in 2013 extensive rule changes were made in May, accompanied in the aftermath of other adjustments and suggestions for improvement (Sjdziedzic, Cicioglu and others). Competition rules with the complex effect on competition and training strategies require more extensive and in-depth analysis in order to generate long-term positive effects. Scale assessing the effectiveness of the new rules is the objective to make the bouts with attractive technical- tactical actions dynamically. It is necessary to enforce a combat attack - oriented behavior and simplify the rules for a better understanding for the spectators. It is also necessary to prepare the using of new media (apps, tablets and mobile phones) to present specially for the young generation wrestling heroes with attractive and spectacular techniques.

Taking into account this objective, the rule changes show positive aspects and other approaches to the development of rules for the next competition season. In terms of realized technical points per bout, the analysis results certainly support the assessments of Alexander Karelin in Kazan 2013(FILA WEB site). After his opinion there were many bouts with technical superiority, and the duels were conducted with high dynamic range. In fact, there have been numerous spectacular bouts as video examples of the Asian Junior Championships in Phuket, the Universiade in Kazan and the Junior World Championships in Sofia 2013 show (5 clips) .At the Asian Junior Championships scored the wrestlers from KAZ and IRI together 29 technical points (13:16). And in Kazan the Russian wrestler 60 kg showed the spectacular “Yordanov techniques” of the eighties. Sensational were the performances of the junior world champions of 2013. The Turkish wrestler 55 kg GR required for his four fights only 4 minutes and he realized 24 pts. The Iranian wrestler 55 kg FS realized 42 pts in four bouts in a total time of 7 minutes.

Other findings bring detailed statistical analyzes. We have compared for this purpose the first competitions of Phuket, Kazan and Sofia, which were carried out under the new rules with the Junior World Championships in 2011. We are aware of the fact that it is possible to compare these competitions due to their differences in performance is limited. Therefore, a comprehensive comparative analysis of the World Championships 2013 in Budapest with the World Championships 2011 is necessary.

The competitions with the new rules were examined after three focal points:

- Bout results
- Bout time and
- Technical points

A first look at the statistics shows in principle a success of the new rules (Fig. 7, 8, 9).

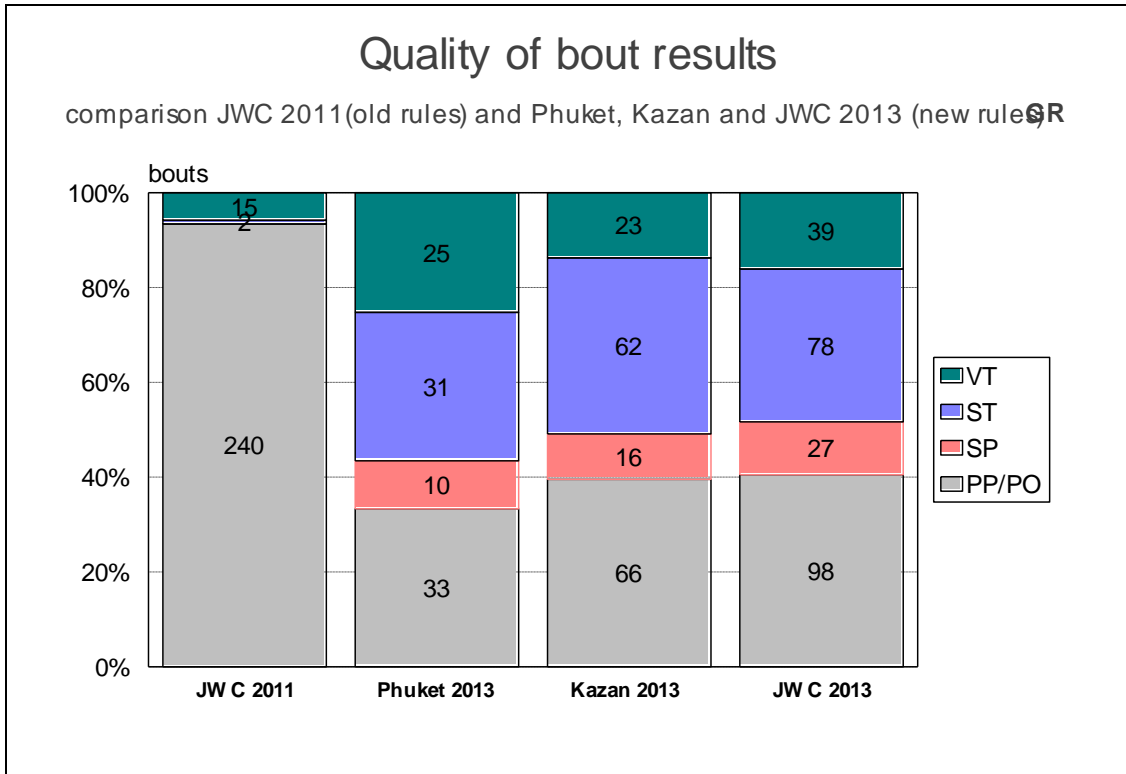


Figure 7 Bout results in Greco-Roman Wrestling

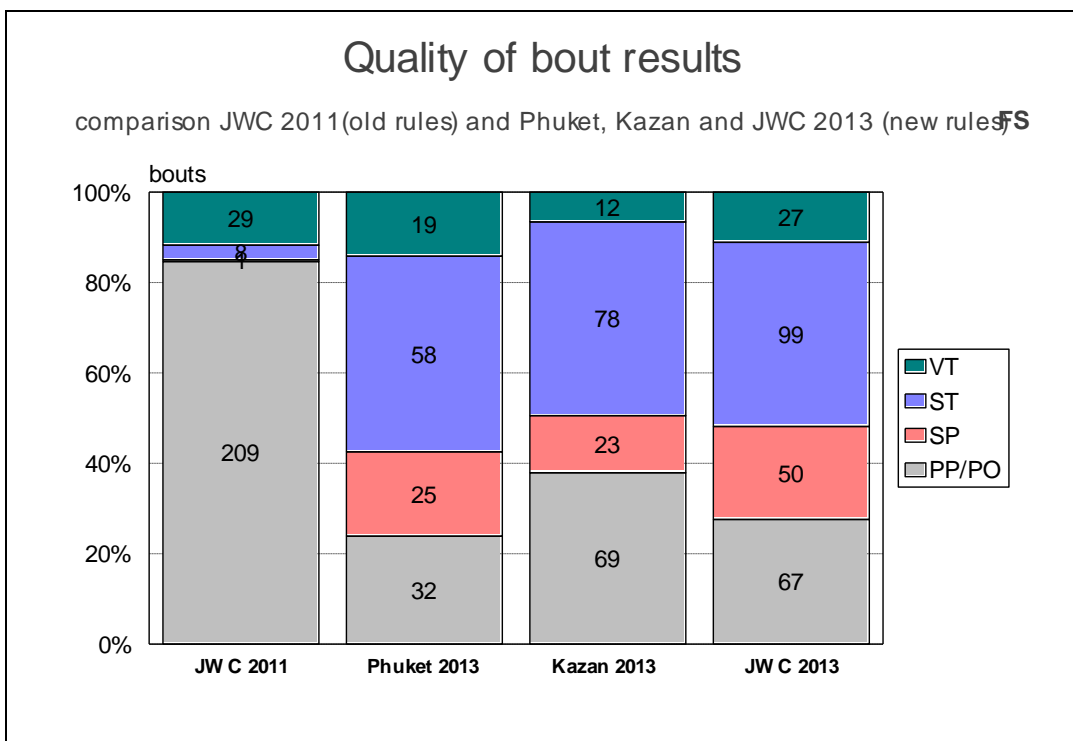


Figure 8 Bout results in Freestyle Wrestling Men

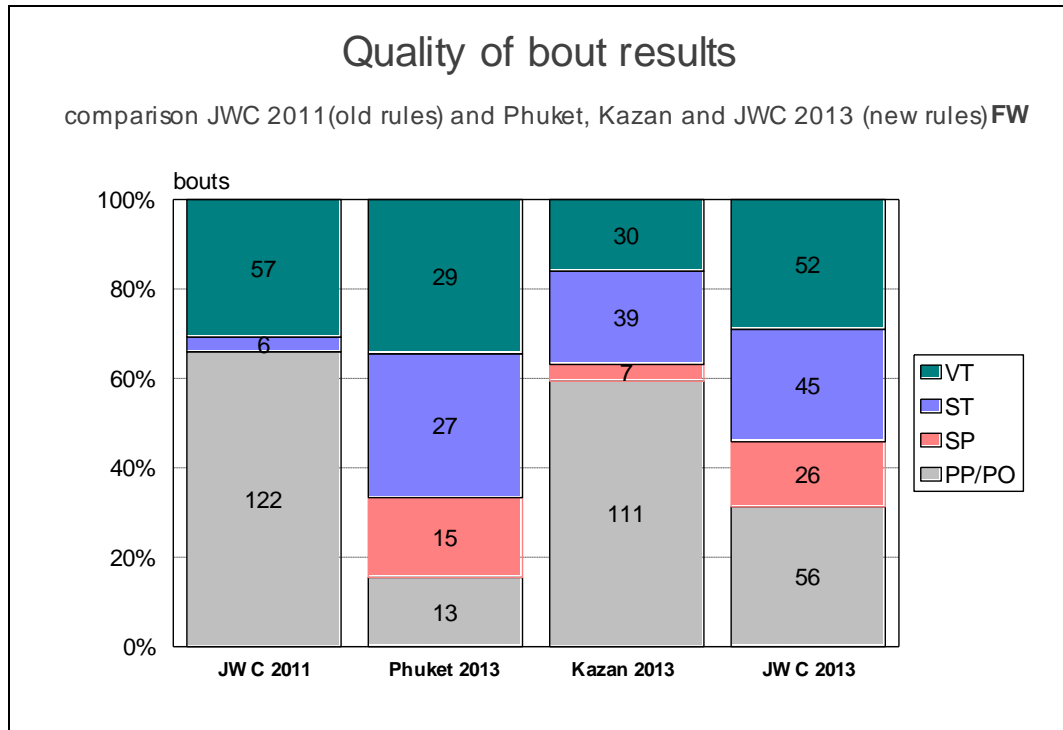


Figure 9 Bout results in Freestyle Wrestling Women

The new rules lead in all three disciplines to a significant increase of victories with technical superiority (ST, SP) at the expense of point victories. In Greco- Roman wrestling, a rise in the number of pins is visible. In both men disciplines the new rules lead to a slight shortening of bout times. The women's wrestling is hardly distinguished from changes in this respect (fig. 10).

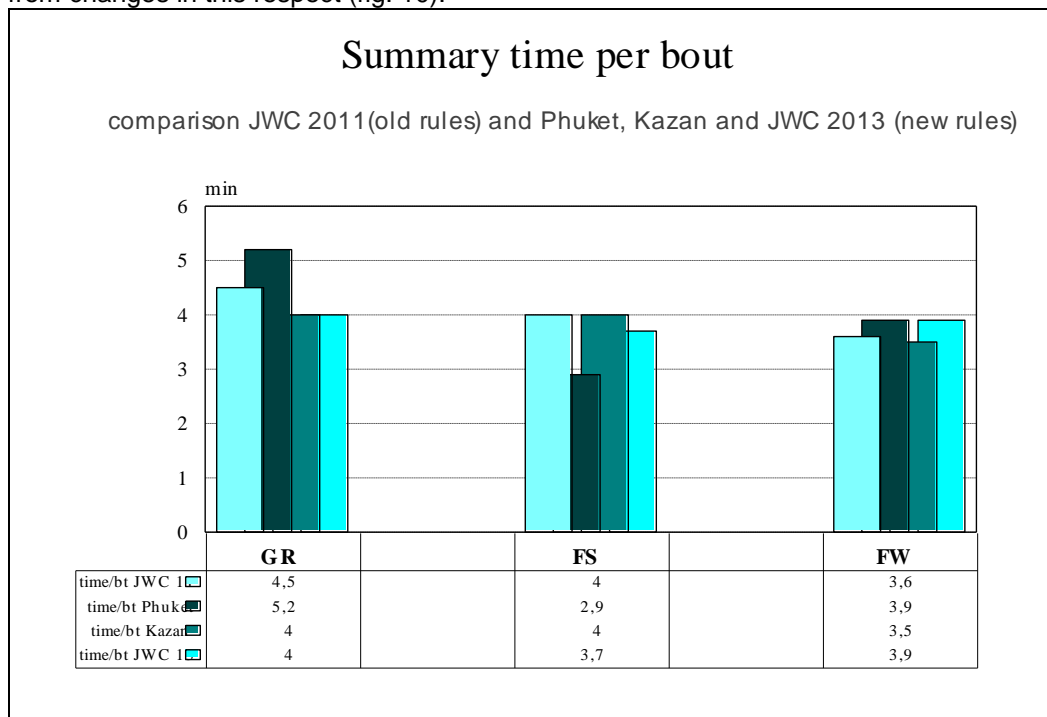


Figure 10 Average time per bout in all three styles

A very important criterion for assessing the performance and the quality of wrestling are the performance index and the quotient of effect (realized number of points per minute) as a measure of the attack strategy .These

factors we have put together since 1976, and we never find such positive values so far (fig. 11).

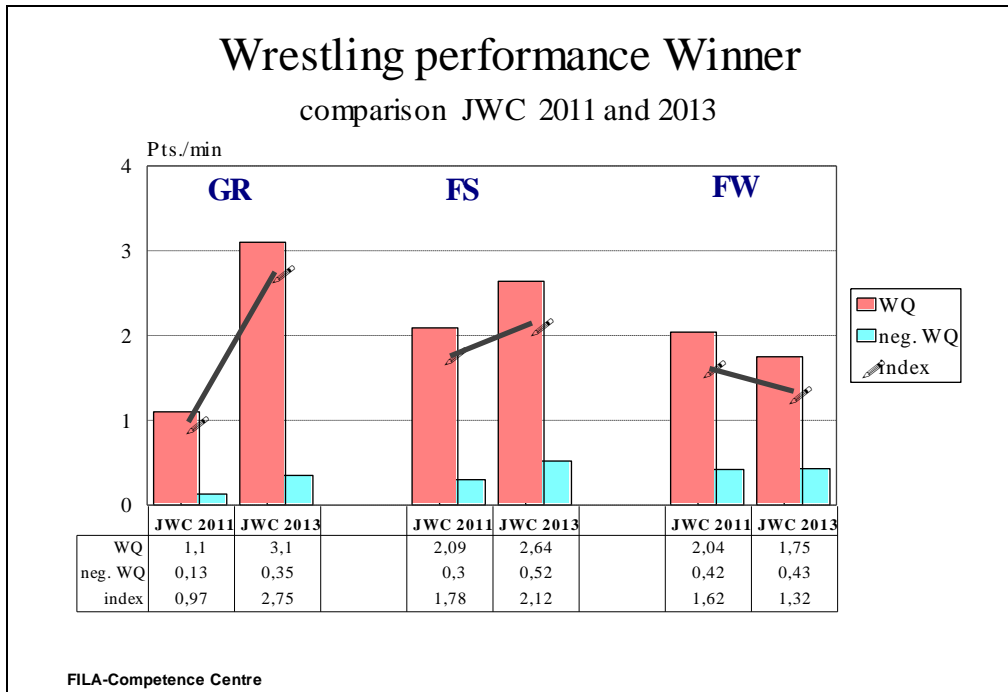


Figure 11 Wrestling performance JWC 2011 and JWC 2013

Particularly positive changes in the comparison between the Junior World Championships in 2011 and 2013 are in the Greco-Roman wrestling (WQ 2011 = 1.1 and WQ 2013 = 3.1 points per minute)!!! Same time, this is a reference to an enormous improvement in the activity increase and attack oriented wrestling strategy. The values in the women's wrestling are slightly negative in this regard.

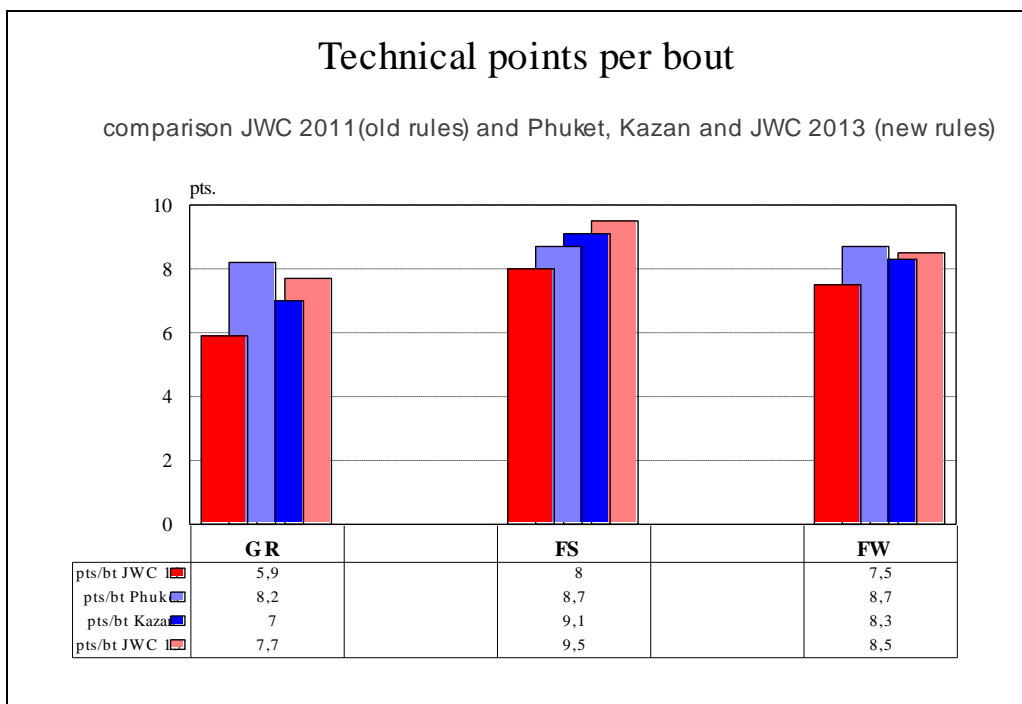


Figure 12 Technical points per bout in all three styles

We can see the same positive sign if we are taking into account the technical points per bout. In all three styles we have an increase of the technical points per bouts after the new rules especially in Greco-Roman wrestling.

An interesting development trend in connection with the rule changes is reflected in the analysis of the quality of technical points (Fig. 13, 14, 15). The evaluation of the all technical points from all occupied bouts shows the decline in 1-point votes in favor of the increase of 2-point ratings, due to the formal upgrading of 1-point techniques with 2 points. Given the fact that the rule changes have to lead to any increase in the attractive 3-point and 5-point techniques (a very significant increase in the attractiveness of wrestling) gives rise to further considerations to rule changes by the senior world championships.

