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Differences in the Intercorrelations of Psychological Characteristics in Karate Competitors and Representatives

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Abstract: *This research was conducted on a purposive sample of 32 respondents, 16 karate competitors and 16 karate national team members, men, seniors (according to WKF) from the Republic of North Macedonia. The main objective of this research was to determine the differences in the interrelations between the psychological characteristics of karate competitors and members of the karate national team. A total of 13 variables of psychological characteristics were used in the research: one variable for assessing general intellectual abilities, three variables for assessing specific intellectual abilities, six variables for assessing emotional characteristics, and three variables for assessing motivational dispositions. To determine the differences in the mutual relationships, first the intercorrelation matrices of the competitors and the national team members were calculated, then the Fisher transformed matrices were calculated, i.e. r1 and r2 - the correlation coefficients for each group, Z-statistics that measure the difference between the two correlation values and p-value - which determines whether the difference in the correlation is statistically significant. The results of the Z-test obtained in the study show statistically significant differences only in 5 pairs of variables from the two intercorrelation matrices.*
Keywords: *psychological characteristics, karate competitors, karate national team members, descriptive statistics, Z-test.*

Introduction

The value of research on psychological differences between karate competitors (karate athletes who practice and compete at different levels), and karate representatives (elite athletes who represent their country), lies in finding and determining the differences that can reveal what separates elite karate athletes from regular competitors. Studies suggest that elite athletes in combat sports tend to have higher levels of self-discipline, self-confidence, and lower levels of cognitive and somatic anxiety (D., Mojtahedi, et all. 2023). Research on these traits can help identify potential future representatives and improve talent selection. Precisely because of this, in their research, Soklevska, I.E., Kostovski, Ž., Mikic. B. (2018), determined the factor structure of the psychological characteristics of karate representatives (members of the national selection) and karate competitors from the Republic of North Macedonia, in order to achieve the desired goal, since as much information as possible is needed that will be properly incorporated and used in the process of building the personality of the karate athlete. Therefore, determining the differences between the examined groups and relating to the intercorrelations of the psychological characteristics of karate athletes is of great importance in karate sport.

Methods Of Work

The research was conducted on a purposive sample of a total of 32 respondents divided into two subsamples, of which 16 karate competitors and 16 karate representatives, male, seniors (according to WKF) from the Republic of North Macedonia. The respondents were subjected to tests to determine psychological characteristics that were conducted in the clubs in which the competitors conduct their daily training).

A total of 13 variables of psychological characteristics were applied in the research (according to the doctoral dissertation of Aleksovska, V., L. 2002), divided into 4 areas, of which:

- one variable for assessing general intellectual ability - IQ Test
- three variables for assessing specific intellectual abilities (sports intelligence) - F1, F2, S1, i.e. the ability for perceptual reasoning, the ability for speed of observation of perceptual structures, and the specific intellectual ability for deriving spatial relations.
- six variables for assessing emotional traits - anxiety (TAI), aggressiveness (T-15), extraversion/introversion,

neuroticism, psychoticism, social desirability (EPQ)
- three variables for assessing motivational dispositions - P2, F+, F-, i.e. the sports motive of achievement through the desire to stand out, for success in basic life activities, the degree of positive emotional engagement and emotional self-control in situations of sports achievement and the degree of negative emotional reaction in situations of sports achievement which is manifested through fear of uncertainty of the outcome.

The data obtained from this research according to the characteristics and size of the selected sample were processed with adequate statistical programs. For the purposes of this research, the following were calculated: the intercorrelation relationship of the variables, Fisher's test which is used to examine the relationship between two categorical variables, usually when the sample size is small or when the expected frequencies in any cell are less than 5, r1 and r2 - the correlation coefficients for each group, Z-statistic - measures the difference between the two correlation values and p-value - tests whether the difference in the correlation is statistically significant ($p < 0.05$ indicates a significant difference).

