THE DIVERSITY OF EMOTIONAL TENSION AND STRENGTH AMONG SPORTSMEN OF MARTIAL ARTS AND TEAM-SPORT GAMES

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Abstract:

This paper is an attempt to evaluate the diversity of emotional tension and strength among athletes training ju-jutsu, kyokushinkai, football and basketball. The substantial issue for the research process was to look for a correlation among the level of aggression, stress-resistance, sense of control, desire to show up in too favorable light to explosive and functional strength. To diagnose more precisely above mentioned correlation there were used a questionnaire for the measure of the level of aggression by A. Buss and M. Perry, questionnaire Delta by R. L. Drwal, studying the location of sense of control, and the "Decision-making skills" test. For the measurement of strength there were used trails from the European Test of Physical Fitness, evaluating explosive and functional strength of lower limbs. The obtained results were subjected to one-factor variance analysis and correlation analysis – in order to determine the interdependencies appearing between the level of strength and the results of psychological tests. For the analysis of the test results were used methods of descriptive and mathematical statistics. This analysis was prepared with using the appropriate procedures of *Statistica 9,0* software. Null hypothesis (about the absence of any dependencies between results and practiced discipline) were verified by the F Snedecor' test.

INTRODUCTION

Each form of physical activity among other things allows the discharge of excess emotions. The level of emotions, its duration and balance between stimulation and inhibition, on account of the specificity of certain sport disciplines, can be varied due to the team competition (i. e. football and basketball) or individual competition (i. e. ju-jutsu, kyokushinkai). There is one similarity in these two types of competition. It is the desire to win, which is built on the improvement of competitors techniques and enhance their physical condition, and is based on appropriate psychological predispositions. The main difference between these two disciplines becoming the specificity of movement and technical preparation. In team-sport games this movement is based on a natural form, whereas in karate the motor habit is shaped through longtime, specialized training, multiple repetition of unnatural movement, which after some time is treated by a competitor as a natural [Miłkowski, 1988].

Many sport psychologists have been searching for factors that correlate with player' psychological resistance [Gould and Krane, 1992, Weinberg, Gould 1995, Hardy 1996]. One of them is the location of a sense of control, which can determine the causes of decreased psychological resistance of player in his specialized competition. According to the LOC

theory, the internal location of a sense of control ensures the competitor an optimum concentration, allowing him to avoid the errors that often occur in case of competitors with an external location. Also the cognitive anxiety, which may cause less psychical resistance, appears less often than in case of player with an external location [Łukaszewski, 1984, Drwal 1978, Poznaniak 1991].

The purpose of this paper is an attempt to explain the correlation between the chosen mental states and the strength of the players training ju – jutsu, kyokushinkai, football and basketball. As significant element has become a testing of the level of aggression, resistance to stress, a sense of control and explosive and functional strength of examined sportsmen. The main exploratory action was searching for answers to the question: **Is there a diversification of emotional tension in the context of strength of competitors practicing martial arts and team-sport games?**

In order to resolve the main research problem, were formulated following questions, which have designated direction of scientific explorations:

1. Is there a diversity of emotional tension of competitors in chosen sport disciplines?
2. Is there a diversity of strength of competitors training individual and team-sport games?
3. What the emotional tension state has the greatest influence on shaping the explosive and functional strength of examined competitors?

TEST METHODS

1. The Aggression Questionnaire by A. Buss and M. Perry [Buss, Perry, 1992]. It is the most widely used measurement tool for aggression, based on self-report. It contains 29 questions designed to measure aggressive tendencies (both physical and verbal aggression), as well as anger and hostility. The respondent evaluates own behavior on a scale of 1 - "completely does not suit me" to 5 - "completely suits me", answers provide information about his physical aggression (nine questions), verbal aggression (five questions), anger (seven questions) and hostility (eight questions).
2. The Questionnaire Delta by R. Ł. Drwal [Drwal, 1981]
3. There are a number of methods for measuring the variable of sense of control location, one of the tools is the questionnaire Delta by R. Ł. Drwal, which allows to examine the location of a sense of control. In this questionnaire the examined person is taking a stance to the presented 24 claims (14 diagnostic claims for sense of the location of control and 10 Lie scale claims) in everyday life situations, in terms of the “true – false”.
4. The „Decision-making skills” test [http://www.mbank.pl/download/pdf_izzy/test_umiejetnosc_podejmowania_decyzji.pdf]. Test consists of 50 closed questions. It measures the ability to make decisions (in three-scale) and resistance to stress. For each of these characteristics are assigned various questions. The obtained answers, after the verification procedure, point to the respondent’s coherence, the ability to avoid and take risks and determine ambivalent persons.
5. There was also used two trials to evaluate the competitors strength. Both came from the European Physical Fitness Test [http://www.wychowaniefizyczne.pl/testy_sprawnosci.html]:
   a) the explosive strength of the lower limbs – long jump
   b) the functional strength – overhang on the stick with bent arms.

