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## Sport technique as a determinant of athletes' personality

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### Abstract

**Background & Aim:** In sports, three groups of sports disciplines can be distinguished depending on the way of performing movement actions: a group with a significant degree of kinematic stabilization in the structure of sports technique; a group with a significant degree of stabilization of the dynamic structure of sports technique; a group with a significant degree of variation in sports technique. This study was intended to determine whether sport technique, depending on the degree of stabilisation and variability of movement actions, is a differentiator of athletes' personality. **Method:** 90 Polish athletes (men, N=90) from clubs operating in the Polish region of Lower Silesia were purposefully selected for the study as part of three samples: breakdancers (n=30), swimmers (n=30) and shotokan style karatekas (n=30). All the subjects had been considerably successful at international sport competitions. The age of the subjects ranged between 20 and 29 years. The research method chosen was the NEO-FFI Personality Inventory. The basic statistical methods used were a one-way analysis of variance and post-hoc tests. The level of significance was set as the probability of  $p < 0.05$ . The statistical analysis was performed using the Statistica 13.1 program. **Results:** Statistically significant differences were revealed in neuroticism among all of the groups studied, in extraversion – between dancers and karatekas, in openness to experience – between dancers and karatekas and between swimmers and karatekas, and in agreeableness – between dancers and karatekas. No statistically significant differences were revealed with regard to conscientiousness. **Conclusions:** Sport technique is a determinant of athletes' personality. In addition, sport technique, depending on the degree of stabilisation and variability, is a differentiator of athletes' personality. Therefore, athletes practising different sport disciplines are characterised by different personalities.

**Keywords:** sport psychology, theory of sport, personality, sport technique, NEO-FFI

### Introduction

An important element of every sport discipline is sport technique, which should be seen as a general method of performing a movement task, defined by the rules of a given discipline and taking into account tactics, motor and mental skills and somatic characteristics [Sanders et al., 2002; Owen et al., 2014; Piepiora et al., 2019]. On the other hand, when viewed from a didactic perspective, sport technique is referred to a movement

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pattern [Liu et al., 2016]. Sport technique is a movement action that enables the performance of a sport action in an economical and effective manner [Piepiora et al., 2016a; Piepiora and Petecka, 2020]. This means that a task that an athlete is faced with and that has a clearly defined goal impels that athlete to select a specific action meant to ensure the most economical possible (i.e. without unnecessary effort) and effective (i.e. consistent with his or her intention) accomplishment of that goal [Szajna, 2006; Brizin and Kernspecht, 2014; Piepiora and Kaśków, 2019].

The purpose of sport training is to shape the movement structure in such a way as to enable an athlete to make the maximum use of his or her fitness capabilities in sport combat. One may distinguish three groups of sport disciplines depending on the manner in which movement actions are performed [Lees, 2002; Franchini et al., 2005; Czajkowski, 2006; Reguli et al., 2011; Potop, 2014; Piepiora and Witkowski, 2015]:

1. a group with a significant degree of stabilisation of the kinematic structure of sport technique;
2. a group with a significant degree of stabilisation of the dynamic structure of sport technique;
3. a group with a significant degree of variability of sport technique, usually caused by the opponent, who renders it difficult to perform a task.

For the purposes of the theory of sport and sport psychology, sport technique may be regarded as a determinant of athletes' personality, which is seen as a character trait acquired through experience. A question needs to be asked: is sport technique, depending on the degree of stabilisation and variability, a differentiator of athletes' personality? If so, then athletes practising different disciplines should be characterised by different personalities. If this is not the case, then athletes from different disciplines should have the same personality. This study was intended to determine these interdependencies.

## Method

90 Polish athletes (men, N=90) from clubs operating in the Polish region of Lower Silesia were purposefully selected for the study as part of three samples:

1. breakdancers (n=30, a group with a significant degree of stabilisation of the kinematic structure of sport technique);
2. swimmers (n=30, a group with a significant degree of stabilisation of the dynamic structure of sport technique);
3. shotokan style karatekas (n=30, a group with a significant degree of variability of sport technique).

All the subjects had been considerably successful at international sport events and an overwhelming majority of them were current or former members of the Polish national team at international competitions. The age of the subjects ranged between 20 and 29 years. The inclusion criterion was: many years of sports experience; license for one of six established sports disciplines; impeccable trainer; documented sports achievements at various levels of competition (national, continental, global). The exclusion criterion was: ethical or unsportsmanlike lifestyle; no recommendation from the trainer.

Table 1 presents basic descriptive statistics for all the athletes studied, while Tables 2, 3 and 4 show basic descriptive statistics for the individual groups studied: dancers (Table 2), swimmers (Table 3) and karatekas (Table 4).