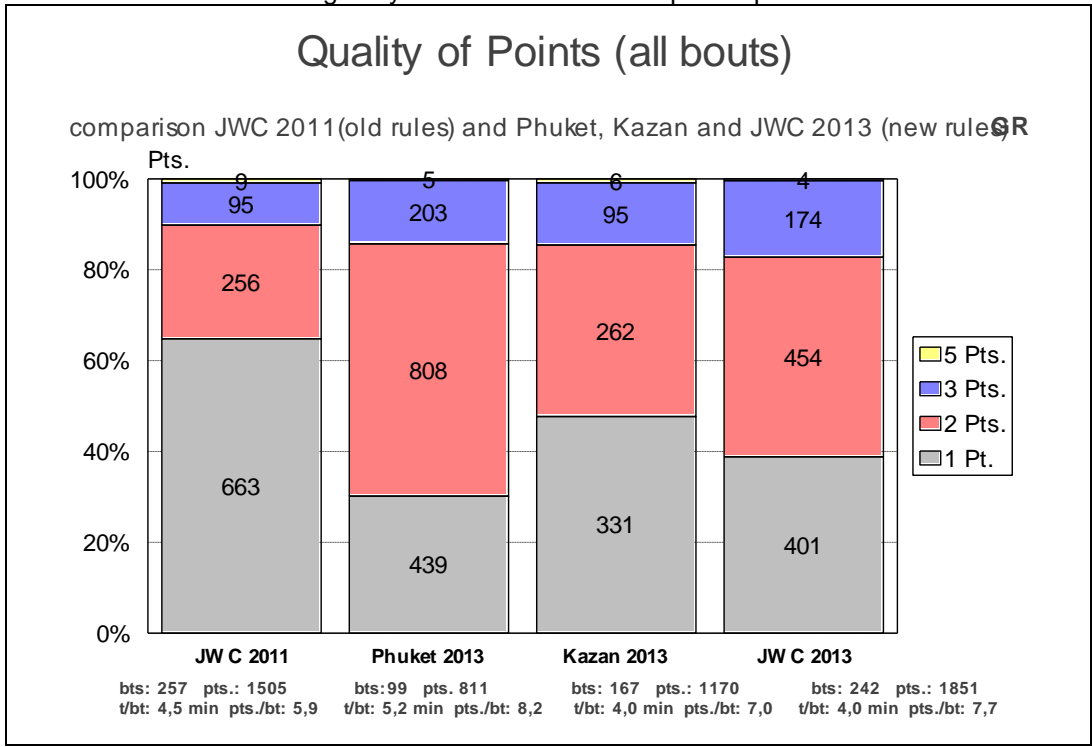


Figure 13 Quality of points in Greco-Roman wrestling

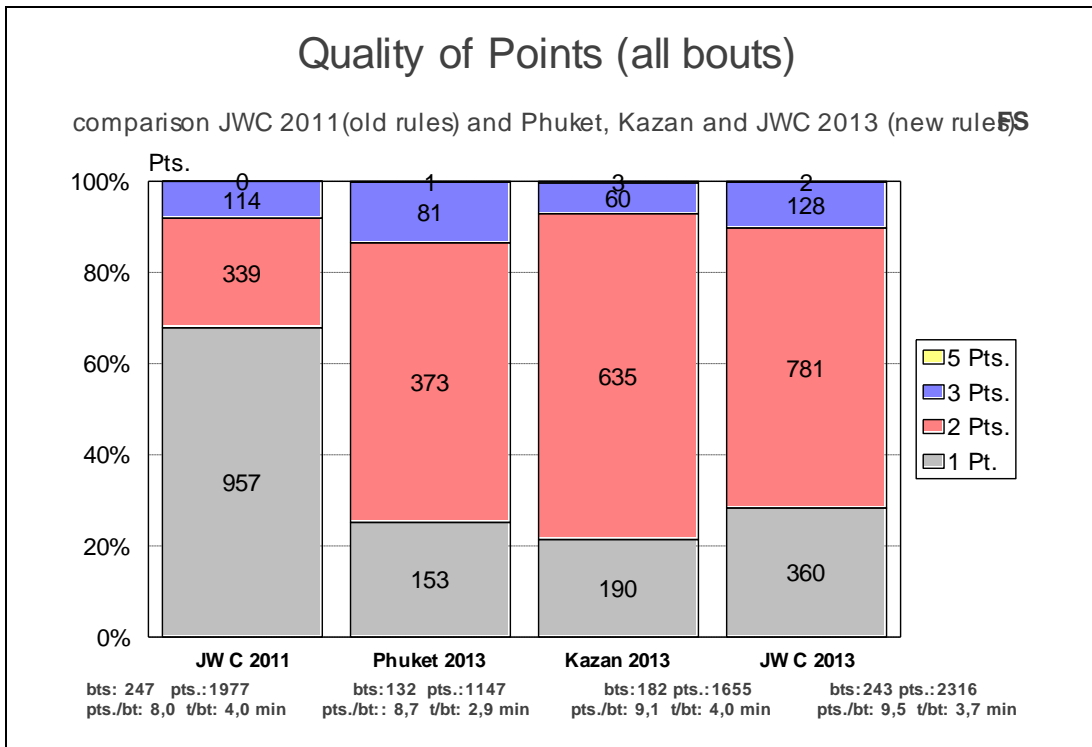


Figure 14 Quality of points in Freestyle wrestling Men

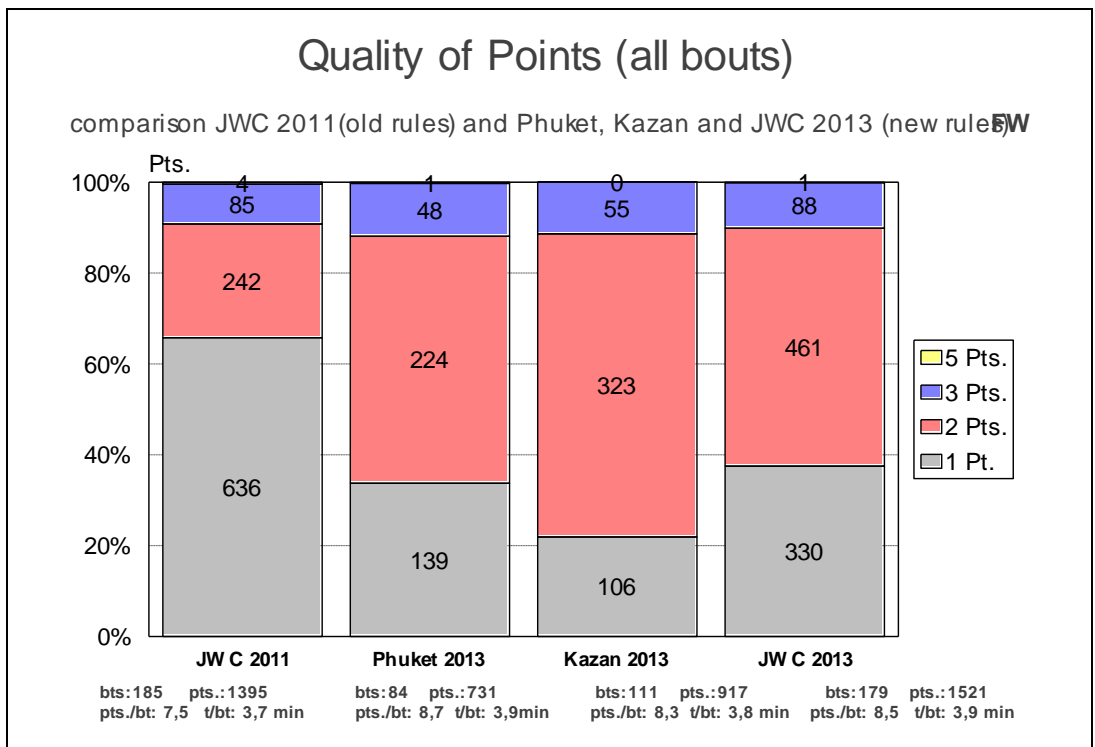


Figure 15 Quality of points in Freestyle wrestling Women

This view is corroborated by the analysis of the wrestling behavior of the Winner (Fig.16, 17, 18).

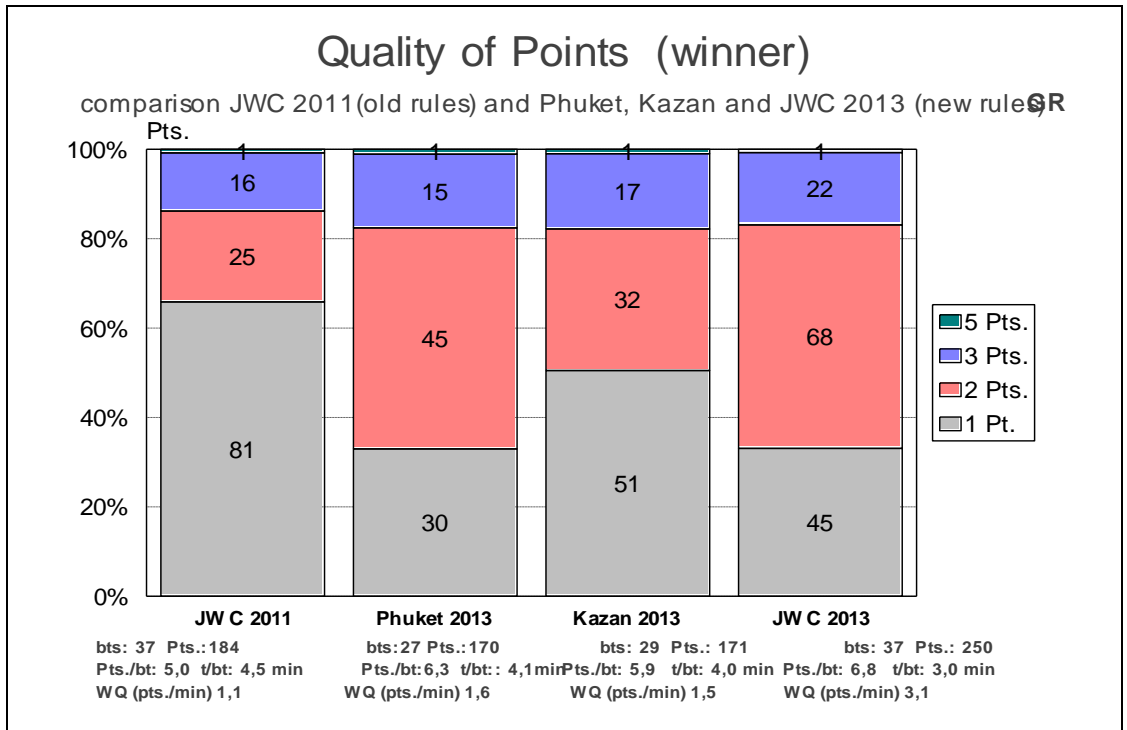


Figure 16 Quality of points of the winner in Greco-Roman wrestling

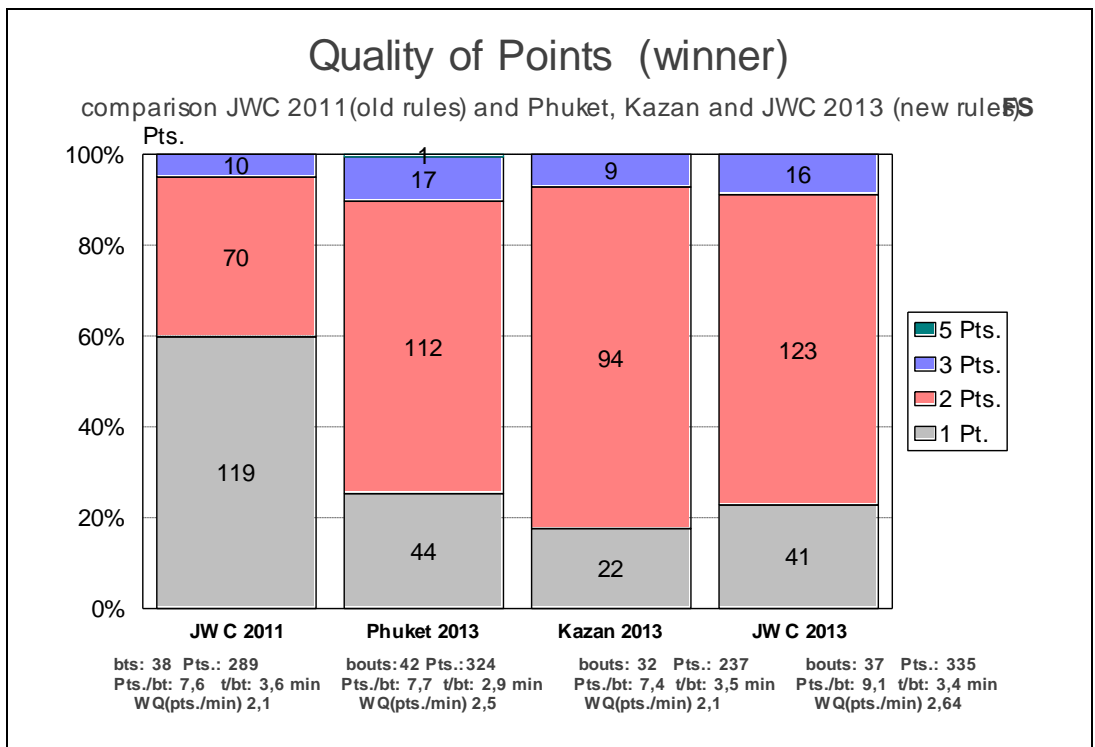


Figure 17 Quality of points of the winner in Freestyle wrestling Men

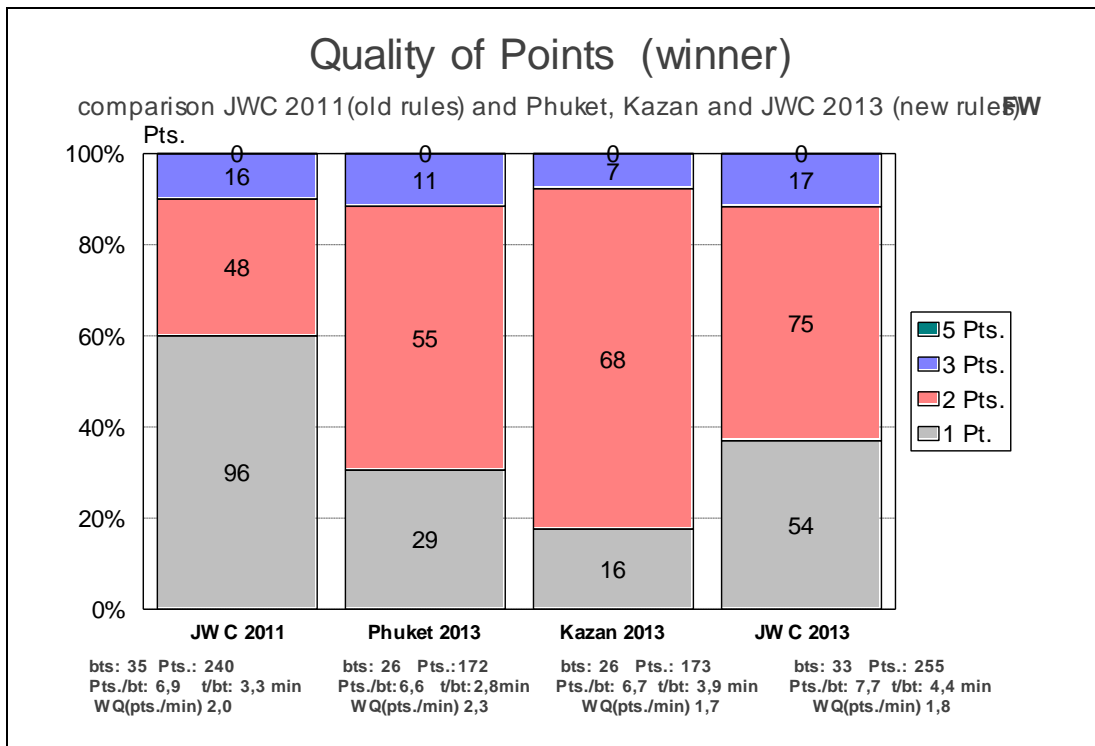
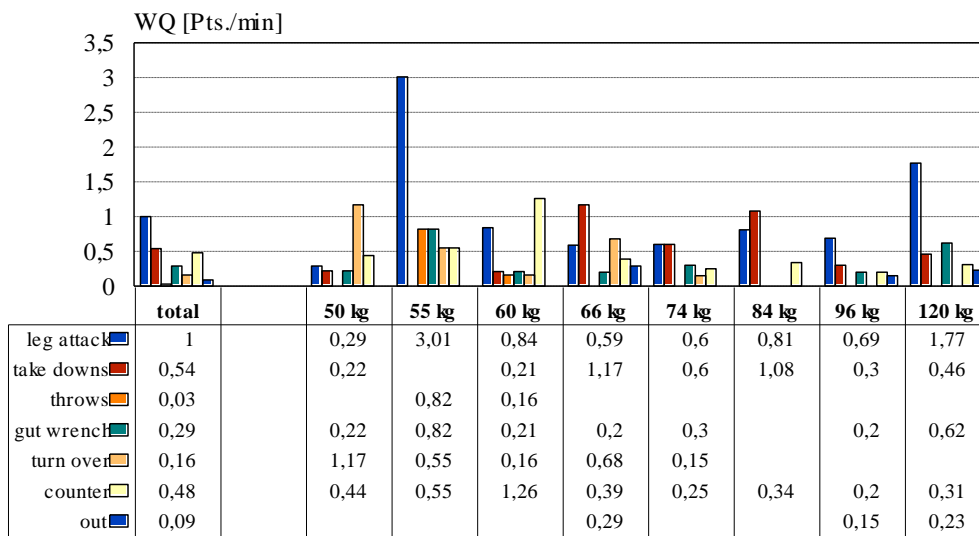


Figure 18 Quality of points of the winner in Freestyle wrestling Women

The champions show the same picture as in the evaluation of all the bouts and they show particularly problematic developments in Freestyle wrestling. A devaluation of attractive techniques in training and competition with respect to the attractiveness of wrestling makes no sense. As a first approach for further discussions, we have therefore realized an analysis of the technical structure of Junior World Champions 2013 (Fig. 19).

Technical structure/Attack efficacy

JWC 2013 FS (winner)



FILA-Competence Centre

Figure 19 Technical structure of the winner in Freestyle wrestling Men

Leg attacks, Take downs and counter were the most used techniques of the Winner JWC 2013. These techniques scored after the old rules 1-point and in the new rules 2 –points. Throws almost disappeared and most of the counter we could see against leg attacks. But we never should forget that 3-and 5-point techniques are the basic for attractive wrestling. Therefore are more discussions after the Senior World Championships welcome.

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ABSTRACTS AND POSTERS PRESENTED AT FILA SCIENTIFIC SYMPOSIUM SEPTEMBER 2013 BUDAPEST, HUNGARY

1

2013 UNIVERSIADE MATCH ANALYSIS FROM THE PERSPECTIVE OF WRESTLING'S NEW RULES

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OBJECTIVE: In this study, the dynamism of the new rules brought to wrestling was investigated by making technical analysis of the 2013 Universiade Games in men's Greco-Roman and freestyle wrestling contests. **METHODS:** Wrestling competitions winning ways, the scores obtained according to the circuits, points types and the duration of competitions; were investigated from 133 Greco-Roman and 197 freestyle competitions. **RESULTS:** From freestyle and Greco-Roman 2013 Universiade games wrestling competitions, in Greco-Roman style, the number and victory are as 45.5% and technical victory is as 42.5% with 7 points difference. In Freestyle, victory by points was observed in 39.7% of the matches, and technical victory in 50.9% (with 7 points difference). Victory by Touché was very low. According to the form of victories there was no significant difference in Greco-Roman and freestyle competitions ($p > 0.05$). In elimination and 3rd and 5th matches technical victory was obtained with maximal 7 points more frequently than victory by point. The points scored in the first circuit (round) of each match in freestyle was 6.14, while in Greco-Roman style it was 5.26. The points obtained in the second round of each match in freestyle were as 2.78, while in Greco-Roman style it was 3.12. The total points obtained by the victors in Freestyle for each match was 7.44 and the points obtained by the losers are 1.89. According to styles there is significant difference in one and two-point match numbers ($p < 0.05$). In Greco-Roman style one-point matches were observed more than in freestyle, and in freestyle two-point matches were observed more than in Greco-Roman style. According to the styles there was no difference in 3 and 5 point scores ($p > 0.05$). Greco-Roman style competitions lasted 3.96 minutes, while the freestyle competitions lasted 3.74 minutes on average. The matches lasting 6 minutes were 58 in Greco-Roman style and 72 matches in Freestyle. **CONCLUSION:** According to the new rules, wrestling matches were seen to average less than 4 minutes in duration. We can say that either taking more points per minute, along with the shortened duration of the matches by technical superiority brought vitality and dynamism to wrestling and increased the enjoyment of watching. In this context it was observed that FILA reached its purpose practically by the idea of bringing dynamism and vitality to wrestling with new rules.