The battery tests consists of 8 trials. Physical fitness test is recommended to perform within 2 days, while l, 2 and 3 trial in first day, and 4, 5, 6, 7, 8 in the second day. If the entire test is performed in a single day, it is advisable to measure the endurance at the end. An examined person should be informed about the way of performing tests before carrying them out. He should exercise in appropriate outfit (shorts, t-shirt, sneakers), after a thorough warm-

up. All of the trials and their measurements must be carried out strictly according to the instructions.

The results of the surveys were analyzed using appropriate procedures in the *Statistica 9,0* software. There were set the values of several statistical measures, such as: the arithmetic mean (as a primary measure of the position) the standard deviation and the maximum and minimum value (as the measures of depicting the dispersion of results). Among the methods of mathematical statistics to verify the set substantive hypotheses was used the one-factor analysis of variance and the diversity of psychological test results depending on the specified discipline.

THE RESEARCH MATERIAL

The research was conducted in 2012 with the group of 98 competitors from four sport clubs located in Przemyśl and the surrounding area. They were players representing: LKS Grom Wyszatyce from football section, Polonia Przemyśl from basketball section, Society of Karate Kyokushinkai IFK "Saiha" from Przemyśl and Przemyśl Klub Ju jutsu.

Table 1. The number of respondents including cultivated sport discipline

Discipline	Competition	N	%
Martial arts	Ju jutsu	19	24.4
	Kyokushinkai	20	25.6
Team-sport games	Football	19	24.4
	Basketball	20	25.6
Total		98	100.0

In order to thorough analysis of test results. the quantitative distribution of research groups is similar. There were examined 39 competitors practicing martial arts and the same number of competitors playing team-sport games (Table 1). Arithmetic mean of the age of respondents representing martial arts was 18.5. while competitors of team-sport games were on average older for 1.3 year.

RESEARCH RESULTS

In order to resolve the main research problem and specific problems was made analysis of specific indicators (Table 2). It turned out that the majority of indicators. without the scale of the lie. are increased in favor to team-sport games competitors. Parameters of these sportsmen also differ from national averages indications [Buss. Perry. 1992]. For example. the overall level of aggression of martial arts competitors is 78.30. in case of the representatives of team-sport games is 92.60. while the national average for men is 81.40. Similar divergences appear in case of the hostility (martial arts 20.95. team-sport games 25.95. the national average 23.60). anger (martial arts 17.95. team-sport games 22.30. the national average 19.10). verbal aggression (martial arts 15.75. team-sport games 17.05. the national average 15.70) and physical aggression (23.65 martial arts. team-sport games 27.30. the national average 22.90).

Table 2. Evaluation of a psychological state of martial arts and team-sport games competitors.

No.	Measurement indicators		Martial arts	Team-sport games
			$\bar{x}$	$\bar{x}$
1	Anger		17.95	22.30
	Hostility		20.95	25.95
	Physical aggression		23.65	27.30
	Verbal aggression		15.75	17.05
	Total level of aggression		78.30	92.60
2	Sense of control		4.15	5.30
		Lie scale	2.50	2.30
3	Stress-resistance		3.25	5.85

The research conduct forces to convert the raw results of the above mentioned indicators using statistical measures and analysis of variance (Table 3).

