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DEVELOPMENT TREND OF FREESTYLE WRESTLING: INFLUENCE OF THE RULE CHANGES ON COMPETITIVE ACTIVITY

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ABSTRACT

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

Key words: analysis of competitive activity, wrestling attractiveness, combat sport.

INTRODUCTION

The competitive activity of wrestlers (i.e., wrestling combat) represents the performance of skills and techniques against an opponent in competitive conditions, following the rules of the specific sport. Competitive activity analysis is the basic method that provides data on success in wrestling including indicators of good technical, tactical, psychological, physical and theoretical preparation of wrestlers, as well as their pattern during combat within the boundaries of set rules (Tünnemann, 1996).

Analyzing competitive activity provides an insight into the general characteristics of wrestlers and the specific characteristics of each particular wrestler, which results in being able to identify the mechanism for attaining success. In addition, it allows trends in the development of wrestling to be monitored, in order to control the validity of the rules and their potential improvements (Koropanovski & Jovanović, 2007). New rule changes have always proven to be a great challenge for coaches, wrestlers, officials and performance analysts engaged in the research of the impact of such changes on the further development of sports, coaching and technical, tactical and physical preparation (Lopez-Gonzalez, 2013; Tünnemann, 2013b). However, it is recognized that these changes are sometimes needed in order to improve sport or to increase viewership that could possibly bring in sponsors and investment to certain sports. In that regard, major changes in the rules of wrestling combat occurred in 2013, when the status of wrestling at the Olympics was questioned and revoked.

A partial reason for this decision can be found in studies conducted during the 1990s, which indicated that some leg takedown moves, that were of great importance in wrestling during the 1960s and 1970s, had almost completely disappeared from the technical-tactical repertoire of wrestlers (Shakhmuradov, 1997). Furthermore, it was found that freestyle wrestling relies on relatively simple scoring techniques, which do not carry a high risk (Podlivajev, 1999) and that the number of attractive throws per competition has been in constant decline since the Olympic Games hosted in Barcelona, 1992. Moreover, it was noted that the number of less attractive actions had increased (Tünnemann, 1998). These facts may have contributed to a decrease in the attractiveness of

freestyle wrestling for the spectator. Considering this, the first changes in the rules were introduced after the European Wrestling Championships in 2013. It resulted in a significantly higher percentage of technical pin victories, more points per fight, as well as a significantly higher number of 2-point actions and a decrease in 1-point actions, while the number of 3- and 5-point actions achieved remained unchanged (Tünnemann, 2013a). Although these changes had an effect on the dynamics of wrestling combat, they could not be considered as increasing the attractiveness of the sport (Tünnemann, 2013a).

A new set of rules were again introduced after the 2013 World Wrestling Championships, encouraging athletes to be more active in wrestling matches, while also contributing to a greater understanding of wrestling by a wider audience. The rule changes were aimed at having an impact on physical, technical and tactical preparation in the training process by adjusting them to achieve the best results within the boundaries of the new rules. Afterwards, it was confirmed that all three styles of wrestling moved in a positive direction in terms of fighting activity, but also in the average number of points scored per fight (Tünnemann, 2016; Mykola et al., 2017). On the other hand, through a series of studies, it had been determined that in freestyle wrestling the average number of actions and repertoire of techniques used in the competition did not change significantly, that attractive techniques were insufficiently used and that low risk attack techniques prevailed (Kasum & Marković, 2014; Marković & Dopsaj, 2015; Marković et al., 2017). The number of points was significantly higher due to the higher point value of actions, but the number of successful actions per unit of time has decreased due to the longer duration of the fight. However, more frequent passivities awarded and a higher number of points achieved contributed to a greater match dynamic and attractiveness in freestyle wrestling (Kasum & Marković, 2014; Marković & Dopsaj, 2015; Marković et al., 2017). Although the change of rules preserved wrestling in the family of Olympic sports, the results of previous studies did not provide sufficient forecasts for the effects of their application as the studies were conducted shortly after the implementation of the new rules. The real picture of the effectiveness of the newly introduced rules could be evaluated when coaches and athletes fully adapt physical, technical and tactical preparation of athletes to all match characteristics.