Keywords: New Rules, Dynamic Wrestling, Match Analysis

#2

RELATIONSHIP BETWEEN ANAEROBIC ALACTIC POWER AND BODY COMPOSITION IN CADET WRESTLERS

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PURPOSE: This study determined the relationship between Anaerobic Alactic Power (AAP) and Body Composition (BC) in cadet's wrestlers. **METHODS:** Ten subjects of Greco Roman and Freestyle wrestling (16.62 ± 0.53 years old) participated. To evaluate the strength/power – anaerobic alactic – (AAP) was estimated using the standard test developed by Bosco, using a platform contact Ergo Jump Bosco System. The protocol used for the assessment of body composition and muscle mass and area were the standards set by the International Society for the Advancement of Kinanthropometry (ISAK). The data analysis was performed using statistical software (SPSS) version 17.0. **RESULTS:** there was a significant correlation (positive) between the Countermovement Jump AAP and Medium Thigh Muscular Area (MTMA) (0.777**, $P < 0.01$), Abalakov Jump AAP with the Skeletal Muscle Mass Percentage (% SMM) (0.632*, $p < 0.05$), Arm Muscular Area (AMA) (0.866**, $P < 0.01$) and with the Medium Thigh Muscular Area (0.929**, $P < 0.01$) and Anaerobic Alactic Power Squat Jump of Arms (SJA) with % SMM (0.806**, $p < 0.01$). **CONCLUSIONS:** It was found that the AAP and BC represent a critical role in the performance and success in the wrestling. There is a significant relationship between muscle mass and power levels generated by these subjects, therefore, increasing the SMM, or cross-sectional area of the muscles contribute to a higher level of anaerobic power output and better performance on tests strength/power. This information can help the coach to make adjustments that will allow a more specific schedule of training for their athletes, and lead to greater success.

#3

RELATIONSHIP BETWEEN CHANGES OF RULES AND THE DESIGN OF TRAINING

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Research indicates that the ignorance of a majority of coaches with exigencies of the FILA rules and subsequent rule changes has been the most important reason for the International Olympic Committee's (IOC) recommendation for elimination of wrestling from the 2020 Olympic Program. On the other hand, properly educating and updating coaches, wrestlers and

referees on the rules and ways to implement them would ensure a return of beauty, attraction and fairness to wrestling competitions, thus guaranteeing reinstatement of the oldest branch of sport in the Olympics. Change in the educational system in proportion with the wrestling spirit would be so advantageous, that it would motivate the international audio-visual media, i.e. TV, press and internet, to cover and reflect wrestling alongside football events. In another words, changes in rules and the design of training – that is the core of the research at hand – would reflect the Olympic Games' motto "Faster, Higher, Stronger". Highlights of the researcher's suggestions are as follows: Preparing wrestlers for 5-6 competitions/day; prioritizing offensive over defensive wrestling; designing training in tune with mandates of rules; designing competition-specific training; emphasize the importance of the zone and develop the necessary tactics to make wrestling in the zone more competitive; designing training assimilated with competition conditions; preventing wrestlers from refraining to do helpful exercises; explaining to wrestlers the difference between fleeing from mat and fleeing from enforcement of techniques; designing 15- and 30-second speed and power training to raise speed, power and resistance of wrestlers; Avoiding partial practice of techniques; enhancing effective span of exercises; including upper-body techniques in trainings; teaching wrestlers which techniques to use when being ahead or behind; teaching wrestlers logical offense/defense to avoid caution for passivity; designing training specifically for implementing 3-/5-point score techniques both in FS/GR; building a link with referees as executors of rules; Learning details of the Challenge Law and applying it in best possible manner; getting wrestlers prepared for changing tactics under special conditions; banning wrestlers from play of fault techniques both in training and competitions; dividing competition periods to ensure beautiful wrestling .

KEYWORDS: FILA; training; techniques; tactics; challenge; offensive

#4

AN EXAMINATION OF THE PERCEPTIONS OF FORMER AND CURRENT WRESTLERS FROM THE TURKISH NATIONAL WRESTLING TEAM TOWARDS DOPING THROUGH METAPHOR

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This study was conducted to identify the perception of former and current wrestlers of Turkish National Wrestling Team about the concept of "doping". The general aim of the present study is to determine the Turkish wrestlers' views about "doping" concept by metaphors. In 2013, randomly selected 108 wrestlers who were still active and previously active in the Turkish National Wrestling Team were participated to study. The metaphors produced by participants related to the "doping" concept were examined by content analysis method, and the frequency of each metaphor was identified and the categories were formed. In this context, the analysis and interpretation of the metaphors were achieved by the following four steps: (a) identification of the metaphors, (b) classification of the metaphors, (c) formation of the metaphors, (d) reliability and validity analyses. In the study, the wrestlers produced 106 metaphors related to the concept of "doping". Based on their perceptions of doping, "avoidance", "awareness", "acceptance", "exclusion", "weakness", and "ambition" categories were formed. Results have shown that the wrestlers perceive the concept of "doping" as something to be avoided; they are aware of its positive and negative consequences; they think that its use can be acceptable; they think that they would be excluded if they use doping; they perceive using doping as weakness and being inefficient; and they see ambition as passion.

Key words: Doping, metaphor, perception

#5

ANALYZING WRESTLERS' PERCEPTIONS OF WRESTLING BY STUDYING THE METAPHORS OF THE ATHLETES WHO HAVE WRESTLED FOR TURKISH NATIONAL WRESTLING TEAM

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This study aimed to explore the perceptions of wrestlers in Turkish national wrestling team by analyzing their metaphors for wrestling. 107 athletes voluntarily participated in this study in 2013. Data were collected by asking the volunteers to fill in the blanks of the following sentence: "Wrestling is likesince....." In this way, it was expected that each participant would come up with a metaphor. For this study, the phenomenology research design was used and data were analyzed using content analysis technique. Within this scope, the analysis and interpretation of data is carried out in five stages: (1) Specifying the metaphors (2) Classifying the metaphors (3) Developing the categories (4) Ensuring validity and reliability (5) Entering data into SPSS program for the quantitative data analysis. According to the findings of the research, the participants generated 59 valid metaphors for wrestling. 10 different categories were developed by examining common characteristics of the metaphors. It was found that participants perceived wrestling as follows: As an expression of life (31 %), as a guide-ideal (19.2 %), as happiness (13.9 %), as dependence (11.7 %), as culture (10.7%), as income (9.6 %), as continuity (8.5 %), as diversity-richness (5.3 %), as strategy (5.3 %), as labor (2.1 %).

KEY WORDS: Wrestling, athlete, perception, metaphor

#6

HEMATOLOGICAL, OXIDATIVE STRESS AND IMMUNE STATUS PROFILING IN WRESTLERS OF DIFFERENT STYLES

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The aim of this study was to profile haematological, oxidative stress and immunological parameters in male athletes who practiced combat sports and to determine whether the type of combat sport influenced the measured parameters. Eighteen Greco-Roman wrestlers, fifteen Traditional wrestlers and fourteen Freestyle wrestlers participated in the study. Haematological, iron-related, oxidative stress and immunological parameters were measured at the beginning of a pre-competitive period. The general linear model showed significant differences between the Greco-Roman, Traditional and Freestyle wrestlers with respect to their haematological and iron status parameters (Wilks' Lambda= 0.270, F=2.186, P<0.05) and oxidative stress status (Wilks' Lambda=0.529, F=1.940, P<0.05). The immature reticulocyte fraction (IRF) was significantly higher in Freestyle (0.30 ± 0.03) compared with Greco-Roman (0.24 ± 0.04 ; P<0.05) and Traditional wrestlers (0.26 ± 0.04 ; P<0.05). Low haemoglobin density (LHD) was significantly lower in Freestyle and Greco-Roman wrestlers (P<0.05) compared with Traditional wrestlers (Freestyle: 3.51 ± 1.19 , Greco-Roman: 1.95 ± 1.10 , Traditional: 1.77 ± 0.76). Significant differences were observed between the Freestyle and Traditional wrestlers with respect to their pro-oxidant-antioxidant balance (PAB) (437 ± 103 vs. 323 ± 148 , P<0.05) and superoxide-dismutase activity (SOD) (73 ± 37 vs. 103 ± 30 , P<0.05). All the measured parameters (with the exception of SOD activity) fell within their physiological ranges indicating that the study participants represented a young and healthy male population. Hematological parameters differed between Greco-Roman and Traditional wrestlers. The low pro-oxidant-antioxidant balance and high SOD activity in wrestlers could be associated with the long-term

#7

PREDISPOSING FACTORS FOR KNEE PAIN SYNDROME IN WRESTLERS COMPARED WITH UNTRAINED INDIVIDUALS

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PURPOSE: The study of sports injuries and cognitive factors - methods of treatment and prevention programs in professional sports today is of particular importance. The level of the annual injury costs create a very heavy burden for sports clubs. Injuries to the patellofemoral joint (PF) pose a danger for wrestlers. **METHODS:** For this purpose 6 elite wrestlers were randomly selected from each club. This was repeated for 5 clubs and a total number of 30 wrestlers were obtained. 30 subjects for the control group were randomly selected from a pool of non-athletic volunteers, and based on inclusion and exclusion criteria of the study after initial examination by orthopedic surgeons and physiotherapists were selected separately. This analysis lasted for ten months. These wrestlers had no acute injury, or severe deformity in the knee. Raw data about exercise - different measurements of hip circumference and hip and ankle range of motion and functional tests and clinical information obtained from the knee to any person in a five-page questionnaire collected using the SPSS program with similar data from normal individuals were analyzed and compared to non-athletes. Inventory includes: general information and athletic individuals, injury records, hip and ankle range of motion measurements, a standard questionnaire to assess the knee joint was Kshgky femoral Carlson and function tests. **RESULTS:** The statistical analysis of raw data obtained from both left and right knees of the athletes and non-athletes following the collection of data showed: PF joint evaluation scores related to the right leg, right knee score from wrestlers were significantly lower than from non-athletes (P = 0.039). This relationship was evident at the waist. Significant difference between the values obtained from measuring the thigh circumference was observed in both groups. When comparing the size of the hip circumference in the two groups of athletes and non-athletes with all other values, the P value was not been significant. **CONCLUSIONS:** Considering the high load exerted on the knee during exercise, the poor maintenance of the skeletal PF joint during knee flexion, is an important predisposing factor in the development of PF pain.

Key Words: sports injuries, joint pain, patella – femoral

#8

DEVELOPMENT OF A STRATEGIC PLAN FOR THE ISLAMIC REPUBLIC OF IRAN WRESTLING FEDERATION ACCORDING TO SWOT MODEL

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The purpose of this research was to design and codify a development strategy for the Iran Wrestling Federation. The statistical sample of this research consisted of 30 physical education professors of higher education institutes, academic board managers of physical education in the Ministry of Sciences, Research and Technology, physical education managers and experts, administrative managers of the sports teams which are present in the premier league and MSc students of sports management of the Iran Wrestling Federation who were active in the field of wrestling. A researcher-made questionnaire was used to collect the data; its validity was approved by experienced professors and its reliability was verified using Cronbach's alpha (91%). The questionnaire included 43 ranked questions about the strengths, weaknesses, opportunities and threats of the Islamic Republic of Iran Wrestling Federation. The research data were analyzed by descriptive statistics and Friedman test. After analyzing the strengths, weaknesses, opportunities and threats and forming a rating matrix for every internal and external factors of Iran Wrestling Federation, it was revealed that Islamic Republic of Iran Wrestling Federation was in the SO position and must use an attacking (growth and development) strategy. Finally, based on strategic analyses, the strategic plan of the Islamic Republic of Iran Wrestling Federation was codified and the statement of vision, mission, long-terms objectives, strategies and operational plans were determined for the Iran Wrestling Federation

Key words: Wrestling, Strategy, SWOT model

#9

TRADITIONAL SPORT: MUD WRESTLING & MUD PREPARATION

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Today, India is becoming more aware about its traditional sports, and mud wrestling is one of them. As wrestling in India played on mud, so it is called mud wrestling (kushti). Kushti is an ancient Indian game, present since the ancient time in Maharashtra. This paper describes the various types of mud wrestling, popular Indian mud wrestlers and the benefits of mud wrestling. The objective of this present paper is to develop awareness of mud wrestling and the preparation of the mud.

Key words: Traditional Sports, Mud Wrestling, Mud Preparation.

Introduction: It is evident that mud wrestling (Kushti) is an ancient game of India. It has its deep roots in Indian tradition and culture. It is an art which is almost 3000 years old.

Various types of Mud wrestling:

- Krishna Kushti
- Jambuvanti kushti
- Hanumanti Kushti
- Bheamsene Kushti
- Jarasandi Kushti

The popular Indian Mud wrestlers are:

- Gama
- Gunga
- Denanath Sinh
- Harishcandra Birazdar
- Dadu Chougule

Benefits of mud wrestling

- Improve muscular strength
- Improve co-ordination
- Improve balance
- Improve muscular endurance

As wrestling (kushti) in India is played on mud it is known as mud wrestling. Kushti is an ancient Indian game since ancient time in Maharashtra. People used to play wrestling, and there is a great amount of historical evidence. During those times wrestling was performed in mud, but now modern international wrestling is contested on a mat.

Before the players start wrestling, the wrestling pit must be prepared with 3 feet of sand, which must be filtered and then it is spread on the Aakharas which is a minimum 20x20 feet. The wrestling pit must be watered properly. Mud wrestling is played in a specially prepared red soil. It is prepared by mixing the following ingredients, which have their own special benefits. When these ingredients are mixed in the soil, we get their benefits through the soil.

Name	Quantity	Purpose
Nuts oil/mustard oil	45 tin (60 liters)	Nut oil is known to absorb quickly into the skin, leaving a light, velvety, protective barrier on the skin. It makes a wonderful "carrier oil" for aromatherapy uses. The sand remains cool and no dust is created.
Curd and butter milk	4tin (60liters)	Curd has a nutritive content; it has extensive special values for therapeutic purposes.
Lemon	1600	Lemon fruit acids are ideal for gentle exfoliation, Neutralizing environmental damage, Toning, Hydrating and nourishing, Fighting wrinkles, Pore cleansing.
Camphor	4kg	Camphor provides a cooling sensation and relieves symptoms such as pain, irritation and cough. It can be used in soothing backaches and muscle pain. To soothe skin conditions such as eczema or acne, camphor is used due to its ability to reduce redness and irritation.
Turmeric	80kg	Useful in disinfecting cuts and burns. Treats acne blemishes, blackheads, dark spots and hyper pigmentation and other skin conditions like eczema and psoriasis. It helps heal and prevent dry skin, and to slow the skin aging process, and is used to diminish wrinkles, keep skin supple and improve skin's elasticity. It is used as an ingredient in sunscreens.
Color agent	15kg	To make the sand brighter in appearance
Neem leaves powder	40kg	If you have pimples on your face then apply the <u>neem leaf</u> decoction. Even this can be used to treat minor wounds as this reduces the chance of <u>getting further</u> infection.
Chandan powder (sandal)	40kg	It has medicinal properties which is useful for treating several health problems and fighting skin infections. It has a calming effect on the nerves, and hence, proved to be beneficial to relieve stress, anxiety, irritability etc.
Water	400 litter	When water is put there is no dust created, it should be soft to prevent injuries, and cool.

This content is mixed with 4 tons of dry soil. This soil content takes care of our health as well as improves performance in mud wrestling.

Conclusion: Though there is no importance for mud wrestling at international level today, but it is still of great importance as it has many health benefits. As it is Indian traditional sports it is our responsibility to keep our culture alive.

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#10

ACHIEVEMENT OF WRESTLERS DIFFERENT CONTINENTS AT THE OLYMPIC GAMES

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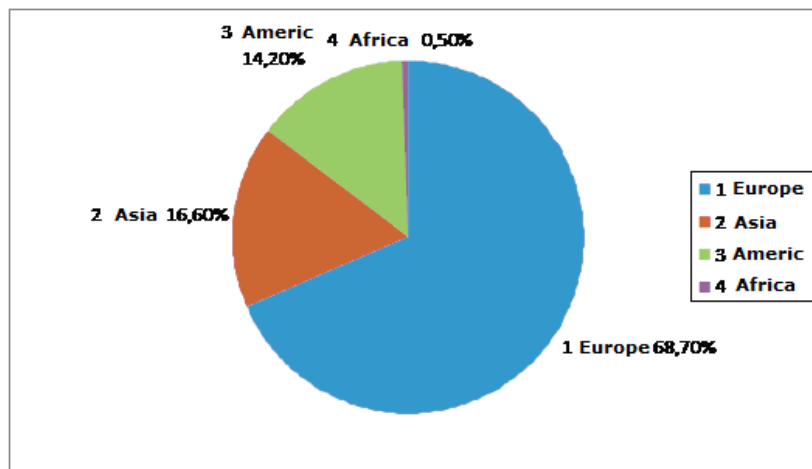
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The paper presents the results of a study of levels of achievements in sport wrestlers from different continents in the Olympics. This level of analysis is required to determine the dynamics and prospects for the development of wrestling as substantiated evidence of its popularity in the international Olympic community. A majority of the number of Olympic medals won belongs to fighters from Europe, leading athletes in Asia, America and Africa. In recent years, the advantage of the European athletes has markedly decreased, which was mainly due to a substantial increase in the number of Asian wrestlers winning awards and some increase in the level of achievement of American athletes. This fact, as well as a significant expansion of the range of fighters from different countries and continents are actually competing for honors in the Olympic Games, is a powerful argument against the unfounded IOC decision calling for the exclusion of wrestling from the core Olympic sports.

Keywords: wrestling, the Olympic Games, the continent, achievements, relationships, reward, a champion, winner, Olympic Movement, the analysis of the dynamics of the prospect.

Olympic sports, such as wrestling, a part of the Olympic Games since 1896, still needs to constantly improve by expanding the range of countries participating in the Olympics. Currently, the FILA With more than 170 countries from all the continents of the planet, the number of these countries is growing. One of the main activities of the FILA is to ensure growth in the number of participating countries from different continents, athletes who can not only participate, but to win awards at the Olympic Games (Mindiasvili DG, Podlivaev BA, 2007). System analysis of these indicators is needed to create a more specific idea of the dynamics and prospects of development of each Olympic wrestling. This information is objective evidence of the insolvency of IOC arguments of insufficient dynamism and popularity of wrestling in the world.



To obtain this information, we conducted a systematic historical analysis of the winners of the tournament in Greco-Roman, freestyle and women's wrestling at all Olympic Games of modern times. It was revealed that in the history of the competition against winners become the athletes of 54 countries on four continents: Europe, Asia, North and South America and Africa. The ratio of awards won by fighters from different continents is represented in Figure 1.

Figure 1 The ratio of Olympic medal winners in wrestling

The content analysis of fig. 1 shows that a clear priority for the number of Olympic medals belong to the fighters of the European countries, who won 68.7% of awards (section 1). In this case, the most successful athletes have made Russia (USSR), Sweden, Finland, Bulgaria, Turkey, Hungary and Germany. Athletes of Asia, efforts mainly Japanese and South Korean fighters, won 16.6% of prizes (section 2). American athletes, first of all, athletes United States and Cuba, won 14.2% of awards (section 3). The share of African fighters were only 0.5% of the medals (section 4). Priority athletes in Europe is obvious and due to the presence of several facts: first, the Olympic tradition of most European countries that have started to act in wrestling before the others, and secondly, a large number of countries in Europe, and contribute to the achievement awards have 32 European champions state, and thirdly, the prevalence of first Greco-Roman, and then the other in the struggle of the peoples of Europe. At the same time, contribute to winning medals Olympic athletes Asian continent have athletes from 15 countries, and among the American fighters distinguished athletes from six countries, including the three countries of North America (United States, Cuba, Canada) and three South American countries (Colombia, Mexico, Puerto Rico). Of the fighters African continent in the number of winners included only athletes Egypt.