Results and Discussion

From the analysis of the intercorrelation matrix in Table 1, it can be concluded that the correlation coefficient between the applied variables results in different values. The variable PM or general intelligence has a medium positive correlation with the variable from the space of sports intelligence, which represents a specific intellectual ability to perform spatial relations (S1 = .55). The positive correlation of these two variables actually indicates that they belong to a single system in the space of specific intellectual abilities. (Aleksovska, L., 2002). A significant correlation with medium values can also be observed in the variable (F2), which represents a specific intellectual ability for the speed of observation of perceptual structures, with the variable neuroticism/stability (N =.51) which is characterized by high levels of negative effects, such as depression and anxiety. A statistically significant positive correlation exists between the variables TAI and P (= .64), i.e. between anxiety and psychoticism.

Table 1. *Correlation of psychological characteristics among the contestant respondents*

	PM	F1	F2	S1	TAI	P	N	E	L	P2	F+	F-	T-15
PM	1.00												
F1	0.42	1.00											
F2	0.45	0.31	1.00										
S1	**0.55**	0.24	0.36	1.00									
TAI	-0.28	0.33	0.14	-0.05	1.00								
P	-0.17	0.32	0.00	0.36	**0.64**	1.00							
N	0.11	0.03	**0.51**	-0.12	0.04	-0.37	1.00						
E	0.27	0.03	0.29	0.21	0.16	0.15	0.22	1.00					
L	-0.05	-0.06	0.07	-0.23	0.14	-0.05	0.25	**0.51**	1.00				
P2	0.41	-0.02	0.16	0.20	0.00	0.31	-0.29	0.23	-0.10	1.00			
F+	0.28	0.41	0.03	0.41	-0.02	0.29	-0.38	-0.17	-0.30	-0.05	1.00		
F-	0.44	0.23	0.43	0.03	-0.07	-0.16	0.21	0.03	0.26	0.36	-0.21	1.00	
T-15	-0.04	-0.40	-0.20	0.33	-0.19	-0.20	0.01	0.16	-0.18	-0.04	-0.36	-0.20	1.00

Also between the variables E (extraversion/introversion) and L (social desire), a correlation with mean values (= .51) is observed. The positive interrelationships obtained based on the intercorrelation matrix are logical and expected. The variables TAI (anxiety) and P (psychotism) belong to the emotional characteristics of the personality according to which the individual is inclined to react to different situations with anxious reactions. The variables E (extraversion/introversion) and L (social desire) also belong to this space. Based on the intercorrelation matrix where the mutual relationship of the applied variables is presented, a small number of mutual relations are observed. Statistical significance at the $p<0.05$ level exists between the variables PM (general intelligence) and S1 (spatial relations = .55), F2 (perceptual structures) and N (neuroticism/stability =.51), and E (extraversion/introversion) and (L social desirability =.51), while at the $p<0.01$ level it exists only among the variables TAI (anxiety) and P (psychotism) (= .64).

Table 2. *Correlation of psychological characteristics among representative respondents*

	PM	F1	F2	S1	TAI	P	N	E	L	P2	F+	F-	T-15
PM	1.00												
F1	0.66	1.00											
F2	**0.62**	**0.74**	1.00										
S1	**0.77**	**0.57**	0.37	1.00									
TAI	-0.26	-0.08	-0.31	-0.20	1.00								
P	-0.18	-0.17	-0.27	-0.21	0.42	1.00							
N	-0.41	-0.36	-0.45	-0.37	**0.60**	0.47	1.00						
E	0.15	0.17	-0.15	0.35	0.11	-0.09	0.09	1.00					
L	-0.43	-0.14	-0.25	-0.41	**0.60**	-0.02	**0.73**	0.17	1.00				
P2	0.02	0.09	0.17	0.29	0.41	-0.04	0.01	0.15	0.10	1.00			
F+	-0.10	-0.04	-0.25	0.17	0.25	0.42	0.38	0.48	0.27	0.04	1.00		
F-	**0.52**	0.44	0.25	**0.57**	-0.34	-0.47	**-0.61**	0.44	-0.45	-0.05	-0.32	1.00	
T-15	-0.03	-0.16	-0.27	-0.05	**0.80**	0.36	0.42	0.05	0.37	0.39	0.11	-0.25	1.00

In a sample of 16 respondents, coefficients greater than 0.49 are considered statistically significant at the $p<0.05$ level, and coefficients greater than 0.62 are considered statistically significant at the $p<0.01$ level.