Accordingly, the question raised is whether the new set of rules significantly affected the competitive activity of elite freestyle wrestlers at the major wrestling competitions between 2013 and 2020. The aim of this paper was to investigate the specific influence of the rule changes on the competitive activity of freestyle wrestling and the trend of development of technical and tactical performance indicators of elite freestyle wrestlers. The hypotheses of this study were that the introduction of new rules will have a significant influence on technical and tactical elements of freestyle wrestling combat, that changes will occur over time and that attractiveness parameters will change by increasing attractiveness. The results of this study could offer possible proposals for the further improvement of wrestling as a sport.

METHODS

Procedures: Data regarding match performance was collected by analyzing the official reports and video materials of the fights (<https://unitedworldwrestling.org>) that occurred at the European Wrestling Championships in 2013 (EC2013), before the introduction of the new rules and at the European Wrestling Championships 2014 (EC2014), First European Olympic Games 2015 (FEOG2015) and European Wrestling Championships 2020 (EC2020), after the introduction of new rules. The data were generated from an open access website whereby personal information and the country identification were not used, therefore there were no ethical issues in analyzing or interpreting these data (Morley & Thomas, 2005; Ceylan & Balci, 2017). All the data were recorded directly from the scoreboard so there was no mistake in terms of recording the scores and penalties. Official reports obtained prior and after the introduction of new rules were compared and analyzed for potential longitudinal changes in trends in attaining points, thereby investigating the increase in activeness of wrestlers and the potential increase in attractiveness of the sport of wrestling. This type of research is justified when expert analyses are conducted on a sample of the most important competitions (Koropanovski & Jovanović, 2007).

Sample: The research included 536 freestyle wrestling fights: 129 fights from the EC2013, 127 fights from the EC2014, 146 fights from the FEOG2015 and 134 fights from the EC2020. Six categories were selected from each competition: EC2013 - 55, 66, 74, 84, 96, 120 kg (missing category 60 kg); EC2014 and FEOG2015 (missing category 61 and 70 kg), FEOG 2015 (missing category 61 and 70 kg) and EC2020 - 57, 65, 74, 86, 97 and 125 (missing category 61, 70, 79 and 92 kg).

Variables: Wrestling is an exceptionally dynamic activity for both competitors, with a pronounced change in the pace and rhythm of the fight, as well as changes in offensive and defensive activities (Marković et al, 2017; Marković et al. 2020). Moreover, these tasks could be realized in a standing position or while on the ground, as a planned activity or as a reaction to an opponent's action. Therefore, the identification of indicators of competitive activity in martial arts is a methodologically very complex task and obtaining objective measures of competitive activity needs to be cautiously performed. Considering this, 14 variables were used for objective evaluation of competitive activity of wrestlers that were grouped into the following sets:

General variables

1. Mean duration of the fight, expressed in seconds - FightDuration (s),
2. Type of winning (WinType), by scoring points, technical pin or pin (was not performed by statistical analysis).

Scored points

3. Average number of scored points in technical actions (PTActions),
4. Average number of scored points in awarded penalty (APenalty),
5. Average number of scored points in awarded unsuccessful challenge (FChallenge),
6. Average number of scored points in awarded passivities (APassivities),
7. Total number of scored points - TnPoints.

Performed actions

8. Average number of performed actions worth 1 point (W1point),
9. Average number of performed actions worth 2 points (W2points),
10. Average number of performed actions worth 3, 4 or 5 points (W345points),
11. Total number of performed actions - TnActions.

Fight effectiveness:

12. Average action value (Aver.ActionV) – quotient of total number of points scored only by technical actions and the total number of actions in the fight,
13. Intensity of scored points (Inte.SPoints) – quotient of duration of fights and number of scored points in the fight (seconds/points),
14. Intensity of performed actions (Inte.PActions) – quotient of duration of fights and number of performed actions in the fight (seconds/action).