At the present stage of development of wrestling in international Olympic movement, there have been significant changes in both the socio-political and organizational nature. In block these changes included: the formation of new states in the background of the post-Soviet space, dramatically increasing the number of high-class fighters, ready to fight for honors Olympic Games (AA Karelin, Ivanyuzhenkov BV, Nelyubin VV, 2005), the inclusion of in the program of the Olympic games competitions in women's wrestling (Dusson M., 1997; Nerobeev NY, Cockroaches, BI, 2012), reduction of the number of weight categories of male wrestlers (Ercegan M., 1997), a significant increase in the prestige of the Olympic achievements in the international community (AA Karelin, 2002; Vorobyev VA, 2011 Brusov GP, 2012). This has led to significant changes in the balance of the sporting achievements of wrestlers from different continents in the Olympics. This altered ratio is shown in Figure 2.

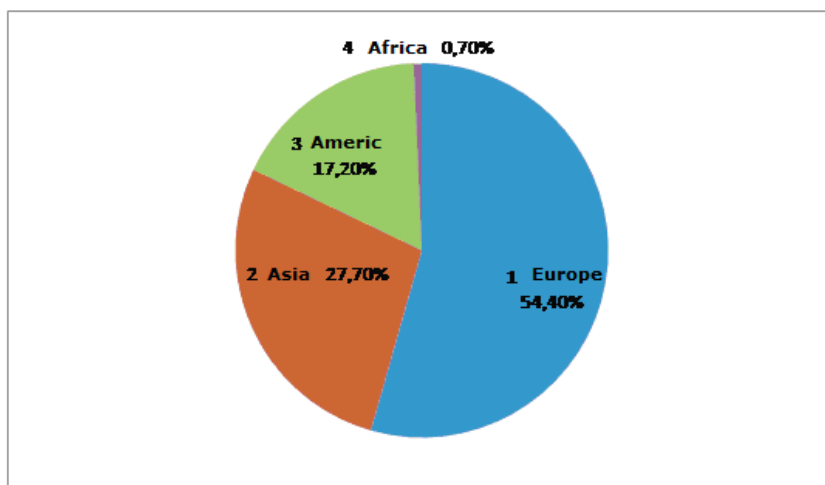


Figure 2. The ratio of winners of Olympic wrestling (starting from the Games of the XXVI Olympiad (1996))

As the analysis of the content of fig. 2 wrestlers European countries still dominate the Olympic mat, winning 54.4% of awards (section 1), although it is significantly less than for the whole period of the modern Olympic Games (68.7%, Fig. 1). The number of medals at the Asian athletes weighty increased, reaching 27.7% (section 2). Less important, but still increased the number of awards the athletes from the American continent, reaching 17.2% (section 3). Africa's share of medals fighters remained unobtrusive (0.7%, sector 4).

However, much has changed not only the ratio of the number of awards won by fighters from different continents, but the representation of

athletes and countries participating in the fight for Olympic medals. For example, among European athletes have significant superiority fighters Russia, but in the following positions are athletes of Azerbaijan, Turkey, Georgia, Ukraine, pushing the athletes of the "old world." In all probability, this fact is the main reason for the negative attitude of the IOC to wrestling, the headquarters of which is located in Switzerland. In Asia remain strong leadership athletes Japan. In addition to them, adequately serve Iranian and South Korean fighters, which have already reached the athletes of Kazakhstan and Uzbekistan. American athletes have a clear advantage wrestlers United States, and considerably added athletes of Cuba.

Thus, the above analysis of the dynamics of the balance of the Olympic achievements of wrestlers from different continents of the world, shows that the number of awards judging Olympic athletes are absolute leaders in Europe. They are far ahead of champions of Asia, in turn preserving the superiority of the American athletes and African countries. In addition, it can be noted that the range of countries that contribute most to the achievement of fighters from different continents, has changed significantly in recent years, exacerbating competition and expanding the geography of struggle. In this regard, it should be emphasized weak arguments and the failure of the IOC Executive Board decision on exclusion of wrestling from the list of mandatory Olympic sports. In all likelihood, this decision is due to political and economic ambitions of the IOC, and not care about sports development and prosperity of the Olympic movement in the world today.

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#12

EVALUATION OF THE THESES WRITTEN IN OMU INSTITUTE OF HEALTH SCIENCES REGARDING PHYSICAL EDUCATION AND SPORTS IN TURKEY

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It is aimed to study Physical Education and Sports programs regarding the selection of thesis topics, what was done with the findings, the frequency of topics being studied, the establishment of new paradigms, what research is needed in subject areas for specific regions, and new technologies employed in research. These are examined by using a document analysis technique that has been employed in qualitative research. For this research the 19 doctorate and 63 master theses written in Mays University Institute of Health Sciences between 1994 and 2013 were examined. The research was evaluated by researchers using the thesis evaluation criteria set by the institute. As a result of the analysis of the theses submitted to OMU Health Sciences Institute of Physical Education and Sport between 1994 and 2013, it is found that nearly half of the topics of the thesis related to football. The remaining half did not include any thesis on wrestling. Future students who are interested in graduate studies in Physical Education and Sports department should be encouraged to undertake the study of wrestling in their theses.

Key Words: Physical Education and Sports, Masters, Theme

#13

USING INFORMATION TECHNOLOGY IN THE CONSTRUCTION OF THE TRAINING PROCESS FOR WRESTLERS

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ANNOTATION: This scientific work describes methods for the construction of the training process of wrestlers, based on the use of computer technology.

INTRODUCTION In recent years, we are witnessing the fact that computer technology has been introduced into various sectors of the economy, as well as in the areas of physical culture and sport. Today, it is obvious, that it is necessary to use new information technologies for building the training process of athletes at all stages of long-term training [1,2,3]. But in the realm of sports, including wrestling, there still has not been automated system developed which allow for the construct competent training process of wrestlers. When planning the training process of wrestlers, one looks first for a system of plans designed for different periods, which must be implemented by a set of interrelated aims. While creating workout plans one needs to know the baseline of the object planning and possible prospects for change: near, medium and long-range. In the monitoring of the training process it is advisable to keep records of all factors associated with the preparedness of wrestlers, to assess their dynamics and efficiency, as well as their applications in structural formations of the training process. In the course of solving the above problems a large amount of information of various kinds is used, and the manual processing is a very time consuming process. Therefore the creation of an automated system for planning and monitoring the training process based on the use of computer technology is essential.

Aim of investigation: is to create an automated system for planning and monitoring the training process of wrestlers, based on the use of computer technology. To solve this problem all of the training tools used in wrestling were divided into blocks of exercises that share similar content. Various kinds of training share specific loads which allowed one to classify the structure of the most commonly used training exercises. From training exercises we formed a compendium, training sessions, days, and weeks of complex micro-cycles and primary orientation. From various types of training tasks were formed structure of the basic and additional training sessions and complex orientation. Orientation of training sessions include the following objectives:

- 1) Development of a general or special explosive power
- 2) Development of general or special speed abilities, strength endurance, aerobic capacity;
- 3) Improvement of the basic techniques in combined (aerobic-alactic), (anaerobic-alactic) and (anaerobic glycolytic) directional modes of loads;
- 4) Increase the level of competitive activity and the technical and tactical skills of wrestlers;
- 5) Control the level of competitive activity and the technical and tactical skills of wrestlers;
- 6) The development of absolute general and special power abilities;
- 7) Remedial training sessions;

Then, the plans for the loads of training days, weeks and stages of preparation of the annual cycle were made. Compiling plans of training structures are produced in an automated way by computer. The above plans provide notes attached to the calendar dates of the annual cycle.

CONCLUSIONS

The accumulated allowance of all structures of the training process, which allows an analysis of the parameters of the current and staged control improve managing of training process.

The experimental test confirmed the effectiveness of the proposed approach for the construction of the training process with the use of information technology.

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#14

A SCIENTIFIC-PEDAGOGICAL BASIS FOR THE CONSTRUCTION OF THE TRAINING PROCESS FOR WRESTLERS FROM ANALYSIS OF COMPETITIVE ACTION WITH USE OF INFORMATIONAL AND INNOVATIVE TECHNOLOGIES

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Annotation: In this scientific work a method for the construction of the training process of wrestlers is developed and experimentally proved from an analysis of competitive action with the use of informational and innovational technologies.

Analysis of recent publications. Analysis of numerous works in the literature (1,2,3,4,5) regarding this problem showed that wide use of computer programs in the training and competitive activities (CA) of wrestlers possible to get express clear information about CA results of sportsmen, which in its point lets to analyze TTP of wrestlers correct and to individualize the training process on different levels of preparedness. Use of information technologies in practice, in detail wrestling frees the investigator from routine calculation of done work, opens express - access to use of different numerous information for decision making on correction of the training process.

Aim of investigation: construction of the training process of wrestlers on base analysis of competitive activity with use of informational and innovational technologies.

For the realization of aim there has been following dudes:

1.To stud specifics of the construction of the training process on the base of competitive activity of quilted wrestlers.

2.To create the methodic of construction of training process with use of different computer programs.

3. Experimental prove of effectiveness of the created methodic of training process of wrestlers on base of the analysis of competitive activity with use of informational and innovational technologies.

Methods and organization of the investigation. Following methods of investigation were used in this work: theoretical analysis of scientific literature; pedagogical observation on CA of wrestlers, educational experiment, instrumental methodic, mathematical and statistical analysis. To make the process easier for the gaining and correction of the information about character of CA of wrestlers and to organize order of its keeping and use of it has been created special computer program. This program works in this way:

1). Record of technical and tactical actions is done on the base of the program BZA, attempts to the actions marked and not marked, writing not points, etc. All of these information while analyzing of the event was accepted.

2). Later, in automatic way with the help mathematic algorithms of calculation were done investigation of derivatives, complex results, which were later added as individuals to form of special protocol analysis CA of exact sportsmen. In computer program is organized the system of keeping this information and access to it in special database.

3). The program also lets to check analysis of dynamics of results of CA of exact wrestlers and also to competitive analysis of difference in results.

For the elimination of shortcomings related to problematic realization of express control on competitions, we worked out effective methodic of analysis TTA of wrestlers based on of inserting created specialized computer program «BZA» for recording and analyze TTA with acception of giving speed information on CA with use of modernized computer program «WREST» on scheme fig.1

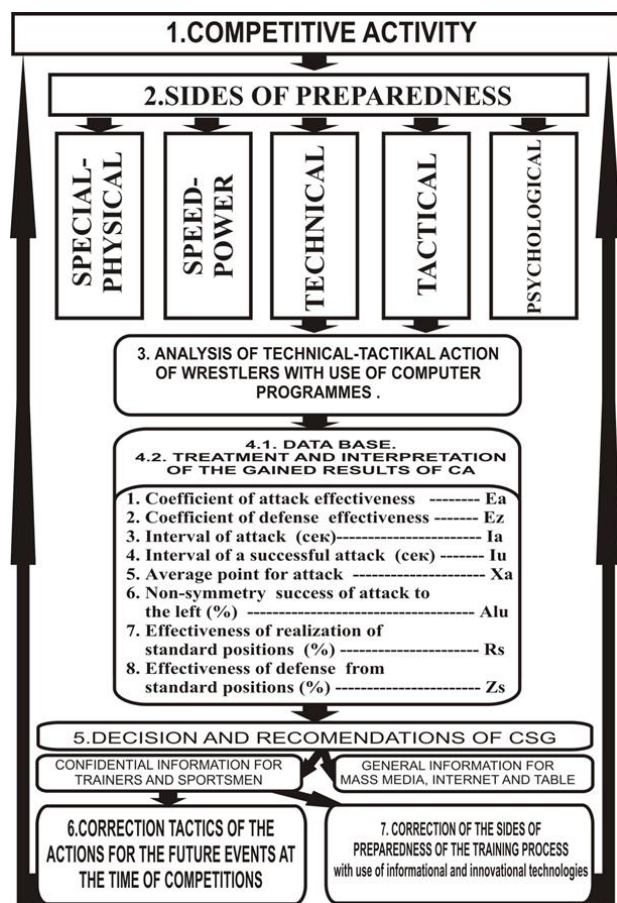


Fig. 1 Scheme of construction of the express control on competitions on the base of analysis of TTA with use of specialized computer programs

The scheme consists of the next blocks: in first block – competitive activity. Second block – sides of preparedness: special-physical, speed-power, technical, tactical, psychological. In the third block are used instrumental methodic «BZA» and «WREST». The fourth block makes distribution of base, also treatment interpretation and renovation of gained information on TTP of wrestlers. The fifth block keeps decisions and recommendations of CSG, which keeps sub blocks divided to confidential and general information. Confidential information transits to 6 and 7 blocks in which CSG corrects the work of coaches and tactics of wrestlers till the next

match, or aspects of preparedness till the next competition. While holding educational training camp (ETC) is done analysis of competitive sights with use the program «BZA» and computer program «WREST» on the contingent of wrestlers. Analysis of specifics of technical and tactical actions and pedagogical marking let's to find baste directions for investigation structures of technical and tactical arsenal of attacking actions in comparison with results of model characteristics of wrestlers.

In process of investigation was given mark of effectiveness of readiness of the wrestlers of national team on the base of use computer program. As a result on conducting ETC is proved correctness of the made hypothesis and offered effective system of individual approach to the training of wrestlers on the base of analysis of competitive activity.

Results which were gain while the investigation served as the base for individualization of TTP of qualified wrestlers of different weight categories on set up levels of pedagogical experiment. For this aim has been organized basic pedagogical experiment. In this experiment participated two groups (experimental and control), which consisted of wrestlers, masters of sports and candidates to master of sports.

Results and investigation and their discussion. Comparing gained results of average means of EG and CG at the beginning of pedagogical experiment on the results of CA doesn't have rightness of statistical differences in all eight results characterizing technical and tactical preparedness of wrestlers on Student t-test. Results are witnessing on the same level of technical and tactical readiness of wrestlers of experimental and control groups at the beginning of the pedagogical experiment ($P>0,05$).

Table 1 Results of competitive activity wrestlers of experimental and control groups at the end of pedagogical experiment

№	Results of competitive activity	f	EG		CG		t-test	P
			X_1	σ_1	X_2	σ_2		
1.	Coefficient of attack effectiveness	Ea	0,773	0,09	0,667	0,08	2,920	<0,01
2.	Coefficient of defense effectiveness	Ez	0,631	0,06	0,599	0,05	1,359	>0,05
3.	Interval of attack (sec.)	la	17,13	2,07	19,01	2,01	2,161	<0,05
4.	Interval of a successful attack (sec.)	lu	31,21	3,30	34,23	3,22	2,172	<0,05
5.	Average point for attack	Xa	1,209	0,11	1,101	0,13	2,103	<0,05
6.	Non-symmetry success of attack to the left (%)	Alu	30,01	2,23	27,07	2,19	3,120	<0,01
7.	Effectiveness of realization of standard positions (%)	Rs	43,12	4,14	39,02	4,28	2,284	<0,05
8.	Effectiveness of defense from standard positions (%)	Zs	19,46	2,02	20,31	2,11	0,965	>0,05

From comparative analysis data which presented on (Table 1) is shown results of average means of EG and CG at the end of the pedagogical experiment is observed a considerable grow of results of CA. Realibility of statistical differences is seen on 6 results from 8 characterizing TTP of wrestlers on Student t-test. Results also showed positive and effective influence of methodic offered by us ($P<0,05$).

Decision and perspectives of future investigation. Theoretical analysis of the problem and experimental work let's to form following decisions:

1. On base of study of the scientific and methodological literature we decide that the problem of technical and tactical readiness of qualified wrestlers till present days didn't get it's own full solution in practical action of specialists and theoretical works of investigators using to wrestlers. Depending on changes of rules of competitions and growing requirements to the level of TTP of wrestlers, motivating specialists to find modern methods, on the base of which they can make rival advantage with counting operative inserting to the practice. Absence of express access to use of different numerous information, which in it's in turn doesn't let to influence on competitive and training process. Present barrier limits gaining of correct results about TTP of wrestlers, which as a results serves as cause of unstable computational results.

2. Analysis of competitive activity of wrestlers with help of computer program leted effectively selection of training means and to observe dynamics of changes of effectiveness of attack. Huge amount of worked out information leted to distinguish model meanings of CA of leading wrestlers of the world: the coefficient of attack effectiveness (Ea) - 0,82; coefficient of defense effectiveness (Ez) - 0,63; interval of attack (la) - 14,5; interval of a successful attack (lu) - 28,1, average point for attack (Xa) - 1,66; non-symmetry success of attack to the left (Alu) - 38,4%; effectiveness of realization of standard positions (Rs) - 51,6%; effectiveness of defense from standard positions (Zs) - 29,2%.

3. Calculation of advantages and disadvantages of skills sight is distinguished by comparison of results of computational action of wrestlers with analogy results of his rival, also with model results of computational action of champions. Deviation of individual results from average point will witness advantages and disadvantages of readiness of the wrestlers. Results of CA can serve as a reference point for construction of tactics of sights with possible rivals in coming competitions.

Generalizing all pointed above can be decision that analysis of competitive action with use of computer program helped to form system of informative and express accessed results, also specify ability of management of effective training means.

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#15

THE RELATIONSHIP BETWEEN PERCEIVED INTERPERSONAL BEHAVIORS OF COACHES AND SPORT CONFIDENCE IN IRANIAN SENIOR FREE STYLE WRESTLERS PARTICIPATING IN A NATIONAL TRAINING CAMP

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Purpose: Most athletes, coaches, and sport psychology consultants strongly believe that confidence is a crucial psychological requisite for success in sport, and enhancing self-confidence is often a crucial consideration for all athletes (1). Based on the multidimensional sport-confidence model (Vealey & Chase, 2008), Coaches' behaviors, such as their interpersonal behaviors, may greatly influence athletes' self-confidence (2). Previous research has shown that the coaches' behaviors can be a significant social factor that influences athletes' affect cognition and behaviors (3). Accordingly the purpose of this research was to determine the relationship between perceived interpersonal behaviors of coaches and sport confidence in Iranian senior free style wrestlers participated in national training camp.

Methods: Participants were 30 Iranian senior free style wrestlers participating in a national training camp, who completed The Sport-Confidence Inventory (SCI) Vealey & Knight (2002) and Interpersonal Behavior Scale for Sport (IBS-S) Pelletier et al. (2008). The content validity of these instruments was confirmed by experts and the internal consistency of the SCI and IBS-S scale proved to be 0.87 and 0.80 respectively in a pilot study. The data were analyzed by employing Pearson correlation and stepwise regression tests.

Results: The results in Table 1 showed that there is a positive relationship between autonomy-supportive behaviors and Sport-confidence about physical skills and training ($p=0.034$, $r=0.388$ positive relationship between Social support behaviors and Sport-confidence about

cognitive efficiency ($p=0.007$, $r=0.485$) and positive relationship between positive feedback behaviors and Sport-confidence about resilience ($p=0.040$, $r=0.508$).

Table 1: Relationship between Perceived Interpersonal Behaviors of Coaches and Sport Confidence

Pearson Correlation	Sport-confidence about physical skills and training	Sport-confidence about cognitive efficiency	Sport-confidence about resilience
autonomy-supportive behaviors	*.388	-.276	.305
Sig. (2-tailed)	.034	.140	.101
Social support behaviors	.264	**485	.310
Sig. (2-tailed)	.158	.007	.095
positive feedback behaviors	.262	.000	**508
Sig. (2-tailed)	.163	.998	.004

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

A stepwise multiple regression analysis was conducted to determine predictors of Sport-confidence. Results presented in table 2 show that Social support behaviors was the best predictors of Sport-confidence ($\beta= 0.485$, $t = 2.936$; $p <0.007$).