By inspecting Table 2, where the obtained results are presented, it can be observed that the variable PM or general intelligence has a statistically significant positive correlation with the variables from the space of sports intelligence, i.e. perceptual reasoning (F1= .66), the ability to speed up the observation of perceptual structures (F2= .62) and the ability to perform spatial relations (S1= .77). A medium positive connection is observed with the variable (F- =.52) that examines the degree of negative emotional reaction. The three variables that define the space of sports intelligence are interconnected with medium to moderately high positive correlations. Correlation with medium and high values exists with the TAI - anxiety variable: with the neuroticism variable (N= .60), social desire (L= .60), and with the aggressiveness variable (T-15 =.80) with which it is in a statistically significant high positive relationship. The degree of connection of the applied neuroticism/stability variable (N) with the variable L (social desire) from the space of emotional characteristics is .73, which indicates a statistically significant correlation. With the variable F- (which examines the degree of negative emotional reaction in situations of sports achievement) it is in a moderate inverse relationship, which is represented by a coefficient of -.61.

Table 3. *Fisher's Z-test for independent correlations for pairs of variables: F1, PM, F2, S1, TAI, P, and N*

Variable 1	Variable 2	r1 (Group 1)	r2 (Group 2)	Z-Statistic	p-Value
F1	PM	0.42	0.66	-0.88	0.38
F2	PM	0.45	0.62	-0.61	0.54
F2	F1	0.31	0.74	-1.61	0.11
S1	PM	0.55	0.77	-1.02	0.31
S1	F1	0.24	0.57	-1.03	0.30
S1	F2	0.36	0.37	-0.03	0.98
TAI	PM	-0.28	-0.26	-0.06	0.96
TAI	F1	0.33	-0.08	1.08	0.28
TAI	F2	0.14	-0.31	1.18	0.24
TAI	S1	-0.05	-0.20	0.39	0.70
P	PM	-0.17	-0.18	0.03	0.98
P	F1	0.32	-0.17	1.28	0.20
P	F2	0.00	-0.27	0.71	0.48
P	S1	0.36	-0.21	1.50	0.13
P	TAI	0.64	0.42	0.79	0.43

N	PM	0.11	-0.41	1.39	0.16
N	F1	0.03	-0.36	1.04	0.30
N	F2	0.51	-0.45	2.67	**0.01***
N	S1	-0.12	-0.37	0.68	0.49
N	TAI	0.04	0.60	-1.67	0.10
N	P	-0.37	0.47	-2.29	**0.02***

Table No.3 presents the analysis of Fisher's Z-test for two independent correlations for each pair of variables, the Z-statistic that measures the difference between the two correlation coefficients, and the p-value that indicates whether the difference is statistically significant. Statistically significant differences at the level of ($p < 0.05$) are observed only in two pairs of variables: N and F2 ($p = 0.01$) i.e. neuroticism and perceptual structures where in group 1 there is a moderate positive correlation (0.51) which means that as the value of one variable increases, the value of the other variable also increases, while in group 2 we have a moderate negative correlation (-0.45), where the relationship turns negative (as one increases, the other decreases). The other statistically significant relationship is between the pair of variables N and P ($p = 0.02$), neuroticism and psychoticism. In group 1, N and P have a negative relationship (higher N means lower P) and are accompanied by a moderate negative correlation (-0.37). In group 2, the relationship is reversed (higher N means higher P). This relationship is accompanied by a moderate positive correlation (0.47). The statistically significant p-value (0.02) suggests that this change is not due to chance. In their research, Friesen, A., et al. (2018) indicate that there are correlations between performance and perceived congruence in desired and actual emotions. Kostovski, Z., et al. (2019), also examined psychological characteristics as a factor for success in karate athletes and concluded that there are statistically significant differences in the entire examined space except for the variables L and P (L - social desire and P - psychoticism).