Statistical Analyses

All statistical analyses were performed using the statistical package for social sciences (IBM, SPSS 20.0). Descriptive statistics included mean (Mean) and standard deviation (Std. Deviation). Differences between competition prior and after the introduction of new rules were analyzed using multiple analysis of variance (MANOVA), followed by the Bonferroni post hoc adjustment for the partial pairwise comparison. Principal component analysis was used to define the key parameters of wrestling attractiveness. The level of statistical significance was set at $p < 0.05$ (Hair et al., 1998).

RESULTS

Table 1 shows the descriptive statistics of all monitored variables. In general, as fight duration significantly increased so did the PTActions and APassivities, leading to a significant increase in TnPoints. Although the TnActions remained unchanged, the W1point and W3,4,5points significantly decreased, while the number of actions for 2 points significantly increased. Furthermore, a significant increase occurred in Aver.ActionV and Inte.PActions, while Inte.SPoints decreased.

Table 1. Descriptive statistics and between-group differences (ANOVA).

Variables		Mean ± Std. Deviation				F
↓	Years:	2013	2014	2015	2020	
FightDuration		254.25±73.27	292.52±93.97	301.60±92.05	320.66±78.49	14.152†
Scored Points	PTAction	6.69±3.46	9.46±4.33	8.72±4.30	8.12±3.81	11.165†
	APenalty	0.01±0.09	0.03±0.22	0.00±0.00	0.03±0.21	1.419
	FChallenge	0.16±0.37	0.10±0.30	0.08±0.28	0.16±0.37	1.993
	APassivities	0.15±0.40	0.50±0.83	0.49±0.70	0.66±0.73	12.949†
	TnPoints	7.01±3.35	10.09±4.02	9.29±4.07	8.96±3.50	15.694†
Performed actions	W1point	3.51±1.56	1.03±1.27	1.03±1.15	0.80±1.05	134.447†
	W2points	0.91±1.10	3.50±2.06	3.20±1.89	3.30±1.80	62.636†
	W345points	0.43±0.75	0.37±0.58	0.32±0.56	0.18±0.44	4.458†
	TnActions	4.85±1.95	4.89±2.34	4.55±2.30	4.28±1.96	2.361
Fight effectiveness	Aver.ActionV	1.35±0.36	1.98±0.50	1.95±0.43	1.91±0.45	62.727†
	Inte.SPoints	46.30±27.41	35.89±24.30	39.95±24.31	43.15±24.00	4.081†
	Inte.PActions	64.58±51.59	87.32±85.23	91.70±78.66	100.31±73.89	5.640†

† Significant at level $p < 0.01$.

After determining the influence of the rule changes on the investigated parameters, the numbers for penalties and challenges were excluded from further analysis due to the absence of statistically significant differences between the observed groups ($p = 0.236$ and $p = 0.114$). Although no significant difference between groups was found for the average number of actions per fight ($p = 0.071$), this variable was not excluded, due to its importance and for more detailed further analysis. The differences in all other variables between the specific competitions are shown in Table 2. Pairwise comparison revealed significant gradual increase in FightDuration and PTActions were lower in 2013 compared to competitions from 2014, 2015 and 2020. Moreover, significantly higher values in FightDuration but lower PTActions occurred in 2020 compared to 2014. Furthermore, significantly lower numbers of APassivities and TnPoints, occurred at EC2013 compared to EC2014, FEOG2015 and EC2020. Considering performed actions, the number of W1point was significantly higher, while the number of W2points was significantly lower at EC2013 than at EC2014, FEOG2015 and EC2020. The number of W345points was lower only when EC2013 was compared to EC2020, while TnActions remained unchanged. Regarding fight effectiveness, Aver.ActionV was lower at EC2013 than at all competitions analysed afterwards, Inte.SPpoints was lower at EC2013 than at the EC2014, while Inte.PActions was higher at EC2013 than at the FEOG2015 and EC2020. However, there was no significant difference in performed actions and fight effectiveness between the competitions that were held after the new rules were introduced.

Table 2. Between-group differences (t test).