Table 2: Stepwise multiple regression analysis Summary for Prediction of sport-confidence from coaches' behaviors

Predictors	indicator	SS	df	MS	F (P)	R	R2	SE	B	Beta	T (P)
Social support behaviors	Regression	1.240	1	1.240	8.618 (.007)	.485	.208	.155	.454	.485	2.936 (.007)
	Residual	4.208	28	.144							

Conclusion: According to the findings of this study there was a positive relationship between autonomy-supportive behaviors and Sport-confidence about physical skills and training, these results are consistent with previous research in sport (3). Previous studies indicate that a significant positive relationship between the autonomy-supportive behaviors of Coaches and Motivation in athletes. In other words, the more the athletes perceived their coach to be autonomy supportive, the more their motivation for practicing their sport activity was self-determined. Based on research findings there was a positive relationship between Social support behaviors and Sport-confidence about cognitive efficiency. Coaching effectiveness research consistently shows that perceived coaching behaviors greatly influence athletes' psychological processes (5). It seems reasonable to find that the more athletes perceived their coaches to be caring, the more confident they felt about their ability, and especially about their cognitive ability. Because little research has been done on a Sport-confidence about resilience, it seems a bit difficult to interpret these results and the need for future studies is suggested. Generally, the results from the present study provided support for the multidimensional Sport-Confidence Model by Vealey & Knight (2002).

Key words: Sport Confidence, Perceived Interpersonal Behaviors of Coaches, Iranian senior free style wrestlers.

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#16

THE SELF-CONCEPT OF ELITE WRESTLERS WHO WERE PARTICIPANTS IN THE 2006 ASIAN'S GAMES (QATAR)

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The Purpose of this study is the comparison between the self-concept of elite wrestlers who were participants in the 2006 Asian Games (Qatar). Statistical populations were all wrestlers who were participated in 2006 Asian's Games Qatar (N=106). The 93 wrestlers with an average age of (22.77± 4.31) completed Elite Athlete Self-Description questionnaire (EASDQ). Method of research is causal comparative. Data collection-the EASDQ which includes 29 items and six scales (Skill, Body, Aerobic, Anaerobic, Mental and Overall performance) was translated to Persian, Arabic, Russian, Japanese and Korean, and then was validated. These questionnaires were administered before the beginning of the games and the data was collected. The data analysis of data utilized ANOVA and Spearman correlation. They differed from each other (p< 0.05). There was a significant and reverse correlation between Athletic self-concept and performance (p< 0.05) .

Key words: Elite athletic, self concept, wrestlers

#17

A STUDY OF CAUSES FOR THE FAILURE OF CADET AND JUNIOR MEDALISTS IRAN IN SENIOR WRESTLING: PERSPECTIVE OF COACHES

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PURPOSE: The purpose of this research is to study the causes for the failure of cadet and junior medalists from Iran to continue their success as they move to senior level wrestling from the perspective of coaches. **METHODS:** The research sample was selected randomly and is included 162 people from grade I and II active coaches of Iran. In this study a researcher-made questionnaire consisting of 35 questions in five subscales including facilities, management, physical fitness, sport injuries and psychological problems. The validity of questionnaire was approved by 7 experts of physical education, and in pilot study of 30 cases from wrestling experts, the reliability of the questionnaire by Cronbach's alpha was measured at 0.80. In order to evaluate and compare the descriptive data used from descriptive and inferential statistical (Friedman test) in SPSS software the significant level was established with p≤0.05. **RESULTS:** Results showed that the greatest impact contributing towards a failure of cadet and junior medalists in senior wrestling was attributed to facilities, management, sport injuries, physical fitness and psychological problems, in that order, respectively. **CONCLUSIONS:** It is recommended that wrestling federation officials prioritize their attention to these subscales in order to increase the success of the cadet and medalists in senior wrestling. Finally, as was seen in the findings, the main factor of 20 is related to the lack of success of the young teen wrestling medalists at world level in the category of adult age, 18 were related to the facilities and management of the environment. Sports injury, physical fitness and psychological issues remain viewed as having less impact, however, administrators and those involved in the organization of national wrestling should be focused on the facilities and management. It is also possible that if adequate attention is given to these two largest contributors, a lot of obstacles in the remaining three areas, training sports injury, physical fitness and psychological problems, can be dealt with and elevate the role of scientific specialists and trainers. **Key words:** training of sporting talent, cadet and junior wrestlers, barriers to wrestling development.

Table: Prioritization of research in terms of trainers

Items	Component	Rating average	Priority
To neglect the financial status of the wrestlers in the age bracket of adults	Facilities	25/66	1
The lack of good paying cash bonuses to earn the championship titles in the category base	Facilities	24/67	2
There are differences in how the Wrestlers makers to medal in adolescents and young adults in May with other sport-specific, such as the field of football and volleyball	Facilities	24/43	3
Job mentality and the existence of problems regarding the lack of supply of the essentials of life in the future	Facilities	22/02	4
The lack of proper use of bodybuilding, nutrition professionals of psychology etc. On the basic category of the arrival of the team.	Facilities	20/56	5
The existence of specific relationships and apply your preference by adult instructors in the selection of members of the national team.	Management	20/49	6
Scientific advice and guidance of a loss of sports centers in the country for the category of age of adolescents and young people	Management	20/01	7
Not the real age (recent age) and young teen medal makers may Wrestlers	Management	19/71	8
The low weight of continuous, too basic and non-basic of category	Sports injury	19/16	9
Lack of a proper strategy for the education in the educational problems of adolescents and young adults in order to compensate for the hero	Facilities	18/38	10
The lack of holding joint field trips with the famous Wrestlers of the world countries	Management	18/37	11
The program did not administer the (strategic) on how to transfer the base class wrestlers to the adult national team	Management	17/73	12
Failure to hold the selected tournament in order to identify top talent and staying young and teen wrestlers may Medal from the adult national team	Management	17/69	13
Determination of basic category, and the lack of possibility to use it in the category of adults due to repeated doping tests	Management	17/63	14
Not reach the level of fitness and movement due to the lack of the use of technology	Preparation	17/45	15
Administrators were athletes champion	Management	17/28	16
The lack of evaluation (technical, physical, mental and Tactical) of the wrestling makers in different time after obtaining official Championship in the category of basic	Facilities	17/11	17
The lack of a proper reflection of official business in mass media	Management	16/83	18
The lack of proper use of medication and food supplements in other countries than permitted in the various	Facilities	16/68	19

age categories			
The lack of appropriate internal and external organizing field trips during the period of the age of teens	Facilities	16/64	20
The lack of proper and steady presence at international competitions in line with the growth and progress of the Wrestlers makers may place teenagers and young people	Preparation	16/52	21
Failure to control the amount of pressure in training of adolescents and young adults category	Preparation	16/35	22
The lack of coordination between the national teams of instructors and youth and adults in the country	Management	16/22	23
Lack of harmony in the base teams and adults how to exercises	Management	16/12	24
Failure to use advanced equipment and technical data for the development of the wrestlers	Facilities	15/84	25
The proper exercise of an opponent in place of a loss of life, consuming the wrestling hero	Facilities	15/64	26
Reduction of the rate of support for the family of the Wrestlers with increasing age athletes	Facilities	14/71	27
Characterize the maturity and the surrounding issues of failure to control it by athletes and their families	Mental issues	14/54	28
Improper use of the category of negative aspects of Fame and by athletes after obtaining the medal in the category of adolescents and young people	Mental issues	14/16	29
The incidence of sports injuries in youth and adolescents failed	Sports injury	14/15	30
The change in the age category adult educators how to approach towards the base of the team coaches	Management	13/71	31
Difficult access to facilities and equipment health centers for treatment of sports disorders	Sports injury	13/07	32
Saturate the internal motivation of athletes with regard to obtaining the medal in the category of basic	Mental issues	12/92	33
The lack of identification and treatment of serious injuries in basic age category	Sports injury	12/55	34

Table: Prioritization of the research component of the trainers

Component	Rating average	Priority
Facilities	4/64	First
Management	4/36	Second
Sports injury	2/75	Third
Fitness	1/77	Fourth
Mental issues	1/48	Fifth



#18

MOTIVATION FOR HIGH ACHIEVEMENTS AND GOAL ORIENTATION OF ELITE WRESTLERS

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ABSTRACT

The purpose of the study was to determine the displays and the main determinants of the goal orientation of freestyle wrestlers, and to determine their motivation for high achievements. The research included 30 athletes, all active freestyle wrestlers (17 juniors and 13 men). Their ages vary from 15 to 34 (average age – 22 years). The length of the athlete's involvement in wrestling ranged from 4 to 24 years (9 years on average), and most were listed among the top three places in the national rankings. Most wrestlers were members of the national team, and they competed for six representative clubs. The research methods are complex and include: 1. Questionnaire for researching the status of the problem; 2. Task and Ego Orientation in Sport Questionnaire; 3. Athlete Interview. **RESULTS:**

The results analysis shows that half of the athletes (50%) recognize that hard work, the continuous and hard training, and working efficiency as the main factors for their development as wrestlers, and for achieving good shape. Those are, according to them, the main factors for developing also goal orientation towards building skills, such as constant, persistent pursuit and working for their own personal growth. Second is discipline as a volitional quality of the organization. It is the discipline that is important condition for the proper execution of the tasks, of the coach's requirements, and for observing the sports regime. As an important volitional quality the discipline helps the good wrestler to become successful athlete (indicated by 23.33% of the researched subjects).

Third the athletes indicated that mental stability, motivation and patience (13.33%) as crucial for achieving success. Fourth, the wrestlers indicate the respect between the coach and the athletes, the good relations as a guarantee for their proper training in the process of their sports interaction and mutual understanding. Only one of the subjects indicates that proper financial compensation is the main factor for his sport participation. Also one of the subjects indicated that the natural and genetic specifics of the athlete are among the significant factors for the training.

KEY WORDS: Wrestling, motivation, goal orientation

#19

PRACTICAL MEDICAL GUIDE FOR WRESTLING COMPETITIONS

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PURPOSE Health regulations are strictly defined and described by the International Federation of Associated Wrestling Styles. There are well prepared medical instructors, doctors and health providers both for the FILA and for the National Federations. The major number of wrestlers takes part in competitions which are for youngsters or held by local authorities - but obviously accepted by their National Federations. The health support of these competitions are supervised by local medical doctors or Ambulatory Service. Every Country has its own regulation for sport competitions but we do not possess a general practical guide for Physicians or health care providers who are not familiar with wrestling **METHODS:** We prepared a Practical Medical Guide for Wrestling Competitions in order to help those Physician or health care providers who are not familiar nor with the wrestling rules, neither with the wrestling injuries. We listed all the important aspects of the wrestlers, referees, trainers in relations with the medical responsibility and how to supply them.

RESULTS: We defined the basic instructions for the medical examination before the weight in, the relation with the chief referee, how to behave in the mat, how to communicate with the referees, trainers and with the wrestlers. When and how to help, what kind of equipment is necessary, what is the purpose in different situations. We also listed the typical medical issues and injuries. We strictly emphasized the reasons and the ways to suspend the bout. **CONCLUSION:** A controversy exists between the strict FILA instruction, the practical knowledge of the well prepared physician of the International or National Federations and the performance of a general medical staff assisting at lesser competitions where the majority of the competitors take part. Further communication and discussion is warranted between all groups of wrestling medical providers.

#20

DESIGNING A SPECIFIC AGILITY TEST FOR FREE STYLE WRESTLING

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The purpose of this study was to develop a reliable, valid and specific agility test for freestyle wrestling. 62 wrestlers participated in this research. 23 wrestlers from wrestling clubs in Tehran were used for a pilot study in designing the agility test. 29 wrestlers from a Tehran team were selected as Tehran group (TG). In this group 10 of them had won medals in the Asian championships, world championships, or had been invited to be on the Iran freestyle wrestling national team and were considered as the elite group (EG). Additionally, there were also 10 non- elite wrestlers forming the non-elite group (NG). These groups were used to study the validity and reliability of the specific agility test. Wrestlers were tested three times on a specific reactive agility test (RAT) and twice on pre-planned agility test (PPAT) and once on 4x9 meter shuttle run test. Data analyzed from the TG was used for reliability analysis. For obtaining validity, EG results were compared with NG. Statistical analyses revealed significant correlation between the 4x9 shuttle run and the PPAT, 0.75 and 0.70 respectively, between 2 times of PPAT (0.87) and between 2 series of RAT (intraclass correlation coefficient = 0.87). Statistical analyses also showed significant difference between the EG and the NG ($p < 0.05$) in RAT time means. According to the results, RAT was reliable and valid for freestyle wrestling, and as it called here, the TMUWAT (Tarbiat Moalem University Wrestling Agility Test) and would be suggested for free style wrestlers. Performance differences on the RAT were attributed to the differences in perceptual skills and/or reaction ability. Testing and training agility should therefore stress those dimensions of agility and not only PPAT.

Key Words: Agility Test, Validity, Reliability, Wrestling

#21

INVESTIGATION OF THE EFFECTS OF INTENSIVE TRAINING ON SELECTED BLOOD PARAMETERS IN YOUNG WRESTLERS

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PURPOSE: In this study for young wrestlers, we aimed to examine the effects of an intensive wrestling training program on blood parameters and serum leptin values. **METHODS:** The wrestlers trained 6 days a week for one and half hours. The diet was prepared according to the conditions of this training program. Blood collection was made when wrestler first entered the wrestling educational center on October 2011, and a second blood collection was made 8 months later in June 2011. In this 8 month period, athletes participated in competitions as wrestlers. Analysis of the data using SPSS statistical program in Windows, and the t-test was applied. **RESULT:** The wrestlers were found to have a mean age of 12.40 years at the pre-test, a mean height of 1.50 m and a mean body weight of 44.44 kg. During the second measurement period, the average height was 1.57 m and a mean body weight of 50.56 kg. The wrestler's increases in height and weight were significant ($p < .001$). A decrease was observed in the value of HDL-C, along with an increase in triglycerides, and both were statistically significant ($p < 0.05$). Glucose values decreased, and creatinine and uric acid levels increased. These changes were statistically significant ($p < 0.001$). The decrease in insulin values was statistically significant ($p < 0.05$). Alkaline phosphatase and calcium levels were decreased significantly ($p < 0.001$). Hematocrit values was found to decrease significantly ($p < 0.001$). The decrease in the leptin hormone was statistically insignificant ($p > 0.05$). **CONCLUSION:** Some results of the intensive training program that were observed are opposite of what would be expected for HDL, triglycerides, creatinine, and uric acid. An inappropriate implementation of intensive training at this age of wrestlers, which included competition weight loss, irregular eating habits,

has produced the unexpected in blood values. In this study, we have identified some negative aspects of intensive training on children's growth and development.

#22

THE EFFECTS OF INTENSIVE TRAINING ON SELECTED BLOOD PARAMETERS IN YOUNG MALE WRESTLERS

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PURPOSE: This study was carried out with the aim of determining the effects of intensive training on the blood parameters and leptin levels in young-age male wrestlers. **METHODS:** In total, 16 young-age wrestlers who were between 12 and 15 years old, participated voluntarily in this study. The healthy volunteers were trained at the Wrestling Training Centre (WTC). The mean value of wrestlers' age was 12.44 ± 0.63 years, height was 147 ± 0.11 cm and body weight was 40.38 ± 2.95 kg. Throughout eight months, intensive training was applied to the wrestlers for a duration of 90 minutes daily for 6-days per week. The athletes were participated in wrestling competitions during this eight-month period. The daily dietary programs of the wrestlers were prepared according to the amount of calories expended in these trainings. The blood samples of the wrestlers were collected at the beginning of training camp (pre-test in October, 2010) and at the end of 8-month training camp (post-test in June, 2011). A paired samples t-Test was used to analyze the differences between the pre-test and post-test values for the subjects. The level of significance was set at $p < 0.05$. **RESULTS:** After the 8-month intensive training programs, there were significant differences between the pre-test and the post-test average values of age, height and body weight of the young-age wrestlers ($p < 0.001$). There were significant decreases in the mean values of HDL-C, insulin ($p < 0.05$), glucose, calcium, hematocrit and alkaline phosphates levels ($p < 0.001$) in the wrestlers. There were significant increases in the mean values of triglyceride ($p < 0.05$), creatinine and uric acid levels ($p < 0.001$) in the wrestlers. The mean value of the leptin hormone level of the wrestlers decreased, but it was statistically insignificant ($p > 0.05$). **CONCLUSION:** At the end of 8-month intensive training period, the expected decreases in the levels of HDL, hemoglobin and hematocrit were not seen, and these values had increased. A similar pattern was observed for creatinine and uric acid levels which increased rather than decrease. Applications of high intensive training and weight loss for competition could produce these unexpected results in blood values of these young-age wrestlers. Therefore, it was concluded that this type of intensive training and competition may have a negative impact on the growth and development of young-age wrestlers.

#23

THE INVESTIGATION OF THE EFFECT ON SOME BLOOD VALUES AFTER INTENSIVE TRAINING IN 13-15 YEAR OLD WRESTLERS

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PURPOSE: This study investigated the effect of intensive training on some blood values in 13-15 year old wrestlers. **METHODS:** Wrestler and control group blood samples were taken ($n=31$) in June 2011. Analysis of the data was done with the Windows SPSS statistical program, utilizing the t-test. **RESULT:** There was no significant difference between wrestlers and a control group for age, height and body weight ($p > 0.05$). Lower cholesterol and triglyceride levels found in the control group than the wrestlers ($p < 0.05$). Wrestlers had LDL-C values that were higher than the control group, while their HDL-C values were lower. The wrestler's lower HDL-C values were not significant, while their LDL-C values were significantly higher ($p < 0.05$) than the control group. There were significant difference between the wrestler and the control group for creatinine level differences $p < 0.001$ and glucose values differences $p < 0.05$. The wrestler's cholesterol, triglycerides and LDL-C values were higher than the control group, and HDL-C values were lower. **CONCLUSIONS:** The reason for these unexpected levels, may be found in the training intensity, nutrition, and weight loss for competition. The wrestler's age must be considered and the appropriate training, work and rest intervals, and nutrition should be better regulated.

#24

COMPARISON OF ANTHROPOMETRIC CHARACTERISTICS AND SQUAT SKILL RECORD IN TWO GROUPS OF ELITE MIDDLE WEIGHT GRECO-ROMAN AND FREESTYLE WRESTLERS

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Introduction: The aims of this study were to compare anthropometric characteristics and squat skill records in two groups of elite Greco-Roman and freestyle wrestlers.

Methods: A total of 14 male elite wrestlers (Including: 8 freestyle wrestlers and 6 Greco-Roman wrestlers) were recruited as the study sample. Anthropometric characteristics and squat skill records in the two groups were measured. MANOVA and Independent sample T test were used for statistical analysis. The α level was set at 0.05.

Results: The result of the present study showed significantly higher sitting height ($P=0.023$) in Greco-Roman wrestlers and higher forearm length ($P=0.002$) for freestyle wrestlers. The amount of 1RM in squat skill didn't show any significant difference ($p=0.680$) between two groups.

Keywords: Anthropometric characteristics, Greco-Roman wrestling, freestyle wrestling

#25

DESIGNING A STRATEGIC PLAN FOR PAHLEVANI WRESTLING AND THE ZURKHANE SPORTS FEDERATION OF IRAN

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Pahlevani Wrestling and Zurkhane Sports National Federation of Iran
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The purpose of this study was the development of a strategic plan for the Pahlevani Wrestling and Zurkhane Sports federation of Iran. Statistical population of this study includes 65 experts and elite practitioners of this sport. 60 questionnaires were returned correctly and were included in the study. Respondents were asked to list the strength, weakness, opportunities and benefits of this sport federation. After determining the significance frequency and rank of each mentioned factors and identifying the strategic status of the organization, the research team grouped the internal and external factors into 15 strategies (6 SO strategies, 5 WO strategies, 2 ST strategies and 2 WT strategies) and assigned them to action plans, and vision, mission, key values and goals were determined. Pahlevani Wrestling and Zurkhane Sports federation of Iran was determined to be in SO strategic status. SO strategies should be utilized in the developmental activities that it undertook. Increasing the participation rate in Pahlevani wrestling through coordination with other organizations, improving public awareness and promotion of Pahlevani wrestling culture, interaction with active sport clubs in other sports, organizing federation competitions' system by focusing on establishing leagues, improving the quality and quantity of Pahlevani wrestling clubs (Zurkhanees), by focusing on even distribution and easy availability, developing media and public relations toward the promotion of Pahlevani wrestling culture, helping the IZSF (International Zurkhane Sports Federation) in developing Pahlevani wrestling at basic levels, developing this sport in schools, colleges and universities, interaction with academic centers and implementation knowledge management systems, diversify federation income through creating marketing committee and driving private sector for investing in this sport, updating and standardization rules and facilities, utilization of strategic management, updating the information systems of the federation, developing and training required human resources including athletes, coaches, referees and volunteers in the sport, were main strategies that obtained in this study.