Table 4, which is a continuation of Table 3, shows that none of the differences are statistically significant, but some correlations change direction or strength between groups. The most notable trend is between variables L and N, i.e. social desirability and neuroticism, which has a much stronger positive relationship in group 2, and $p = 0.09$, or close to significant. The stronger relationship among national team members, i.e. national team players who show a higher positive correlation between social desirability and neuroticism compared to competitors, may suggest that in the national team, individuals who tend to present themselves in a socially desirable manner may also experience higher levels of neuroticism (e.g., anxiety, emotional instability). Karate competitors who are still developing and are considered younger and less experienced than national team members may not feel the same pressure that allows them to focus more on self-improvement than on social expectations. According to research by Shkelzen S., et al. (2022), younger respondents focused more on developing and improving their competence and putting effort into activities, trying to find a strategy to successfully solve the tasks at hand, and less on achieving results and relying on their abilities.

Table 4. *(continued from Table 3), Fisher's Z-test for independent correlations for pairs of variables: E, L, P2, PM, F1, F2, S1, TAI, P, N*

Variable 1	Variable 2	r1 (Group 1)	r2 (Group 2)	Z-Statistic	p-Value
E	PM	0.27	0.15	0.32	0.75
E	F1	0.03	0.17	-0.36	0.72
E	F2	0.29	-0.15	1.15	0.25
E	S1	0.21	0.35	-0.39	0.70
E	TAI	0.16	0.11	0.13	0.90
E	P	0.15	-0.09	0.62	0.54
E	N	0.22	0.09	0.34	0.73
L	PM	-0.05	-0.43	1.04	0.30
L	F1	-0.06	-0.14	0.21	0.84
L	F2	0.07	-0.25	0.83	0.41
L	S1	-0.23	-0.41	0.51	0.61

L	TAI	0.14	0.60	-1.41	0.16
L	P	-0.05	-0.02	-0.08	0.94
L	N	0.25	0.73	-1.72	0.09
L	E	0.51	0.17	1.00	0.32
P2	PM	0.41	0.02	1.06	0.29
P2	F1	-0.02	0.09	-0.28	0.78
P2	F2	0.16	0.17	-0.03	0.98
P2	S1	0.20	0.29	-0.24	0.81
P2	TAI	0.00	0.41	-1.11	0.27
P2	P	0.31	-0.04	0.92	0.36
P2	N	-0.29	0.01	-0.79	0.43
P2	E	0.23	0.15	0.21	0.83
P2	L	-0.10	0.10	-0.51	0.61

From the inspection of table no. 5 (continued from table no. 3), it is noticed that the largest statistically significant difference (0.00) occurs in the pair of variables aggression and anxiety T-15 and TAI. In competitors, aggression is slightly related to anxiety (r1=−0.19 - weak negative correlation), which may mean that they use aggression as a mechanism for coping with stress. In national team players, r2=0.80 (strong positive correlation), where aggression is highly correlated with anxiety, which suggests that as their anxiety increases, so does their aggressive behavior. Anxiety is associated with impaired cognitive-motor performance and increased release of cortisol, a stress hormone that is associated with poorer physical performance and recovery (Lo, L.C., et al. 2019). Aggression can help control anxiety, which is essential for performance and a key area of focus for psychological support and training, emphasize Valentin et al. (2022).