Variables	Years:	2013			2014		2015	
		2014	2015	2020	2015	2020	2020	
FightDuration	Mean Diff. (I-J)	-38.27†	-47.35†	-66.42†	-9.08	-28.14*	-19.06	
	Std. Error	10.63	10.28	10.49	10.32	10.53	10.17	
Scored points	PTAction	Mean Diff. (I-J)	-2.77†	-2.03†	-1.43*	0.75	1.35*	0.60
		Std. Error	0.50	0.48	0.49	0.49	0.50	0.48
	APassivities	Mean Diff. (I-J)	-0.35†	-0.34†	-0.51†	0.01	-0.16	-0.17
		Std. Error	0.09	0.08	0.08	0.08	0.08	0.08
TnPoints	Mean Diff. (I-J)	-3.09†	-2.28†	-1.95†	0.81	1.13	0.32	
	Std. Error	0.47	0.45	0.46	0.46	0.47	0.45	
Performed actions	W1point	Mean Diff. (I-J)	2.48†	2.48†	2.71†	0.00	0.23	0.24
		Std. Error	0.16	0.15	0.16	0.15	0.16	0.15
	W2points	Mean Diff. (I-J)	-2.59†	-2.29†	-2.39†	0.30	0.20	-0.10
		Std. Error	0.22	0.21	0.22	0.21	0.22	0.21
	W345points	Mean Diff. (I-J)	0.06	0.11	0.26†	0.05	0.19	0.14
Std. Error		0.07	0.07	0.07	0.07	0.07	0.07	
TnActions	Mean Diff. (I-J)	-0.04	0.30	0.58	0.33	0.61	0.28	
	Std. Error	0.27	0.26	0.26	0.26	0.27	0.26	
Fight effectiveness	Aver.ActionV	Mean Diff. (I-J)	-0.64†	-0.61†	-0.56†	0.03	0.08	0.05
		Std. Error	0.05	0.05	0.05	0.05	0.05	0.05
	Inte.SPpoints	Mean Diff. (I-J)	10.40†	6.34	3.14	-4.06	-7.26	-3.20
		Std. Error	3.13	3.02	3.09	3.04	3.10	2.99
Inte.PActions	Mean Diff. (I-J)	-22.74	-27.12*	-35.74†	-4.38	-12.99	-8.61	
	Std. Error	9.20	8.89	9.07	8.93	9.11	8.80	

*Significant at level $p < 0.05$, † Significant at level $p < 0.01$.

Considering the type of match wins, the results indicate an initial decrease of 19.3% in the number of matches that were won by the number of points scored and an initial increase of 13.7% and 5.5% in the number of matches won by technical pins and pins, respectively (Figure 1).

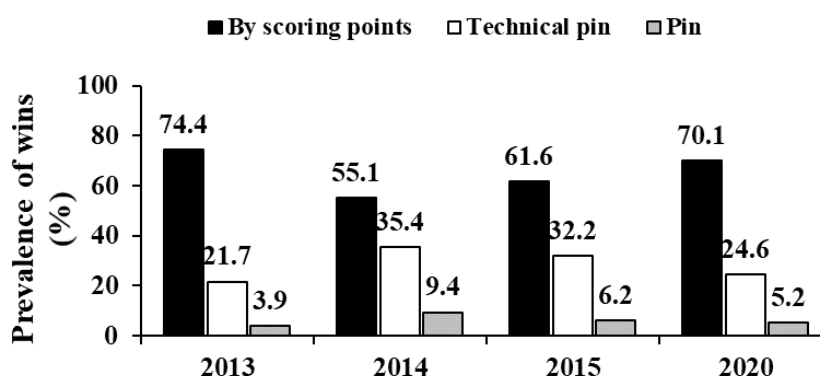


Figure 1. Type of winning in competitions.

However, it seems that this trend did not continue with time as the structure of win types was observed to be gradually reversing towards those from Principal component analysis defined two components for each of the observed groups of variables (Table 3). Variables from the scored points group explained 64.2% of the variance match performance, whereby the first component and second component comprised 42.8% and 21.4% of the variance, respectively, with PTAction being the most discriminative variable. Variables from the performed actions group explained 75.9% of the variance in match performance, whereby the first and the second component comprised 41.3% and 34.6% of the variance, with TnAction being the most discriminative variable. Variables representing the fight effectiveness explained 95.7% of the variance in match performance, whereby the first and the second components explained 61.1% and 34.6% of the variance, respectively, with Inte.PActions being the most discriminative. Figure 2 shows the changes in the key variables of wrestling attractiveness through the time course of development of the applied rules and in relation to the course of development of the duration of the fight.