Table 3. Results of the level of aggression evaluation: anger and hostility (statistical measures and results of the variance analysis)

Competition	Anger				Hostility			
	$\bar{x}$	Sx	Min	Max	$\bar{x}$	Sx	Min	Max
Ju jutsu	19.3 b	4.94	13	27	22.1 a	5.03	13	31
Kyokushinkai	16.6 a	4.31	11	26	19.8 a	6.38	10	35
Football	24.2 c	3.66	16	29	30.0 b	6.16	14	39
Basketball	20.3 b	5.66	13	33	21.9 a	7.33	11	31
Variance analysis								
$F = 8.60^*$ $p_{gran} = 0.000$					$F = 9.84^*$ $p_{gran} = 0.000$			

„" symbol indicates that the null hypothesis should be rejected (p=0.05). The same letter symbol means a homogenous group of medium – in a post-hoc analysis (NIR Test).* $\bar{x}$ *- arithmetic mean; Sx standard deviation*

Variance analysis showed a statistically significant correlation between the results obtained in the aggression test (Test A) and cultivated discipline/sport competition. the calculated value of Test F authorized the rejection of the null hypothesis (the limit value of the level of significance – p_{gran} – is less than 0.05). NIR Test analysis leads to the conclusion that the competitors training Kyokushinkai are characterized by the lowest level of anger. while the football players – the highest level.

Variance analysis showed a statistically significant correlation between the results obtained in the aggression evaluation test (Test H) and cultivated discipline/sport competition. the calculated value of Test F authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that football players have significantly higher level of hostility than competitors in other disciplines.

Table 4. Results of physical and verbal aggression evaluation (statistical measures and the results of variance analysis)

Competition	Physical aggression				Verbal aggression			
	$\bar{x}$	Sx	Min	Max	$\bar{x}$	Sx	Min	Max
Ju jutsu	25.3 a	8.01	12	39	16.8 b	2.86	13	21
Kyokushinkai	22.0 a	5.92	12	37	14.7 a	2.56	8	18
Football	31.1 b	5.38	20	43	18.5 b	3.10	12	24
Basketball	23.5 a	4.68	17	33	15.6 ab	3.93	8	22
Variance analysis								
$F = 8.18^*$ $p_{gran} = 0.000$					$F = 5.24^*$ $p_{gran} = 0.002$			

Variance analysis showed a statistically significant correlation between the results obtained in the aggression evaluation test (Test PA) and cultivated discipline/sport competition. the calculated value of Test F authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that the football players are characterized by the higher physical aggression than competitors in other disciplines.

Variance analysis showed a statistically significant correlation between the results obtained in the aggression evaluation test (Test VA) and cultivated discipline/sport competition. the calculated value of Test F authorized the rejection of the null hypothesis (the limit value of the level of significance – p_{gran} – is less than 0.05). NIR Test analysis leads to the conclusion that the competitors training Kyokushinkai are characterized by the lowest level of verbal aggression. while the competitors training ju-jutsu and football players – the highest level.

Table 5. Results of a sense of control evaluation and a tendency to *show up in a too favourable light* (scale lie) by Delta Test (statistical measures and the results of variance analysis)

Competition	Sense of control				Lie scale			
	$\bar{x}$	Sx	Min	Max	$\bar{x}$	Sx	Min	Max
Ju jutsu	4.4	1.92	1	9	1.8 a	2.12	0	6
Kyokushinkai	3.9	2.46	0	10	3.2 b	1.81	1	7
Football	5.2	1.71	3	8	1.8 a	1.72	0	5
Basketball	5.4	2.06	2	9	2.8 b	1.54	0	6
Variance analysis								
$F = 2.02$ $p_{gran} = 0.118$					$F = 2.92^*$ $p_{gran} = 0.040$			

Variance analysis showed a statistically significant correlation between the evaluated lie scale and cultivated discipline/sport competition. the value of Test F authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that the competitors training ju-jutsu or football are characterized by the lower results in the lie scale in compared to results of competitors in the remaining disciplines.

Table 6. Results of the stress-resistance evaluation according to the "Decision-making skills" test (statistical measures and the results of variance analysis)

Competition	Stress-resistance			
	$\bar{x}$	Sx	Min	Max
Ju jutsu	3.7 a	0.99	2	5
Kyokushinkai	2.8 a	2.07	0	8
Football	7.8 b	1.86	5	10
Basketball	3.9 a	2.28	0	9
Variance analysis				
$F = 27.74^*$ $p_{gran} = 0.000$				

Variance analysis showed a statistically significant correlation between the evaluated stress-resistance and cultivated discipline/sport competition. the value of Test F authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that the competitors training football are characterized by the higher results in the stress-resistance test in compared to results of competitors in the remaining disciplines.