Table 5. *(continued from Table No. 3) Fisher's Z-test for independent correlations for pairs of variables: F+, F-, T15, PM, F1, F2, S1, TAI, P, N, E, L, P2*

Variable 1	Variable 2	r1 (Group 1)	r2 (Group 2)	Z-Statistic	p-Value
F+	PM	0.28	-0.10	0.99	0.32
F+	F1	0.41	-0.04	1.21	0.23
F+	F2	0.03	-0.25	0.73	0.47
F+	S1	0.41	0.17	0.67	0.50
F+	TAI	-0.02	0.25	-0.70	0.48
F+	P	0.29	0.42	-0.38	0.70
F+	N	-0.38	0.38	-2.04	0.04*
F+	E	-0.17	0.48	-1.77	0.08
F+	L	-0.30	0.27	-1.49	0.13
F+	P2	-0.05	0.04	-0.23	0.82
F-	PM	0.44	0.52	-0.27	0.79
F-	F1	0.23	0.44	-0.61	0.54
F-	F2	0.43	0.25	0.52	0.60
F-	S1	0.03	0.57	-1.57	0.12
F-	TAI	-0.07	-0.34	0.72	0.47
F-	P	-0.16	-0.47	0.89	0.37
F-	N	0.21	-0.61	2.35	0.02*
F-	E	0.03	0.44	-1.13	0.26
F-	L	0.26	-0.45	1.91	0.06
F-	P2	0.36	-0.05	1.09	0.28
F-	F+	-0.21	-0.32	0.30	0.76
T-15	PM	-0.04	-0.03	-0.03	0.98

T-15	F1	-0.40	-0.16	-0.67	0.50
T-15	F2	-0.20	-0.27	0.19	0.85
T-15	S1	0.33	-0.05	1.00	0.32
T-15	TAI	-0.19	0.80	-3.29	**0.00***
T-15	P	-0.20	0.36	-1.48	0.14
T-15	N	0.01	0.42	-1.12	0.26
T-15	E	0.16	0.05	0.28	0.78
T-15	L	-0.18	0.37	-1.45	0.15
T-15	P2	-0.04	0.39	-1.15	0.25
T-15	F+	-0.36	0.11	-1.24	0.21
T-15	F-	-0.20	-0.25	0.13	0.89

The second statistically significant relationship is between the pair of variables F+ and N (0.04), where there is a moderately low correlation for competitors and a moderately positive correlation for national team players. It can be assumed that for competitors, higher positive feelings are associated with lower neuroticism, meaning that they may experience emotional stability when they feel good. In contrast, national team players show the opposite pattern - those with higher positive feelings also tend to have higher neuroticism. This may indicate that national team players experience greater emotional highs and lows, possibly due to the stress and expectations of performing at the level of elite karate athletes. Negative feelings and neuroticism are the third pair of variables where there is significance ($p = 0.02$). For competitors, negative feelings are slightly related to neuroticism (0.21), which is expected. However, among national team players, negative feelings are inversely related to neuroticism, suggesting that those who report fewer negative feelings actually show higher neuroticism (0.80). C., Kuśnierz et al. (2023), recommend introducing emotional intelligence training into martial arts programs to improve mental and emotional resilience, which leads to improved performance results and reduced aggression. According to Faro, H.K., et al. (2020), negative emotions can be more effectively controlled by individuals with higher levels of self-esteem who also show lower levels of somatic and cognitive anxiety. Statistically significant differences appear in the examined psychological characteristics between competitors and national team members, which represent a very good indicator of the existence of a specific psychological structure, relevant to achieving sporting success, and according to which competitors are separated from national team members (Soklevska, I.E., Kostovski, Ž., Alaj.,I. 2018).