Key Words: Strategic planning, Strategic planning in sport, SWOT analysis, Strategy, Pahlevani Wrestling and Zurkhane sports

#26

COMPARISON OF LUMBAR AND HIP EXTENSOR MUSCLE FATIGABILITY IN WRESTLERS WITH AND WITHOUT CHRONIC LOW BACK PAIN

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PURPOSE: The purpose of this study was the comparison of lumbar and hip extensor muscle fatigability in wrestlers with and without chronic low back pain during a modified Biering-Sørensen test. **METHODS:** 10 male wrestlers with chronic, non-specific, low back pain (mean age 23.6 yrs, height 175.2 cm, weight 73.7 kg and athletic experience 6.5 yrs) and 10 healthy male wrestlers (mean age 23.1 yrs, height 175.7 cm, weight 75.4 kg and athletic experience 8.0 yrs) were matched by age, weight, voluntary participated in this study. Endurance time and the median frequency (MF) was calculated from surface electromyography (EMG) of the upper lumbar erector spinae, lower lumbar erector spinae, gluteus maximus and biceps femoris while performing a modified Biering-Sørensen test. Data were analyzed with MegaWin software Version 2.5 and an independent sample t test was used for comparison of the two groups ($p \leq 0.05$). **RESULTS:** MF slope was significantly lower in wrestlers with chronic low back pain (CLBP) when compared to the healthy group. The healthy athletes showed more muscle fatigability than the CLBP group. Extensor muscle endurance time was significantly lower in CLBP group (105.80s) than healthy subject (1053.53s) while performing Biering-Sørensen test. **CONCLUSION:** Results of this study showed that athletes with chronic, non-specific low back pain have reduced muscle endurance in lumbar and hip extensor muscles, therefore, it should be considered in designing rehabilitation strategy by athletic trainer and coaches that might improve the neuromuscular system to actively adjust and reduce muscle fatigability in subjects with CLBP.

#27

ORIENTAL MESSAGE AS A NATURAL AND EFFECTIVE METHOD OF RESTORATION IN YOUNG WRESTLERS

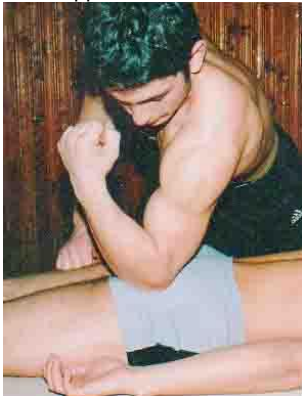
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INTRODUCTION In the "Canon of Medicine," the great physician and philosopher Abu Ali Ibn Sina "Avicenna" (980-1037), who lived in the ancient city of Bukhara, writes about a variety of recommendations concerning the purity of the body, nutrition, water treatments and massages. In one part of his "Canon of Medicine", he wrote: "It is necessary that the massage was reasonable in terms of quality and quantity," and he advised to apply massage is not only to treat but also during exercise. Avicenna performed a great deal of work on the

classification of massage. He divided it into strong - firming body weak - soothing, relaxing the body, contributing to long-lasting weight loss, moderate - contributing to the prosperity of the body, preparation - the previous exercise, rehabilitation, or calming, which is used after exercise. He introduced the term "preparation" and "recovery" massage which continues into the present.

In view of the above, we have attempted to try oriental massage, which is characterized by excellent modern European technique receptions. Very little is described in the current literature, and this massage, in the light of present day science, deserves serious consideration. What eastern massage techniques are preserved to the present day eastern massage, and what are its features distinguish it from other forms?

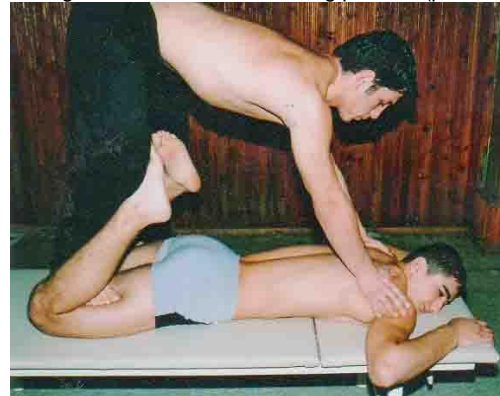
Along with the well-known types of massage, one increasingly finds its use among athletes (especially in different types of fighters, wrestlers, boxers, etc.). Oriental massage is based on several principles, most of the techniques it is made against the flow of venous blood. Massaging is not only performed by the fingers and palm of the massage therapist, but a number of techniques use other parts of the body to provide the massage - head, forearm, elbow, legs, feet, etc. The main methods are stroking, rubbing, and kneading, stretching and light "twisting" of joints of the upper and lower extremities. Some techniques of the varieties of oriental massage are shown in the following pictures (pic.1,2,3)



Pic.1
Specific methods - rubbing the thighs and buttocks with elbow of massagist



Pic.2
Specific methods of oriental massage. Active and passive movements of the spine.



Pic.3
Specific methods. The pressure with hands and soles of the feet to the hips and back.

Aim of investigation. In order to find out what impact oriental massage has on the human body in general and in particular, mainly for athletes, we first performed physiological and pedagogical research on people aged 19-68 untrained and trained athletes - wrestlers age 11-17 years (63 people). The survey was conducted before and after a massage, measuring a number of functions: heart rate, blood pressure myotonometry strength of the muscle groups, skin temperature, and body weight change. The trained wrestlers were measured in a similar manner, but with the advantage of power performance and tone different muscle groups by the method of A.Korobkova and G.Chernyaeva, Myotonometry on F.M.Uflyandu and muscle performance by dynamometer.

The positive effect of massage, according to the mathematically processed and statistically significant indicators demonstrated a more rapid recovery of the functions of the body, in untrained and in trained. Heart rate was increased after a massage by 7.8 beats per minute (+8.9%). There was a marked reduction in both the maximum (15.2 mmHg) and minimum (9 mmHg) blood pressure. These changes occurred only in the group of elderly people aged 61 and above. In the other groups, no significant changes were observed. The most typical indicators have been identified in terms of body weight. After one session of oriental massage was observed to drop weight is approximately the same in all age groups and in average per person of 0.9 kg.

Muscle tone indices were as follows: biceps tone was 0.45 before massage, and after the massage was reduced to 0.35, the coefficient of the quadriceps femoral muscle reaction to massage was similar, going from 0.65, to -0.61 after the massage. Skin temperature was measured before and after the massage, at 11 points in the body. The results showed that after a session of oriental massage the skin temperature increased in the range of 1.3 to 21 °C.

The research results obtained from wrestlers showed that the use of oriental massage promoted:

- Increase of muscle strength in young athletes in all age groups, the magnitude of which has not only achieved a baseline, but to exceed them;
- Restoration of normal muscle tone, as evidenced by changes in amplitude (range) between the tone of tension and tone of relaxation, which is increased by increasing the voltage and lowering the tone of relaxation;
- Increase in skin temperature to the original level in almost all areas of the body;
- an increase in muscle performance (performance running time).

CONCLUSIONS

Thus, on the basis set out the materials we can note that oriental massage is a thousand-year national experience, and is valuable as a prophylactic treatment can be used in practice to decrease fatigue, improve performance, and especially for combat sports athletes in order to regulate the weight categories.

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#28

THE NATURE AND CORE VALUES OF A SPORT ORGANIZATION (A CASE STUDY OF CHINESE TAIPEI WRESTLING ASSOCIATION)

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PURPOSE: This case study presents an example of the nature and core value which is important for a sport organization to gain sustainability. **METHODS:** Analysis of information collected from the website of Chinese Taipei Wrestling Association¹⁵ (CTWA) and interviewed with some stakeholders. **RESULTS:** 1) It was found that staffs and stakeholders don't know much about the history of CTWA. 2) The plight of CTWA, at present, is that the expenditure being much more than income annually. It depends on the donation from wrestling lovers and the government. **CONCLUSION:** As a non-profit and non-government sport organization, CTWA works independently and solely in Taiwan. It not only needs to be strongly supported to develop wrestling activities, but promotion of the spirit and art of wrestling to the public must increase in order to grow the wrestling populations in Taiwan. 3) Good governance of a sport organization should have an integrated personnel, be transparent, have steady finances and use strategic marketing. **SUGGESTION:** It was suggested that 1) CTWA enrich the contents of its website. The contents may include the history, processes and the reasons why CTWA was founded. 2) The nature and the core value of CTWA should be comprehended and identified by stakeholders and the public. 3) Promote wrestling activities and provide international wrestling information to the public and get sponsors. This information may assist the governance body of sport organizations to improve and last for good.

The Chinese Taipei Wrestling Association was established in 1993 by Mr. Huang, Gern-Man, (former wrestler, nick named "Lion King") as a non-governmental and non-profit national sport organization; under the "Civic Organization Law During Communist Rebellion Period" 10 February, 1942 (revised 15 June, 2011). With the collaboration of Chinese Taipei Olympic Committee and Sport Committee, CTWA has been developing a sport organization under the authority of Ministry of Education, Department of Physical Education and following the law of Sport Industry Development Act. CTWA is recognized by the Asian Council of Associated Wrestling which is affiliated with FILA, the International Federation of Associated Wrestling Styles. With 20 years of history, CTWA has prosperously developed from few members to 17 affiliated regional associations with grassroots level of primary school team members to the high end level of sport universities. Since the time it established, CTWA has been operating solely in Taiwan and with the right to enter wrestlers to take part in competitions, such as Asian cadet, youth, and senior Championships as well as senior world championships.

◆ Organizational Context of CTWA

Being an independent sport organization, CTWA is associated to the following domestic and international sport organizations:

Domestic:

- ✚ Chinese Taipei Olympic Committee (CTOC)
- ✚ Republic of China Sports Federation (ROCSF)
- ✚ Department of Physical Education, Ministry of Education

International:

- ✚ Asian Council of Associated Wrestling (AAWC)
- ✚ The International Federation of Associated Wrestling Styles (FILA)

CTWA is responsible for the development of wrestling within the country with the cooperation of Department of Physical Education in order to promote wrestling through school education system from grassroots level and the general public to high end athletes; with the collaboration of CTOC to enter wrestlers to participate in international games.

◆ Nature of CTWA

There are three elements by which a sport organization can be characterized: people; rules, tasks, roles and responsibilities; goals and purposes.

✚ People

Those people who affiliated with CTWA are a combination of members, paid staffs, volunteers (who are the former officers, players, coaches and referees with expertise about wrestling, and had done a great deal of contribution to wrestling field and society) at high ranking of governance positions. Such as president and deputy presidents, consultants of referee committee and other committees. The General Assembly is the highest decision-making unit in general; the members of the Executive Board and the president take the responsibilities for the governance and the development of CTWA.

As for the two paid staffs in house, they have clear roles to do their duties. One of them is the administration staff, responsible for the daily and normal affairs related to stakeholders' that exclusive the core range. The other one, treasurer, takes the responsibilities of finance and financial report. There are some committees related to technical affairs, disciplines, referees, development as well as rules and regulations. The members to these committees are responsible for those affairs connected to each individual expertise, are recommended by the general members and elected by the board members. Athletes, coaches, audiences and fans are important stakeholders to CTWA. However, the wrestlers are under the conducts of their coaches, CTWA has no direct access to them, unless their information of needs and expectations is being passed through their coaches. This means that it is difficult for CTWA to understand what wrestlers really need.

✚ Rules and tasks, roles and responsibilities

Associated with AAWC and FILA, CTWA has the right to enter wrestlers to take part in competitions, such as regional and international tournaments and championships in Asia and other foreign places, and Commonwealth Games in the country. Another important task of CTWA is to be an impetus to raise the technic and skill level of wrestling in Taiwan.

¹⁵ <http://pub.mlc.edu.tw/index.jsp?unitid=002730>

One of the most important tasks of CTWA right now is to:

- ✧ **Advocate and promote activities of “Reinstatement of Wrestling in 2020 Olympics” and “Together We Will Succeed!” in Taiwan.** And then,
- ✧ Host national and international wrestling competitions.
- ✧ Upgrade the level of the technic and skills of wrestling.
- ✧ Make recommendations and qualification evaluations and accreditations of the representative teams to the international competitions to meet the qualification for entering competitions.
- ✧ Organize and train the national teams to participate in the international competitions.
- ✧ Improve commonwealth of civilians by playing wrestling. Wrestling for all.
- ✧ Implement and upgrade the wrestling facilities and equipment.

The roles and responsibilities of CTWA are:

- ✧ **Collaborate with AAWC and FILA to save wrestling in the Olympics for good.**
- ✧ Being an impetus of wrestling activities.
- ✧ Collaborate with Department of Physical Education, the Ministry of Education to train and improve coaches, referees and players under the government’s acts along with relative rules.
- ✧ Collaborate with school programs to develop wrestling through grassroots sport activities.
- ✧ Collaborate with CTOC in representing Taiwan to international competitions, congress and conferences and academic workshops, etc.

Goals and purposes

- ✧ To be an independent sport organization and operate independently from political pressures, ethnic discrimination and of any other kind. Let sport be sport.
- ✧ Increase the international exchange of expertise, technic and unique wrestling culture by hosting international events, symposiums, congresses and conventions.
- ✧ Develop and promote female wrestling to be one of the national sport activities.
- ✧ Elevate sportsmanship, such as play true and anti-doping, peace and excellence which connected with the spirit of FILA and Olympism.

CTWA must further collaborate with AAWC and FILA to develop and promote the wrestling movement through wrestling activities as well as educational systems and programs to reinstate wrestling in the 2020 Olympics and for good. Do not let others extinguish the hopes of the young wrestlers who take 2020 Olympic Games for their first wrestling stage.

The programs to reach these objectives are various as follow:

- ✧ Hosting programs, seminars and courses concerning referees, coaches and players.
- ✧ Selecting qualified athletes and coaches, referees and administration staffs to attend the international seminars, symposiums or train tours overseas.
- ✧ Developing Olympism, sportsmanship and wrestling grassroots education, including women’s, through school system and games.
- ✧ Sending delegations to attend sessions, conferences and congress hold by international wrestling organizations.

The personnel structure and governance of CTWA

The personnel structure of CTWA has evolved since the year it was established in 1993 into the scale of nowadays. The present structure is adequate due to the contribution of some part-time personnel and volunteers. An office is maintained by the 2 paid staffs, the administration staff and the treasurer are on a full-time basis.

The General Assembly of CTWA meets annually in November in which the strategic decision-making body lies. The Executive Board comprises 35 members elected by the General Assembly; one of the 35 executive members is elected as the president and 4 as deputy presidents by the board members. The Executive Board members meet once a month to discuss and make recommendations and strategic decisions. They meet non-periodically in case of urgency and necessity. With the authorities that the General Assembly bestowed, the Executive Board has duties and obligations to report what CTWA has done in the previously year to the General Assembly. The 11 superintendents are responsible for the inspection and correction of the operation of the organization. When referees, coaches and players encounter some problems about technic, discipline about violation or something good and excellent done by these relating people required encouragement and award, which will be send to the committees to deal with. In addition, the Executive Board is inquired inspections from the Superintendents to prevent from any corruption or illegalities.

The programs of CTWA have evolved smoothly over the years. Staffs are responsible for each of the programs understand clearly and are able to operate these programs efficiently.

Monthly financial report, including receipts, payments account, bills of utilities and rental payment and salary of employees, is presented to the Executive Board monthly meeting. So does the Annual financial report present to the General Assembly once a year. The financial administration operation is under the relating taxes laws and regulations of the country. In the meanwhile, the annual balance sheet, income and expenditure, payment and receipts for each calendar year need to be audited by an approved financial firm which is certificated by the government.

As for other stakeholders, CTWA focuses on referees, coaches, players and public sector. To those who are not at the core areas of CTWA, such as spectators and sponsors have no direct influence or suggestion to the organization. However, CTWA cooperates with short-term sponsors for some specific and big events instead of long-term ones. Therefore, CTWA cannot make both ends meet from time to time.

Website Information Management and Information Technologies

The website provides information for teams and coaches and referees to participate in courses, seminar, training programs, and qualification certificated provided by CTWA. Also, CTWA offers information about domestic credits and yearly calendar with major vents for the public to follow up. The information about competitions and programs and relating activities are revealed on the website, too. The website doesn’t provide information about CTWA history, vision, and mission; the minutes of annual report; the personnel structure and their duties of the positions. CTWA neither makes good use of the website to make connections with the stakeholders outside the core areas, nor provides links to other sport organizations or public sectors, which keeps the general public from browsing other information. Thus, the website of CTWA is deficient in connection with the non-central stakeholders.

The Plights That CTWA Encounter

- ✧ The shortage of elite athletes and coaches. Some wrestlers are forced to retire from training due to family poverty.
- ✧ The shortage of budgets to subsidize those wrestlers who are in need.
- ✧ The shortage of international sport affairs administrators and staffs good at English.

To improve these situations, CTWA is suggested be in search of sponsors actively to help the elite wrestlers in poverty. Re-examine methods by which how budgets distributed and reform the ways to achieve a better situation. To avoid the above situations, CTWA should cooperate with college and university students majoring in sport management or sport industry governance as volunteers to assist the daily affairs that concerning English and international sport affairs. On the one hand, CTWA has more voluntary force to assist the international affairs without paying more salaries; on the other hand, students get the opportunities for internship before they graduate.

◆ Conclusion

This case study demonstrate that how an sport organization can be examined and considered by its operation environment, personnel structure, core value including vision and mission, roles and responsibilities, rules and tasks, goals and purposes. Yet, CTWA has some defects need to be corrected, mended and improved. Take the financial aspect for example, though it gains subsidy from the public sector every year that does not mean the sport organization need not to raise its own capital to run smoothly in order to prevent from running out of budgets. In terms of the website on which provides the information about domestic competitions. It lacks of the latest information about international wrestling activities. How could CTWA increase the wrestling populations if spectators who are interested in wrestling activities via Internet to follow up?

Last but not least, the good governance of a sport organization should in line with integrated personnel, transparent, and steady finance as well as strategic marketing. CTWA, as a national solely wrestling sport organization is in need of not only the improvement of its website information system but also its way of financial operating regards to budgets making. To wrap up, in order to improve and achieve the goals and purposes that have mentioned above, strategic marketing and strategic governance are imperative works for the Executive Board members to do immediately. Thus, CTWA will be sustainable for another twenty years and beyond.

#29

REVIEWS AND COMPARISONS PHYSIOLOGICAL AND PERFORMANCE RESPONSES OF WRESTLERS TO RAPID AND GRADUAL WEIGHT LOSS METHODS

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PURPOSE: Weight maintenance is much more essential for better performance and more desirable results in sport matches such as wrestling, weightlifting and judo. Failures in weight management have led to vast research on the mechanisms which are involved in this phenomenon. Weight control and the type of weight loss methods used to reach the ideal weight, are important factors in wrestling, and these methods have also a great impact on the competitive performance of wrestlers and their sport lifespan. According to several reports about rapid weight loss, it has been found that despite the repeated warnings from medical and sports organizations and the well documented destructive effects of rapid weight loss methods on physiological organs of the body, there is a high prevalence of use among wrestlers, including high school, collegiate and international style wrestlers. These rapid methods result in weight loss by 3 to 6 percent, in the interval time of 24 to 72 hours before the competition, in order to reach their weight class limit. It has also reported that 3% to 20% of weight loss can happen in pre-seasons of last days or the day before weigh in. There have been deaths due to the utilization of these methods. Hence, the aim of this study was to review of evidence which has been carried out in the field of weight loss methods, including rapid weight loss, traditional and gradual methods and document the effects on the performance and physiological variables in wrestlers. Hence, we compared these methods and provided the best method based on current scientific evidence.