Table 3. - Structure Matrix.

Groups of variables	Component		
	1	2	
Scored points	PTAction	0.987	
	TnPoints	0.964	
	FChallenge		0.836
	A ^{Passivities}		0.586
	A ^{Penalty}		0.227
Performed actions	TnActions	0.927	
	W ^{2points}	0.872	
	W ^{1point}		0.903
	W ^{345points}		0.457
Fight effectiveness	Inte.^PActions	0.952	
	Inte. ^S Points	0.925	
	Aver. ^{ActionV}		0.993

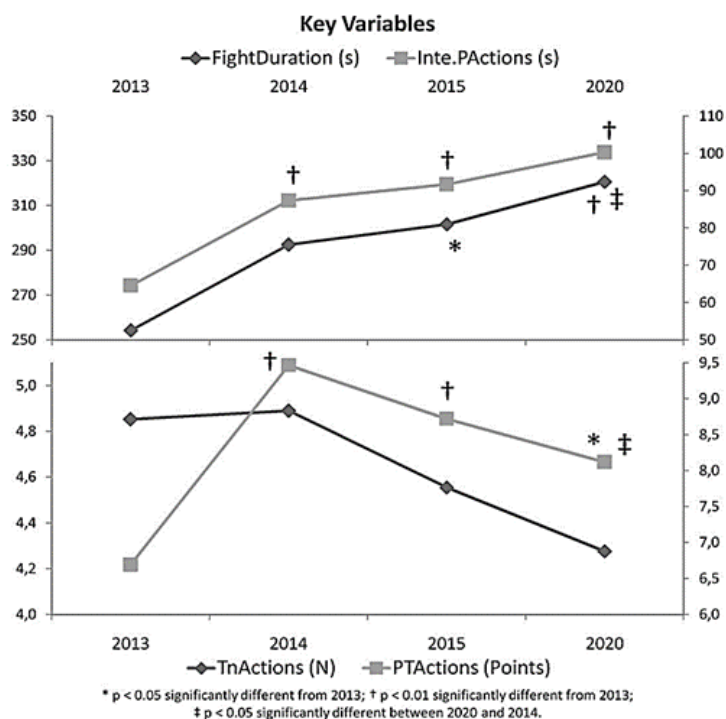


Figure 2. – Key parameters of wrestling attractiveness.

DISCUSSION

The main findings of this study revealed that 10 out of 13 indicators of technical, tactical and performance indicators of wrestling combat significantly changed shortly after the set of new rules was introduced. Although the changes in these indicators remained significant at FEOG2015 and EC2020, further progress in changes occurred only in FightDuration and PTAAction. Therefore, we can conclude that the first hypothesis was true, while the second hypothesis was partially true. Considering the fact that APenalty, FChallenge (which depend on athlete behavior, coaches' perception and the referee) and TnActions did not change, suggests that the new rules did not result in an increase in attractiveness; therefore, the third hypothesis was not true.

The first and most basic characteristic of a wrestling fight is the duration of the match, which plays a significant role in choosing the tactical and technical approach to combat. In that regard, changing the number and duration of rounds from 3 x 120 s to 2 x 180 s could affect the physical, technical and tactical preparation. Although the official duration of the fight would remain unchanged, the intensity of the fight could increase (i.e., higher number of actions), while the tactical approach and type of attack/defense could be adjusted more frequently. This is reflected in an increment in FightDuration that occurred immediately after the new rules were introduced and continued to increase afterwards (i.e., similar to Kasum & Marković, 2014; Tünnemann, 2016; Marković et al., 2017). Changing the structure of the fight could advance the physical preparedness of wrestlers (Marković & Kasum, 2015), reflecting in a greater number of victories with technical pins and pins of physically dominant wrestlers. However, it appears that as time passed and training plans were adjusted, the number of fights won by points again increased, while the number of victories by technical pins and pins reduced (Figure 1).