Conclusion

Using Fisher's exact method for transformation of the intercorrelation matrices and a calculated Z-test, results were obtained indicating that a statistically significant difference exists only in 5 pairs of the examined variables. These significant results suggest that the relationships between certain variables are dramatically different between the two groups. For example, in the pair of variables L and N, the p-value (0.09) suggests that this difference is not very significant, but indicates a significant psychological trend. Athletes who feel externally controlled or pressured (social desirability, national team expectations) experience higher physiological stress (Self-Determination Theory - SDT), which in this case, matches the findings in national team candidates. It would be interesting to conduct research with this sample of respondents that would measure the level of stress in the blood, how it would affect some psychological characteristics that we consider decisive for success or failure and how is link between psychological traits to physiological reactions.The statistically significant differences in heart rate and blood lactate levels between training and competition (Zaborski, B., et al. 2015), indicate that elite athletes maybe experience substantially higher physiological stress in real competition scenarios. According to the results obtained in the pair T-15 and TAI, it could be said that elite athletes experience stress differently, perhaps feeling greater pressure to perform, which causes both anxiety and aggression. Competitors show more conventional relationships (e.g., negative feelings are related to neuroticism as expected). National team members show more complex and sometimes opposite patterns, possibly due to greater psychological pressure, emotional regulation strategies, or environmental expectations. Key differences in neuroticism and emotional regulation suggest that elite athletes may experience stress and emotional highs and lows differently than competitors.

References

Aleksovska, V., L. (2002). *Determination and differences in the psychological structure of personality among athletes from different sports disciplines and non-athletes in the Republic of Macedonia*. Doctoral dissertation, Faculty of Physical Education, Skopje.

Kostovski, Z., Aleksovska, V., L., Iber, A. (2019). Psychological characteristics factor of success in karate athletes, *Sports science and health* 9(1):60-64, DOI: 10.7251/SSH1901060Z, DC: 796.853.26:572.5

Kuśnierz, C., Rogowska, A., & Görner, K. (2023). Emotional intelligence and aggression in kyokushin and shotokan karate athletes. *Arch Budo*, *19*, 137-50.

Mojtahedi, D., Dagnall, N., Denovan, A., Clough, P., Dewhurst, S., Hillier, M., ... & Perry, J. (2023). Competition anxiety in combat sports and the importance of mental toughness. *Behavioral Sciences*, *13*(9), 713.

Faro, H. K., Tavares, M. P., Gantois, P. M., Pereira, D. C., de Lima, M. N., de Lima-Junior, D., ... & Fortes, L. S. (2020). Comparison of competitive anxiety and self-confidence in Brazilian Jiu-Jitsu skills levels: A cross-sectional in-event study. *Ido Movement for Culture*, *20*(1).

Friesen, A., Lane, A., Galloway, S., Stanley, D., Nevill, A., & Ruiz, M. C. (2018). Coach–athlete perceived congruence between actual and desired emotions in karate competition and training. *Journal of Applied Sport Psychology*, *30*(3), 288-299.

Lo, L. C., Hatfield, B. D., Wu, C. T., Chang, C. C., & Hung, T. M. (2019). Elevated state anxiety alters cerebral cortical dynamics and degrades precision cognitive-motor performance. *Sport, Exercise, and Performance Psychology*, *8*(1), 21.

Ilievski, E. S., Shala, E., & Kostovski, Z. (2018). Structure of Situation Motor Stereotips of Karate Competitors and Karate Representatives. *SPORTS SCIENCE AND HEALTH*, *15*(1).

Soklevska, I.E., Kostovski, Ž., Alaj., I. (2018). Differences in the psychological characteristics of karate athletes, XVIII-th International scientific conference ‘‘The power of knowledge’’, Vol.26.3, 979-984, Agia Triada Greece

Shala, S., Emini, B., Stankovska, Z., Nikqi, V., Gontarev, S., & Kostovski, Z. (2022). The relationship of goal orientation, self-esteem, situational motivation and satisfaction from sports among young karate athletes. *SPORTS SCIENCE AND HEALTH*, *24*(2), 150-158.

Valentin, S., Vladimir, P., & Emanuel, M. L. (2022). ANXIETY AND AGGRESSION IN ELITE MARTIAL ARTS ATHLETES. In *Scientific Conference* (p. 148).

Zaborski, B., Šakiri, K., Đukanović, N., & Kostovski, Ž. (2015). Changes in the Physiological Processes During Training and Official Competitions in Young Karate Athletes/Promjene u fiziološkim procesima za vrijeme treninga i zvaničnih takmičenja kod mladih karatista. *Sports Science and Health*, *10*(2).

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