Table 7. Results of evaluated explosive and functional strength of martial arts and team-sport games competitors

No.	Discipline	Explosive strength Average result in meters	Functional strength Average result in seconds
1	Martial arts	2.26	71.96
2	Team-sport games	2.47	42.38

Variance analysis showed a statistically significant correlation between the explosive strength and cultivated discipline/sport competition. The value of Test F authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that the competitors training Kyokushinkai have the lowest explosive strength. while the basketball players – the highest.

Table 8. Results of explosive and functional strength evaluation (statistical measures and the results of variance analysis)

Competition	Explosive strength				Functional strength			
	$\bar{x}$	Sx	Min	Max	$\bar{x}$	Sx	Min	Max
	meters				seconds			
Ju jutsu	2.40 b	0.192	2.04	2.72	76.17 d	14.99	46.03	98.25
Kyokushinkai	2.12 a	0.094	1.96	2.28	67.75 c	9.85	51.00	81.00
Football	2.37 b	0.106	2.20	2.51	57.79 b	10.02	40.00	75.00
Basketball	2.57 c	0.148	2.30	2.80	26.98 a	8.89	10.58	44.37
Variance analysis								
$F = 36.17^*$ $p_{gran} = 0.000$					$F = 73.30^*$ $p_{gran} = 0.000$			

Variance analysis showed a statistically significant correlation between the functional strength and cultivated discipline/sport competition. This value authorized the rejection of the null hypothesis. NIR Test analysis leads to the conclusion that the basketball players have the lowest functional strength. while the competitors training ju-jutsu – the highest.

Statistically significant correlation exists between:

- the explosive and functional strength – the interdependence inversely proportional. Competitors with higher explosive strength have lower functional strength.
- the explosive strength and anger – interdependence directly proportional. Competitors with higher explosive strength have higher level of anger.
- the explosive strength and the sense of control – interdependence directly proportional. Competitors with higher explosive strength have a higher sense of control test results.
- There were also observed a statistically significant correlations between:
- anger and hostility (interdependence directly proportional – competitors reaching higher anger evaluation results are also characterized by higher hostility).
- anger and physical aggression (interdependence directly proportional – competitors reaching higher anger evaluation results have also higher results in the evaluation of physical aggression).
- anger and verbal aggression (interdependence directly proportional – competitors reaching higher anger evaluation test have higher verbal aggression).

- anger and lie (interdependence inversely proportional – competitors reaching higher results in anger evaluation test have lower results in the lie scale).
- anger and stress-resistance (interdependence directly proportional – competitors reaching higher results in anger evaluation test have higher stress-resistance).
- In the case of statistical dependencies analysis between:
- hostility and physical aggression occurred interdependence directly proportional – competitors reaching higher results in the hostility evaluation test have higher physical aggression.
- hostility and verbal aggression was observed interdependence directly proportional – competitors reaching higher results in the hostility evaluation test have higher results in a test of verbal aggression.
- hostility and lie scale was observed interdependence inversely proportional – competitors reaching higher results in the hostility evaluation results have a lower grade in lie scale.
- hostility and resistance to stress occurred interdependence directly proportional – competitors reaching higher results in the test of hostility evaluation have a higher stress-resistance.

Analyzing the dependencies between physical and verbal aggression occurred statistically significant dependencies directly proportional.

Table 9. Interdependencies between the physical fitness and results of the aggression evaluation tests. sense of the control and stress-resistance (values of the coefficient of "r" correlation and significance border level „p_{gran}")