METHODS: Numerous studies have been conducted on the problem of weight loss in athletes. These studies have been conducted in different methods, including: poor diet (severe and gradual food restriction), changes in eating habits of athletes, dehydration from intense exercise, limiting drinking water, impermeable clothing, warm environment (saunas, steam room), diuretic pills and vomiting. Hence, several studies have demonstrated that functional and physiological variables of wrestlers were destroyed by rapid weight loss methods. Among these methods, the only method of weight loss which has been promising to solve this dilemma is gradual weight loss (twelve-day). It has been shown that this method had no adverse effects on the body's performance and physiological variables of elite wrestlers compared to those who used rapid weight loss methods, respectively. Then, subsequent studies used this method (twelve-day) plus aerobic exercise on overweight and obese individuals and confirmed their findings. Furthermore, recently, it has shown that twelve-day weight loss method which was performed by elite wrestlers, it also had no significant effect on AgRP levels (a powerful orexigenic peptide which is secreted by the arcuate nucleus of the hypothalamus, and plays an important role in weight control). This method also decreased body fat percentage and body weight, whereas rapid weight loss led to decreased body weight, increased AgRP levels and unchanged body fat percentage. Accordingly, it should be acknowledged that the twelve-day method is more effective and the best method observed at the present time. **FINDINGS:** We found that traditional methods alone or together have deleterious effects on cardiovascular function, electrical activity, thermal regulation, renal function, electrolyte balance, body composition, muscular strength and endurance, aerobic performance, vigor, short-term memory and cognitive-perceptual. These methods also increase energy disorders and increases brain neuropeptide of AgRP which involved in appetite, energy balance and weight management. The method of gradual weight loss (twelve-day) did not cause a reduction of muscular strength and endurance, but also it improves body fat percentage and leads to stability of resting plasma IL-6 and brain neuropeptide of AgRP levels. **CONCLUSION:** Many studies of weight loss have shown the negative effects of rapid weight loss and traditional protocols on physiological function and athletic performance of wrestlers. Hence, utilize these methods will lead to decline of sport's lifetime and health of wrestlers and will encounter them with serious risks. Among these, the twelve-day weight loss program which is done before the competition, may be a suitable method to replace the traditional methods. Hence, this article attempted to review the scientific evidence of weight loss methods in wrestling, highlighting the risks which are caused by rapid weight loss, and also suggested the best weight loss methods considering scientific evidence to coaches and athletes.

#30

ANALYSIS OF WRESTLING COMPETITION AT THE WORLD UNIVERSITY GAMES-KAZAN, 2013

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PURPOSE: This work is intended to contribute to the arguments for the inclusion of wrestling in the regular program of the World University Games. **METHODS:** Descriptive data was collected relating to the wrestling participants of World University Games 2013 and their sports results. **RESULTS:** The data collected described the prior achievements of all wrestling participants, as well as their results in the current competition. **CONCLUSIONS:** The main conclusion is that the wrestling program at the University Games was of a very high quality. Evidence for this is that 50% of the wrestlers entered have been medalists at the highest level official international competitions: Olympic Games, World Championships, and Continental championships in either the senior, juniors or cadets level. It is important to point out that out of the 90 senior medal winners at the Olympic Games, World and the Continental Championships who participated in the University Games 2013, a total of 48 of these athletes (53.33%) remained without a medal. Based on these valuable data, it is hoped that the Executive Committee of FISU take action involving wrestling and add the sport to the official program of the University Games. Adding to this information, is the fact that FILA has already organized 10 Student world championships.

#31

EFFECT OF AGING ON THE MENTAL SKILLS OF VETERAN FREE STYLE WRESTLERS

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The aim of this project is to investigate the effect of aging on the mental skills of free-style veteran wrestlers. From 400 wrestlers participating in the veterans national championships held in 2009, 77 wrestlers were randomly selected from five age categories: (35-40), (40-45), (45-50), (50-55), and (55<). They completed the Ottawa Mental Skills Assessment Test (OMSAT3). This questionnaire was created by Durand Bush and Salmela in 1995 and the Persian version was validated by Sanati Monfared in 2006. This questionnaire consists of 48 questions which assesses both basic psychological skills (purpose, selection of confidence, commitment), bodily mind (response to stress, fear, control, relaxation, refreshment) and cognitive skills (concentration, re-concentration, visualization, mental exercises, match planning). The mental skills of free-style veteran wrestlers at various ages were at an optimal level. Results of Multivariate Analysis Of Variance (MANOVA) did not demonstrate any significant difference between in the basic psychological skills, cognitive, and psychological skills of wrestlers ($p > 0.05$) within various ages. Therefore, the aging process does not have a significant impact on the mental skills of free style wrestlers.

#32

FACTORS AFFECTING THE SUCCESS OF THE IRANIAN NATIONAL GRECO ROMAN WRESTLING TEAM AT THE LONDON OLYMPIC GAMES

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Purpose: the purpose of this research was to identify the effective factors associated with the success of Iranian national Greco Roman team in Olympic competition in London 2012. Wrestling draws a great amount of attention from millions of people in Iran. What were the factors that led to the achievement of the Iranian greco roman wrestling team in winning 3 gold medals. This research studies and compares the factors which contributed to the success of this team. **Methodology:** the method for this research is a comparative description of the perceptions of the greco roman team and trainers (5 coaches and 6 athletes) of the 2012 Olympic team. These 11 subjects completed a questionnaire developed earlier that includes four effective factors. The validity has been established by way of analysis of experts in wrestling and the validity was established with a Cronbach's Alpha test ($\alpha = 0.91$). The means of the questionnaire research that was constructed by the researcher included 4 effective factors (physical fitness - mental - facilities - management) Analysis of the data distribution was performed through the use of a Kolmogorov-Smirnov test which indicated that the data distribution was normal, and therefore a t test was subsequently used in the analysis ($p < 0.05$). **Findings:** All four factors were deemed as effective by this group the success of Iranian national greco roman team benefited from suitable levels of factors related to physical fitness, mental, facilities, and management, indicating that these factors had a role in the success of the team. **Conclusion:** all factors contributed to the success of Iranian national greco roman team in the Olympic Greco roman wrestling competition in London 2012. **Key words:** success- greco roman- olympic 2012 London

#33

EFFECTS OF SHORT-TERM CREATINE MONOHYDRATE SUPPLEMENTATION ON A SINGLE BOUT OF RESISTANCE EXERCISE INDUCED CELLULAR DAMAGE IN MALE WRESTLERS

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PURPOSE: The purpose of this study was conducted to identify the effect of short-term creatine(Cr) supplementation and a session of resistance exercise on total serum cellular damage indices changes (Creatine Kinase & Lactate Dehydrogenase) in male wrestlers. **METHODS:** Eighteen collegiate young male wrestlers in a quasi-experimental, randomized and double-blind designs were allocated equally into supplement and placebo groups. After six consecutive days of supplementation (0.3 g.kg.day Cr or dextrose), all subjects participated in a single session of a circuit resistance exercise protocol (with 80% 1-RM in 3 sets with 6 repetition) of six stations. Changes in cellular damage indices were determined in three stages (before and after the supplement stage, and 24 hours after the exercise protocol). The normal data were expressed as mean (\pm SD) and analysis of variance (ANOVA) with Bonferroni and independent t test at $\alpha \leq 0.05$. **RESULTS:** The results show that the creatine loading has only a significant effect on the basal total serum CK ($P < 0.05$). Moreover, the total serum CK and LDH in both groups (supplement & placebo) were significantly increased 24 hours after the resistance exercise ($P < 0.05$). However, the change range of the cellular damage indices 24 hours in supplement group was insignificantly lower than in placebo group ($P > 0.05$). **CONCLUSION:** From the levels total serum Creatine Kinase there was no effect of creatine on 24 hours indicators of cellular damage in male wrestler after the resistance exercise.

KEYWORDS: Creatine monohydrate, Resistance exercise, Creatine Kinase, Lactate Dehydrogenase.

Table1. Physical characteristics of the creatine and placebo groups

Variable	Creatine (n=9)	Placebo (n=9)
Age (years)	21.22 \pm 1.48	21.00 \pm 0.70
Weight (kg)	65.56 \pm 2.35	65.89 \pm 1.53
Height (cm)	173.56 \pm 2.18	172.67 \pm 2.34
BMI (kg/m ²)	21.79 \pm 0.67	22.13 \pm 0.73
Body fat (%)	12.33 \pm 2.00	13.00 \pm 1.73
1-RM bench press (kg)	98.23 \pm 6.19	99.41 \pm 5.38
1-RM leg press (kg)	238.60 \pm 7.05	239.10 \pm 8.68

Table2. Changes of serum enzymes activity in the placebo and creatine groups following supplementation

Groups	Stages	CK activities (IU/L)	LDH activities (IU/L)
Creatine group	Before Supplementation	129.11 \pm 22.34	284.44 \pm 29.90
	After Supplementation	141.67 \pm 23.88 †	290.00 \pm 25.51
	24 hours After Exercise	245.67 \pm 17.97 †	403.70 \pm 32.20 †
Placebo group	Before Supplementation	133.56 \pm 14.85	308.11 \pm 22.78
	After Supplementation	137.22 \pm 8.64	304.10 \pm 21.16
	24 hours After Exercise	254.89 \pm 33.14 †	413.22 \pm 26.78 †

† indicated the significant indicators is the study.

#34

THE EFFECT OF A SPORT PROMOTION MIX ON REVENUE OF THE IRAN WRESTLING FEDERATION

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Purpose: The aim of this paper is to examine the effect of a sport promotion mix (Public Relations, Sales Promotion, Sponsorship, Advertising, and Personal Selling) on the revenue of the Iran Wrestling Federation. **Methods:** In this applied research the statistical sample selected by non – random technique among the population of research, that is the coaches, administrators and experts of the Iran Wrestling Federation. Data was collected through a self-administered questionnaire. Data was analyzed through descriptive and inferential statistics: one sample t test, ANOVA, post hoc analysis of Duncan and Tukey. **Findings:** The results show that there is significant relation between the use of promotional tools and revenue of Iran Wrestling Federation. This is the main hypothesis of the research, which is confirmed. Regarding the identification of the most effective tools, the results show that the Personal Selling tool is the most effective, followed in rank by Public Relations and Sponsorship, the third ranked tool is Sales Promotion and the last tool is Advertising. **Conclusion:** The Wrestling Federation of Iran can use promotional tools to earn and increase its financial support and should emphasize the use of the Personal Selling approach. **KEYWORDS:** Sport Marketing, Sport promotion mix, revenue, Public Relation, sales promotion, Sponsorship, advertising, personal selling

#35

THE INVESTIGATION OF THE COMPONENTS OF TEAM IDENTITY AND NATIONAL IDENTITY IN FANS OF IRAN NATIONAL WRESTLING TEAMS

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PURPOSE: The aim of the present study was to investigate team identity and national identity of fans of Iran's national teams of wrestling. **METHODS:** For this purpose, 161 male students of University of Tehran (Fans of Iran National Wrestling Teams) voluntarily participated in this study. The subjects were asked to fill out team identity and national identity using Bob Hier's

questionnaires which has been confirmed in several validity studies; including Bogdanov¹⁶; 2011. The reliability of the study was analyzed via a sample with 30 persons; hence, a reliability was calculated ($\alpha=0.88$). To analyze the data, Friedman test and independent T-Test and analysis-confirmed were used using SPSS V.20 and Amos V.20. **RESULTS:** The results demonstrated that attachment and integration in wrestling fans achieved the highest scores in the following components of team identity respectively: general evaluation, attachment and integration, and awareness while their highest scores were allocated to the following components of national identity respectively: attachment and integration, awareness and general evaluation.

Results of confirmatory factor analysis and Cronbach's alpha calculated for each of the components

Dimensions of identity	Statistical tests	CFA	Cronbach alpha
	Components		
team identity	Public Evaluation	0/52	0/84
	Personal Evaluation	0/67	0/84
	Interconnection	0/74	0/68
	Sense of interdependence	0/64	0/68
	Involvement	0/69	0/82
	Awareness	0/60	0/79
National identity	Public Evaluation	0/55	0/92
	Personal Evaluation	0/55	0/84
	Interconnection	0/55	0/74
	Sense of interdependence	0/69	0/79
	Involvement	0/71	0/79
	Awareness	0/53	0/83

Mean and standard deviation scores of fans and team identity component and National identity

Dimensions of identity	National identity		Team Identity	
	Mean	SD	Mean	SD
Components				
Public Evaluation	3/01	1/8	3/53	0/96
Personal Evaluation	3/56	1/08	3/40	1/12
Interconnection	3/33	0/95	2/60	0/95
Sense of interdependence	3/40	0/97	3/21	1/12
Involvement	3/07	0/95	2/33	1/02
Awareness	3/72	0/87	3/05	1/00

Results of Friedman test for national teams in Fans wrestling

Variables	Components	Fans wrestling	
		Mean	Rank
team identity	Public Evaluation	4/94	1
	Personal Evaluation	2/68	5
	Interconnection	4/85	2
	Sense of interdependence	1/41	6
	Involvement	2/94	4
	Awareness	4/17	3
National identity	Public Evaluation	3/46	3
	Personal Evaluation	2/01	5
	Interconnection	5/60	1
	Sense of interdependence	1/93	6
	Involvement	3/42	2
	Awareness	4/58	4

Keywords: Team Identity, National Identity, Fans, Wrestling

#36

THE STUDY OF THE RELATION BETWEEN GOAL-ORIENTATION AND SPORT ETHIC IN THE IRANIAN YOUNG ELITE WRESTLERS

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PURPOSE: The main aim of the present study is the analysis of the impact of goal-orientation on the sport ethic of young wrestlers of national teams of Iran. **METHODS:** This study is functional and in term of methodology is descriptive. Data gathering was based on fieldwork and the scale used was a questionnaire. The sample was all 24 wrestlers from a junior national team (the age of 18-20) that were present at the wrestling house of Tehran. The scale of sport ethic's questionnaire was the MSOS and the goal-orientation's questionnaire was TEOSQ. In order to collect data and test the research questions, the questionnaire scale called the multidimensional character Sport (MSOS), which was first proposed in 1994 by Valrind and colleagues was used. It uses a five values Likert scale (not at all inconsistent with my behavior, my behavior is consistent with the very low, relatively consistent with my behavior, my behavior is consistent with a very large, it is consistent with my behavior) with 25 closed questions. The questionnaire and its reliability has been established (Cronbach alpha=0.82) obtained by Saye (2007). To analyze the data, Friedman's K-S test, T test of the correlation of Pierson and confirmative factor analysis were used by using SPSS V.20 and Amos V.20. **RESULTS:** based on the results of Friedman test, the ranking of the components of sport ethic of young wrestlers respectively are: 1. Loyalty to the sport, 2. Respect to disciplines and authorities, 3. Respect to the social behaviors, 4. Respect to the competitor, 5. the lack of negative approach in direction of sport performance. In addition, the Pierson Test showed that the goal-orientation has a significant impact ($\alpha = 0.05$) on the levels of sport ethic in the young wrestlers of national team of Iran.

Keywords: Sport ethic, wrestling, goal-orientation, wrestler

#37

SURVEY OF STRENGTH AND CONDITIONING PRACTICES OF MAZANDARAN PROVINCE (IRAN) WRESTLING COACHES

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This study describes the results of a survey of the practices of Mazandaran province wrestling coaches (n= 120). Data were collected through a standard questionnaire. This study examines: the coaches background information, physical fitness testing, flexibility development, speed development, plyometrics, aerobic capacity development, strength/power development. Results showed that wrestling coaches in the province of Mazandaran, used strength (85%), speed (80%), flexibility (63%), agility (47%), and aerobic training (75%) in general and specific preparation phases. All coaches measured fitness factors of their athletes. The wrestling coaches (100%) used speed exercises for speed development, plyometric exercises (100%) for muscle power, stretching before and after practice (90%) and static stretching (84%) in their training programs. Most of the coaches (85%) used special exercise weightlifting (the snatch, the clean and jerk) in resistance training, 75% of the wrestling coaches used aerobic training for development of aerobic capacity. The survey serves as a review and a source of applied information for other wrestling coaches.

Keyword: methods of training, physical fitness, wrestling coaches, fitness tests

#38

APPLICATION OF THE SPORT SPECIFIC MOTOR COORDINATION DEVELOPMENT (SPOSPMCD) ON YOUNG WRESTLERS

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Motor Coordination (MC) is a main factor of early human development (Zimmermann et al. 2002; Kirino & Azumane, 2004) and the training of MC has a positive impact on the development of children's muscle tissue and neural network (Lyakh & Sadowski, 2006). Most of the known MC intervention studies have been limited to the effects of MC training to rehabilitation (Yokohata, 2002; Carraugh, 2004). On the other hand, the importance of MC for sport performance is well recognized by trainers and researchers. Nevertheless, there is still limited research information on the effect of sport specialized MC training on children's motor coordination development. The aim of this study is to present a sport specific MC program (SpoSpeMCP) for wrestling (Kambas, Barbas, Venetsanou, 2013) and to check its effectiveness on the MC performance of preschool children. A sample of 40 children between 5-6 years were divided in experimental (EG: n=18) and control group (CG: n=22). Children's MC was evaluated with a specialized instrument for the assessment of body coordination, the KTK (Kiphard & Schilling, 2006). The MC program followed by the EG was carried out four times/week/60min. and was based at Hirtz's (1985) concept of coordination variables (space and time orientation, kinesthetical differentiation, response ability, rhythmic ability and static & dynamic balance). Children of the CG followed a typical program for introduction in wrestling. Results showed that

both groups (EG & CG) significantly improved their MC ($p<.05$) but the improvement on EG was greater ($p<.001$). Results strengthen the idea of a SpoSpeMCD with training concepts and contents based on Hirtz's coordination variables. However there is a need for retesting the idea with a greater sample size in a longitudinal design.

#39

EFFECTS OF TRAINING CAMPS ON LIFE SKILLS ACQUISITION AMONG CADET- AND JUNIOR-AGE JAPANESE INTERNATIONAL WRESTLERS

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PURPOSE: We examined the effects of training camp participation on the acquisition of life skills (LS) among cadet- and junior-age Japanese international wrestlers. A previous study showed that LS levels have a positive effect on competition performance, as well as the realization of employment goals (Shimizu & Shimamoto, 2012a, 2012b). In order to establish a solid grounding in athletics, these camps conducted not only strength training, morphometrics, and fitness measurements but also classroom education (such as Olympic education), which had previously been ignored.

METHODS: The subjects of the present study were 31 cadet- (15–17) and 18 junior-age (17–20) Japanese international wrestlers. A LS survey was administered before and after a three-day training camp; LS acquisition levels before and after the camp were compared. The survey used was the Appraisal Scale of Required Life Skills for College Student Athletes (Shimamoto et al., 2013), which assesses LS necessary for athletes on the basis of 10 different aspects (setting goals, thinking carefully, communicating, etc.).

RESULTS: Analyses of chronological changes in all skills showed a significant improvement in “thinking carefully,” “appreciating others,” and “always making one’s best efforts” in both age groups. Cadets also showed an improvement in “taking responsibility for one’s own behavior” and “maintaining physical health and well-being,” while juniors also showed improvement in “communicating.”

CONCLUSIONS: These changes were inferred to reflect the acquisition of LS by adapting to the highly competitive environment of international wrestler training camps and in attending classroom education lectures. The results of the present study suggested that training camps that include a classroom education program are important for acquiring LS.