Another important change in the rules was related to an increase in the value of the technique of landing on the back from 1 to 2 points, increasing the value of throwing the opponent directly to the back from 3 to 4 points, and insisting on a more active fight by an increase in awarded passivity. This led to significant differences in the way the points were scored such as PTAActions, APassivities and in the structure of scored points represented by W1point, W2points, and W345points. Significant increases occurred in PTAActions, APassivities and W2point, while W1point and W345points decreased, which overall resulted in higher TnPoints. Therefore, a higher number of scored points mostly occurred on the account of 2-point actions. Similar results were reported in previous studies that investigated the effects of changes in the rules (Kasum & Marković, 2014; Marković et al., 2017). Considering this, an increase in TnPoints occurred on the account of the same or similar technical elements as before the rules were introduced, only this time, these elements were rated higher. Keeping in mind that the number of very attractive technical elements (i.e., worth three-five points), which are the basis for attractive wrestling (Tünnemann, 2013a), also did not change, the imposed rule changes did not affect attractiveness.

A new way of evaluating the grip resulted in a rotation of the representation of W1point and W2points, which was determined by previous studies that showed that the number of actions of landing on the back did not increase but rather slightly declined (Kasum & Marković, 2014; Marković et al., 2017). Studies have already shown that top wrestlers at key competitions perform simpler and less risky techniques such as landing on the back in a standing position, actions in parterre, or pushout from the circle of the arena (Kasum & Marković, 2014; Marković & Kasum, 2015; Marković & Dopsaj, 2015; Marković et al., 2017). In that regard, increasing the value of certain simpler actions may lead to an increase in the number of small-risk actions, which may cause a decrease in the performance of more attractive and risky throws such as W345points. This further reinforces the notion that the attractiveness was not affected.

The indicators of fight effectiveness built for this study showed an increase in Aver.ActionV and Inte.PAActions, indicating higher average points obtained per action but a longer time between the consecutive actions. Consequently, Inte.SPoints (i.e., shorter time per each scored point) decreased but only initially as there was no difference between EC2013 and FEOG2015 or EC2020. Given that wrestlers needed more time between two actions and that the number of actions remained unchanged it could be argued that imposed set of rules did not qualitatively affect wrestling combat. Similar observations can be found in previous studies (Kasum & Marković, 2014; Marković & Kasum, 2015; Marković et al., 2017), even indicating a negative course of development of the competitive activity of free wrestlers. Furthermore, principal component analysis extracted PTAActions, TnActions, and Inte.PAActions as the most sensitive indicators of competitive wrestling performance, meaning that any change in the rules in order to increase the attractiveness of wrestling must not negatively affect these indicators. Accordingly, this study demonstrated that the different scoring of certain technical actions and the higher number of awarded passivities may increase the total number of points independently even though the activity remains similar. Moreover, the duration of fighting time increased, while the number of performed actions remained the same indicating negative trends in measures of attractiveness and match effectiveness.

CONCLUSIONS

In relation to the aim of this research, both the current and long-term effects of a key change in wrestling rules were determined. Based on the results, we can conclude that the changes in rules have contributed to the improvement of point productivity, while the number of realized actions in the fight remained the same. By increasing the duration of fights, yet limiting the possibility of increasing the number of actions in a fight, there was a negative impact on the intensity of actions in the fights at the EC2014 and in the following years it could be argued that the changes in rules may have harmed rather than improved the attractiveness of wrestling as a sport. In that regard, it should be considered that the changes in rules must have positive effects on effectiveness measures such as PTAAction, TnActions and Inte.PAActions. Thus, the rules should be directed towards an increase in the number of actions, especially those that are worth more points. Moreover, judges may need to consider how much tactical influence the award of passivity has on the fight and how understandable it is for the audience, so it may be abolished. This study provided an insight into the short and long-term effects of certain rule changes in wrestling on wrestlers' activity during combat, thereby also on the attractiveness of wrestling combat. The methods of evaluation from this study showed that the variables used loaded very high in principal component analysis providing the statistical value of the approach. Using this method for the analysis of wrestling competitive activity showed that imposed changes were not sufficient for the qualitative changes in technical and tactical elements of competitive wrestling.

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