Indicator	Functional strength	Anger	Hostility	Physical aggression	Verbal aggression	Sense of control	Lie scale	Stress-resistance
	„r" value and p_{gran}							
Explosive strength	**-0.449***	**0.307***	0.188	0.130	0.147	**0.301***	-0.046	0.179
	p=.000	**p=.006**	p=.099	p=.253	p=.198	**p=.007**	p=.685	p=.116
Functional strength		-0.115	0.034	0.047	0.071	-0.149	-0.067	-0.036
		p=.313	p=.764	p=.677	p=.537	p=.193	p=.559	p=.750
Anger			**0.546***	**0.689***	**0.436***	-0.004	**-0.229***	**0.458***
			p=.000	**p=.000**	**p=.000**	p=.970	**p=.043**	**p=.000**
Hostility				**0.535***	**0.485***	0.140	**-0.253***	**0.520***
				p=.000	**p=.000**	p=.219	**p=.025**	**p=.000**
Physical aggression					**0.660***	0.057	**-0.337***	**0.479***
					p=.000	p=.616	**p=.003**	**p=.000**
Verbal aggression						0.032	**-0.361***	**0.426***
						p=.777	**p=.001**	**p=.000**
Sense of control							0.152	0.209
							p=.184	p=.066
Lie scale								-0.095
								p=.406

CONCLUSIONS

1. Looking for the answer to main research question concerning the diversity of emotional tension have been found dependencies between the specified sport competition and the measurement indicators. It turned out that the football players are characterized by a higher than competitors training Kyokushinkai level of anger. hostility. physical and verbal aggression. It can be assumed that such differentiation of described indicators in

the case of competitors training karate is caused by more effective. than in the case of football players. disposal of aggression. According to psychology of sport such status is probably caused by specific martial arts trainings. which lead to reduce the level of aggression in situations of social exposure. Including the above sport competitions. the intensity of aggressive behaviors can be different at the moment of the competition. Perhaps the another reason of such diversity of emotions may be fact that martial arts competitors in addition to technique and fitness training are taught the skills of emotion balancing. self-control. ability to assess a situation in which aggression is unnecessary and its use is possible only in the ring. Aggression of team-sport games players may be suppressed on the field through discipline and its related rules.

2. It has been also observed that the level of the sense of control is similar with all tested competitors. Arithmetical mean of the location of the sense of control with all competitors was about 5 points.
3. The higher stress-resistance have football players. while the lowest the Kyokushinkai competitors. A strong inner tension accompanying karate competitors during a sport fight and individual activities may have an impact on reduced resistance in the situation of social exposure. Football players. for the sake of trained cooperation and the possibility of counting on the help of others players in the competition. are characterized by higher resistance than the "warriors".
4. The higher explosive strength was presented by basketball players. while the lowest by Kyokushinkai competitors. Perhaps this is due to the specification of these sports. Most of the people who regularly train basketball has more than the average height of the body in relation to their peers. and also longer and stronger lower limbs. Therefore. a high score in the long jump is not surprising. Kyokushinkai competitors in their training put emphasis on shaping the strength of arms. which could contribute to a lower explosive strength in comparison to others examined. The low standard deviation of the arithmetic mean. in the case of results of competitors in all sport competitions. can denote to a very low spreading around the strength. and it indicates the determining function of cultivated sport. Also there was observed the highest explosive strength among ju-jutsu competitors. while basketball players had the lowest rate. Same as before. this may be due to the type of sport. In the ju-jutsu training. the emphasis is put on strong upper limbs. the endurance of the shoulder girdle. because in this sport there are a lot of throws. takedowns. holds. ground fighting. Low functional strength test result of basketball players is probably caused by a different specificity of basketball training.
5. A statistically significant correlation appeared between the level of anger and explosive strength. with the absence of the other components of the aggression. *It* turns out that the competitors with higher explosive strength have a greater sense of control. There also appeared the interdependence between anger and hostility. verbal and physical aggression of examined. With the increase of the level of anger also increases the level of hostility. verbal and physical aggression. However. the correlation between the physical and verbal aggression. with a high result in lie scale and resistance to stress can result from the interdependencies in aggression components. The condition between the verbal aggression and high resistance to stress may result from greater frequency participation by aggressive persons in situations with high stress level (for example in the brawl etc.). The desire to show up in a too favorable light may results from the fact that the aggression may contribute to loss of social prestige in the surrounded environment by a person vulnerable to such behavior.
6. The impact of emotional tension on the strength level is low and statistically insignificant. The most important for the explosive strength level is only anger as a component of the

aggression. It has not been observed statistically significant correlation between a sense of control. resistance to stress and explosive and functional strength of competitors.

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