#40

CASE STUDIES OF WEIGHT CYCLING AND MENSTRUATION IN FEMALE JAPANESE WRESTLERS

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PURPOSE: Wrestling is a sport that requires highly frequent and high-intensity training in order to achieve victory. In addition, because wrestling is divided by weight class, many wrestlers practice weight control (reduction) in order to compete in an advantageous weight class. Female athletes face the problem of exercise-induced amenorrhea, in which highly frequent and high-intensity training results in abnormalities in menstruation and reproductive and physiological function. However, the relationship between rapid weight reduction throughout the competition season and menstruation in female wrestlers has not yet been demonstrated. Therefore, the present study continuously monitored body weight changes in female Japanese wrestlers throughout the competition season in order to grasp the actual state of their weight reduction and demonstrate its relationship with menstruation.

METHODS: The subjects of the present study were five female wrestlers with high game level who have achieved high rankings in major domestic and international tournaments. The study covered the 2011 season, which is a period of 265 days. We conducted a factual survey on weight reduction and surveys related to body weight, body composition, and menstruation.

RESULTS: Analyses of surveys related to body composition and menstruation showed that, during the season, the subjects went through four to five weight cycles, in which their body weight increased and decreased rapidly before and after matches. The subjects menstruated an average of 11 times per year, with one subject reporting an abnormal menstrual cycle. In addition, the subjects with normal menstruation showed a 5.8% relative reduction in body weight, whereas the subject with abnormal menstruation showed a relative reduction of 11.1%.

CONCLUSIONS: Female Japanese wrestlers were observed to practice weight cycling throughout the competition season. Furthermore, a case study of the subject with an abnormal menstruation cycle suggested that repeated excessive weight reduction may affect the menstrual cycle.

#41

SPORT SPECIFIC REHABILITATION OF WRESTLERS FOLLOWING AN ACL INJURY

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PURPOSE: Wrestling is an acyclic sport, which requires special technical, tactical, conditional and coordination skills. Improper physical conditioning or inadequate concentration can lead to injury. Of the injuries requiring surgical intervention among wrestlers, the ACL tear is extremely important because of its high occurrence rate, consequences and treatment needs. Our aim was to elaborate a rehabilitation program for wrestlers which also can serve as a protocol after proper studies.

METHODS: In our study we present a rehabilitation program that facilitates the return of injured wrestlers to competitive sport following an ACL surgery. This program was created based on our own experiences along with existing medical guidelines. Our study also addresses existing gaps in related medical literature of this field. **RESULTS:** We created a program which helps to provide a stable, loadable, asymptomatic joint. This protocol also serves as an injury prevention of getting injured. This program contains the elements of basic endurance sports and also includes wrestling specific exercises which prepares the knee for dangerous movements. **CONCLUSION:** Wrestling is an acyclic sport, which requires special technical, tactical, conditional and coordination skills. The importance of the knee injuries in our sport is showed by the fact, that 65% of these injuries need surgical procedure. On the other hand ACL tear is about 9, 1% of all knee trauma. The basic sports (cycling, swimming, running) are sufficient to improve the general endurance. The so-called "sport specific" exercises are applicable after the end of general rehabilitation, but before return to train.

#42

ANXIETY AND PERFECTIONISM IN HIGH SCHOOL WRESTLERS

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Levels of anxiety can influence athletes in performance settings. Cognitive anxiety is the internal response of an individual to increased anxiety characterized by worry, negative self-evaluation, and negative expectations about performance. Cognitive anxiety has been shown to be related to the performance of an athlete. Perfectionism is a tendency characterized by perfectionistic personality traits and cognitive preoccupation with perfectionistic outcomes. Anxiety and perfectionism are positively correlated with one another and are associated with diminished performances. The study was designed to explore the relationship between perfectionism and anxiety, in high school wrestlers (N = 120). The subjects were 120 high school wrestlers participating in a summer wrestling tournament. Anxiety was measured by the CSAI-2R. (from: Cox, R. H., Martens, M. P., & Russell. (2003). Measuring anxiety in athletics: the revised competitive state anxiety inventory-2) Subscales of Anxiety on the CSAI-2R include State Cognitive Anxiety, State Somatic Anxiety, and State Self-Confidence. The Frost Multi-Dimensional Perfectionism Scale (FMPS; Frost, Marten, Lahart, & Rosenblate, 1990) delineates perfectionism into six different subscales in which one can strive for perfection: Personal Standards, Organization, Concern Over Mistakes, Doubts About Actions, Parental Criticism, and Parental Expectations. Wrestlers completed the instruments one hour prior to competition in a tournament. Significant ($p < .05$) positive linear relationships were found between correlations of State Somatic Anxiety and Concern Over Mistakes ($r = .32$), Parental Criticism ($r = .22$), and Doubts About Actions ($r = .29$). State Cognitive Anxiety was positively related with Concern Over Mistakes, Doubt About Actions, Parental Criticism, Parental Expectations, and Personal Standards. State Self-Confidence was positively related with Personal Standards and Organization. The relationship between State Cognitive Anxiety and Concern Over Mistakes was particularly strong as over 25% of the variance was accounted for exclusively by the two variables.

Pearson Product-Moment Correlation Coefficients for subscales on Anxiety with the subscales of Perfectionism.

Variables	r	r ²	p
State Somatic Anxiety			
Concern Over Mistakes	.32	.10	< .00
Personal Standards	.13	.02	> .05
Parental Expectations	.18	.03	> .05
Parental Criticism	.22	.05	< .05
Doubts About Actions	.29	.08	< .05
Organization	.10	.01	> .05
State Cognitive Anxiety			
Concern Over Mistakes	.53	.28	< .05
Personal Standards	.23	.05	< .05
Parental Expectations	.34	.12	< .05
Parental Criticism	.40	.16	< .05
Doubts About Actions	.42	.18	< .05
Organization	.05	.00	> .05
State Self-Confidence			
Concern Over Mistakes	-.06	.00	> .05
Personal Standards	.33	.11	< .05
Parental Expectations	.12	.01	> .05
Parental Criticism	-.05	.00	> .05
Doubts About Actions	-.05	.00	> .05
Organization	.20	.04	< .05

#43

EFFECT OF CONCURRENT TRAINING ON BLOOD TESTOSTERONE/CORTISOL RATIO AND MUSCULAR FITNESS IN MALE WRESTLERS

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This study aims to examine the effect of concurrent training on blood testosterone/cortisol ratio and muscular fitness in male wrestlers. 24 wrestlers ranged from 19 to 22 were selected voluntarily, randomly and systematically, and were grouped into endurance training (ET, N=8), strength training (ST, N=8), and concurrent training (CT, N=8). These groups performed their training program three times a week. Data analysis has been done through intra-group variance procedure with repetitive measurements. To compare the degree of development in muscular fitness, the t test has been used to compare pre-test to post-test. Level of significance was considered to be ($P > 0.05$). Density of serum hormone was measured in three stages and collected at 8 a.m. The findings indicated that testosterone/cortisol ratio decreased by 125.80% in the endurance group ($p=0.00$), 78.12% in concurrent group ($p=0.04$). Strength group showed a significant rise in all movements, endurance group showed a significant decrease in bench press, lateral pull down and shoulder. The concurrent group showed a significant increase in all movements except squat ($p < 0.05$). There was no significant difference in comparison of muscular fitness among these three groups in bench press ($p=0.000$), lateral pull down ($p=0.00$), and shoulder ($p=0.00$). **Conclusion:** concurrent training can cause a catabolic condition in a rising trend to decrease which has been obtained from performing endurance movements. Likewise, it is one of the factors that can prevent a decrease in muscular strength which has been obtained from endurance training in wrestlers.

Key words: concurrent training, male wrestlers, testosterone/cortisol ratio, muscular fitness.

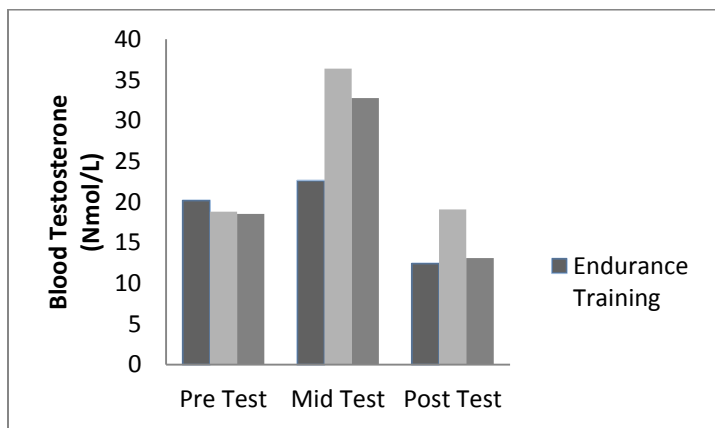


Figure 1: Testosterone A significant difference between (TT) pre-test and post-test in endurance and concurrent groups ($P=0.01$).

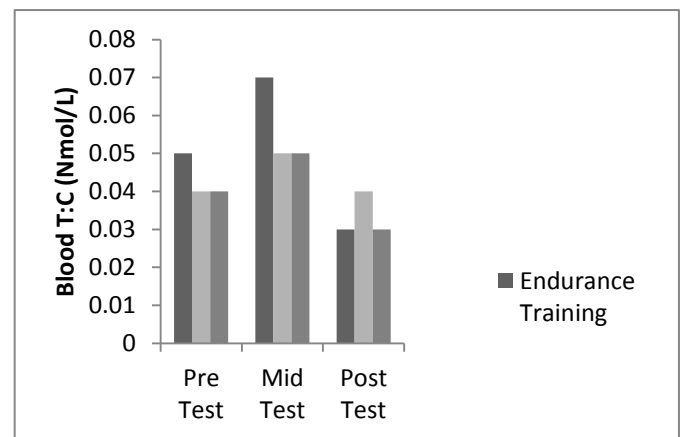


Figure 3: Testosterone to cortisol ratio. Significant difference between pre-test and post-test in endurance and concurrent groups ($P=0.01$).

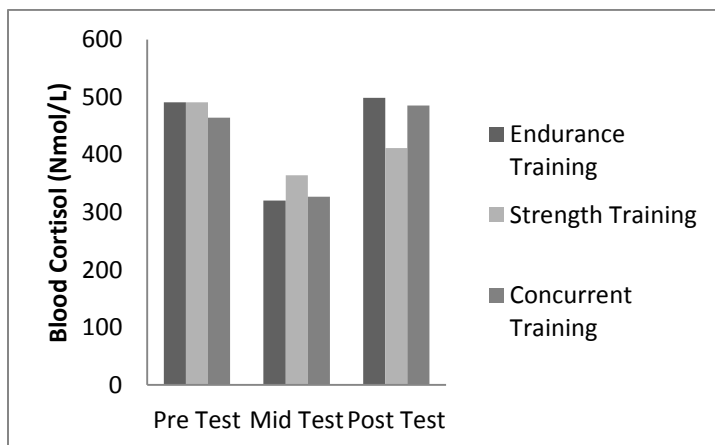


Figure 2: Cortisol . A significant difference between pre-test and post-test in endurance and concurrent groups ($P=0.01$).

#44

DYNAMIC POSTURAL CONTROL OF IRANIAN ANCIENT SPORT “ZORKHANEH WRESTLERS” COMPARED TO GYMNASTS AND GENERAL SPORT TRAINERS

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Dynamic balance performance is an essential neuromuscular skill in wrestling sport. In attack or in defensive conditions postural perturbation is imposed on the athlete. Therefore, the ability to recover optimum posture has important role in successful technical maneuver. Lack of optimum balance performance may lead the athletes to different injuries and game loses. Zorkhaneh sport with more than 2000 years of history is involved with wrestling techniques. The objective of this study was to compare balance performance of Zorkhaneh wrestlers, gymnasts, common sport trainers and sedentary individuals in a dynamic sudden postural perturbation test.

Methods: Fourteen zorkhaneh wrestlers, 14 common sports trainer, 10 gymnasts, and 14 sedentary individuals with similar age, height and mass (age: $28.2_{\text{yrs}} \pm 7.9_{\text{yrs}}$, height: $176.3_{\text{cm}} \pm 6.2_{\text{cm}}$, mass: $77.1_{\text{kg}} \pm 14.3_{\text{kg}}$) were studied. A motion analysis system with 3 Falcon cameras (Fig 1) was used to track the markers' image during the test. Then the data were processed and the marker's positions and the joints motions were calculated. In order to identify head, trunk, hip, thigh, leg and foot, two spherical reflective markers were put on each segment. Subject stood on a 4 wheel cart in up-right standing posture. Then the cart was accelerated to forward and backward directions using an accelerator mechanism. Using K-means algorithm, the motion pattern were classified. MANOVA technique was used for statistical analysis. Significant level of $p \leq 0.05$ was considered for all statistical analysis.

Results: In forward acceleration with eyes open, the dorsiflexion, trunk flexion and head flexion were similar between groups. But, Knee flexion of zorkhaneh wrestlers ($17.2^\circ \pm 8.4^\circ$) and gymnasts ($15.1^\circ \pm 6.5^\circ$) were significantly ($p=0.001$) smaller than that in general sport athletes ($27.4^\circ \pm 9.3^\circ$), control subjects ($32.7^\circ \pm 12.3^\circ$) implying a better balance performance in these groups than the other groups. Also, the number of steps needed to maintain balance after the perturbation, was significantly smaller in gymnasts and zorkhaneh wrestlers compared to other groups. Forward acceleration resulted in a greater perturbation in knee joint than the backward perturbation.

Conclusion: Gymnasts and zorkhaneh wrestlers had a similar balance recovery. Postural control in gymnasts and zorkhaneh athletes were better than in common sport and control groups. This study suggests that zorkhaneh sport can perfectly improve the dynamic balance performance in athletes and its balance components may be beneficial for standard wrestlers.

Keywords: Zorkhaneh wrestlers, dynamic balance, perturbation



Fig 1: The camera setup and the subject standing on the cart

#45

WRESTLERS' PATTERN OF PERCEIVING PROFESSIONAL SKILLS OF THEIR COACHES

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SUMMARY: Purpose of this research is to determine pattern of wrestlers perceiving professional skills of their coaches, and to identify positive and negative behaviors of coaches. Workgroup of the study consists of 69 voluntary athletes who are between ages 16 and 34 and wrestling regularly in different provinces. Data is collected by having face-to-face interviews. Results of this research reveal that early aged athletes are evaluating their coaches more positively. Statistically significant difference is determined in athletes determining their coaches in technical development, competition and social sub-dimensions according to the variable of sporting age. More negative evaluations are seen as the sporting age increases in the technical and competition dimensions. It is determined that students receiving education in a university evaluates their coaches more negatively. Athletes participating in the study have stated that they are pleased with their coaches in many ways. However, it is determined that there is no long-term written program on subjects of enhancement by special exercises in order to develop the correct technique and that coaches are not qualified enough in analyzing the competitors. **RESULT AND DISCUSSION**

In this study, opinions of wrestlers about their style of perceiving professional skills of the coaches are examined. With this purpose, scale filled out by the athletes and results of interviews made after filling out the scale are evaluated together. 72.5% of the participants being at age 21 and above gave confidence that the replies given to the questions are given with their own free will without any prejudice, thus the replies are correct. It is determined that 42.1% and 47.8% of the participants are receiving education respectively in high school and university, thus athletes with whom interviews are made are educated. However, it is established that students studying in the university are evaluating their coaches more negatively. Thus, 81% of the athletes interviewed having at least 7 years of sports background is an indication that they have the broadness of carrying out an evaluation. In the evaluation of coaches by the athletes participating in the study in terms of technical development; no problem is detected on the subjects of displaying the techniques, correction of faults and giving opportunity and time for the formation of a style specific to the athlete. However, coaches are found inefficient in enhancing with specific exercises in order to develop the correct technique and teaching the tactic of the technique. Thomas and Lee (1991) have stated that a relation based on trust should be established between coach and athlete and they should give opportunity to each other for the improvement of their creativeness and their development [12]. United Kingdom Coaching Strategy Association (2002) has defined the coach as informative, assessor, advisor, researcher, instructor, supervisor, organizer, assistive and motivator; and specified some of the skills that he/she should have to fulfill these roles like this: He/she should comprehend learning process and training principles well, be able to detect skills of the young generation, plan training programs satisfying requirements of each athlete, and should lend assistance to athletes to acquire new skills [13]. Also American National Youth Sports Coaches Association (2003) have indicated in their code of conduct that a coach should improve himself/herself continuously in order to have the infrastructure required to teach the skills, strategies of instruction and evaluation techniques related with his/her branch [14]. As a result of statistical analysis, it is seen that athletes at a younger age are evaluating their coaches more positively in comparison to other age groups. This situation is detected as athletes at younger ages do not have the required experience to make comparison between coaches. When athletes evaluated their coaches in terms of physique and condition, they declared that such exercises are made when there is short time to matches. They especially stated that there is no long-term written program and no program is applied regularly. Preparing training program is one of the main purposes of sports organizations in some countries. For example, United States National Olympic Committee expresses that a coach should prepare efficient and required training programs [15]. Replies of the athletes to questions related with their evaluations of coaches in terms of preparing for competitions and during competitions had some contradictions within itself. It is observed that athletes have made evaluations on a coarse basis, and they weren't very considerate. They are stating that simple analyses, such as making shaking up from right side, no beating play from above, are made when evaluating their competitors as long as it is not detailed. They are stating that tactics given during the match are not heard much and they are not comprehensible. Aak and Aak (2001) are expressing that short instructions should be given in a short time during competitions. For example, instructions like "perform the technique quicker" or "raise your head" can be given; instructions other than these confuse the athletes [16]. As a result of statistical analysis realized it draws attention that coach evaluations are more negative in the technical development and competition dimensions as the sporting age increases. Aak and Aak (2001) states that coach should plan tactic exercises before the competition and should work coordinately with the athletes. First of all athlete should believe and rely on his/her coach. However, this is not so possible today. It is observed that top-level athletes place more importance to the tactic understanding of persons to whom they rely on most. Coaches carrying on duty in national teams have expressed that they are planning tactic exercises in general, however they leave the decision of competition tactic to the athlete [16].

It is determined that the attribute of the wrestlers' coaches that is the most influential on the athletes is their social aspects. Most of the athletes participating in the study have expressed that they are pleased with social aspects of the coaches who are training them. However, they expressed that none of the coaches celebrated their birthday and few gave presents to their athletes because of their success.

In the evaluations of coaches by wrestlers in terms of their social aspects, it is determined that the attribute of coaches of wrestling that is the most influential on the athletes is their social aspects. Big portion of the athletes participating in the study has expressed that they are happy about social aspects of their coaches. However, they expressed that none of the coaches celebrated their birthday and few gave presents to their athletes because of their success. Wampbell and Jones (1994) indicate that awarding the athletes is the most efficient factor among the motivating factors. Coaches should be careful about the punishments and rewards they shall give. They expressed that rewards and punishments given wrongly may influence performances of the athletes in a negative way [17]. It is considered that participant athletes wrestle crudely, they do not go into detail, they are far from certain terms and they perceive wrestling different from socialization or being social. Thus this consideration is seen as the obstacle that prevents them to make detailed evaluations. As a result, it is obvious that coaches do not have professional skills to train athletes who shall be champions in world and Olympic Games and to make long-term athlete training plans. It is important to test professional skills of all wrestling coaches and to correct the imperfections by means of a continuous training. Also authorizing the coaches according to their knowledge and skills is another important subject.

Key Words: Wrestling, Coaching Skills, Coach Athlete Relationship.

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Method, which includes a) Participants, b) Instruments-Tests, c) Procedures, d) Research design, and e) Statistical analysis.

RESULTS

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PRACTICAL IMPLICATIONS/ADVICE FOR ATHLETES AND COACHES

REFERENCES

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3. FREISCHLAG, J. Weight loss, body composition, and health of high school wrestlers. *Journal of Physical Sports Medicine*, 12, 121-126, 1984.