**Table 1.** Basic descriptive statistics of all athletes studied

Variable	N	Mean	Median	Min.	Max.	Lower quartile	Upper quartile	Range	IQR	Stand. deviation	Coeff. of variation.	Skewness
NEUROTICISM	90	11.34444	12.00000	1.00000	20.00000	8.00000	15.00000	19.00000	7.000000	4.676408	41.22201	-0.317980
EXTRAVERSION	90	28.98889	29.50000	14.00000	44.00000	27.00000	32.00000	30.00000	5.000000	4.171854	14.39122	-0.260719
OPENNESS TO EXPERIENCE	90	21.77778	23.00000	13.00000	31.00000	19.00000	25.00000	18.00000	6.000000	4.362191	20.03047	-0.309821
AGREEABLENESS	90	24.32222	25.00000	17.00000	32.00000	22.00000	26.00000	15.00000	4.000000	3.266541	13.43027	-0.096273
CONSCIENTIOUSNESS	90	34.14444	34.50000	23.00000	42.00000	32.00000	36.00000	19.00000	4.000000	3.794026	11.11169	-0.352739

**Table 2.** Basic descriptive statistics of dancers

Variable	N	Mean	Median	Min.	Max.	Lower Quartile	Upper Quartile	Range	IQR	Stand. deviation	Coeff. of variation.	Skewness
NEUROTICISM	30	14.93333	14.50000	10.00000	20.00000	13.00000	18.00000	10.00000	5.000000	2.863966	19.17834	-0.050985
EXTRAVERSION	30	28.16667	28.00000	23.00000	34.00000	26.00000	31.00000	11.00000	5.000000	2.767837	9.82664	0.233092
OPENNESS TO EXPERIENCE	30	19.63333	20.00000	13.00000	27.00000	15.00000	23.00000	14.00000	8.000000	4.327007	22.03908	0.019036
AGREEABLENESS	30	23.10000	23.50000	18.00000	27.00000	21.00000	25.00000	9.00000	4.000000	2.411896	10.44111	-0.457235
CONSCIENTIOUSNESS	30	33.73333	34.00000	27.00000	38.00000	32.00000	35.00000	11.00000	3.000000	2.728310	8.08788	-0.528914

**Table 3.** Basic descriptive statistics of swimmers

Variable	N	Mean	Median	Min.	Max.	Lower Quartile	Upper Quartile	Range	IQR	Stand. deviation	Coeff. of variation.	Skewness
NEUROTICISM	30	12.90000	13.00000	7.00000	18.00000	11.00000	15.00000	11.00000	4.000000	2.643796	20.49454	-0.11228
EXTRAVERSION	30	28.46667	29.50000	19.00000	33.00000	27.00000	31.00000	14.00000	4.000000	3.549972	12.47063	-1.17656
OPENNESS TO EXPERIENCE	30	21.36667	22.50000	13.00000	28.00000	19.00000	24.00000	15.00000	5.000000	4.114594	19.25707	-0.38004
AGREEABLENESS	30	24.63333	25.00000	17.00000	32.00000	23.00000	28.00000	15.00000	5.000000	3.925894	15.93732	-0.35772
CONSCIENTIOUSNESS	30	35.13333	35.00000	23.00000	42.00000	33.00000	39.00000	19.00000	6.000000	4.732378	13.46977	-0.73131

**Table 4.** Basic descriptive statistics of karatekas

Variable	N	Mean	Median	Min.	Max.	Lower Quartile	Upper Quartile	Range	IQR	Stand. deviation	Coeff. of variation.	Skewness
NEUROTICISM	30	6.20000	7.00000	1.00000	14.00000	4.00000	8.00000	13.00000	4.000000	2.952497	47.62093	0.341759
EXTRAVERSION	30	30.33333	31.00000	14.00000	44.00000	28.00000	33.00000	30.00000	5.000000	5.504439	18.14650	-0.627314
OPENNESS TO EXPERIENCE	30	24.33333	24.00000	17.00000	31.00000	22.00000	27.00000	14.00000	5.000000	3.325278	13.66552	-0.126382
AGREEABLENESS	30	25.23333	25.00000	19.00000	31.00000	23.00000	27.00000	12.00000	4.000000	3.002107	11.89738	-0.019578
CONSCIENTIOUSNESS	30	33.56667	33.50000	26.00000	41.00000	31.00000	36.00000	15.00000	5.000000	3.578512	10.66091	-0.262655

The research method chosen was the NEO-FFI Personality Inventory [Wiggins, 1996]. The questionnaire used in this method is designed to measure the personality traits included in the popular five-factor personality model, known as the “Big Five” model. The questionnaire items are composed of 60 self-descriptive statements, the truthfulness of which was rated by the subjects with regard to themselves on a five-point scale: 1 – “Strongly disagree”; 2 – “Disagree”; 3 – “Neutral”; 4 – “Agree”; 5 – “Strongly agree”. These items make up five measurement scales: openness to experience (fantasy, aesthetics, feelings, actions, ideas, values), conscientiousness (competence, order, dutifulness, achievement-striving, self-discipline, deliberation), extraversion (gregariousness, warmth, assertiveness, activity, excitement-seeking, positive emotions), agreeableness (trust, straightforwardness, altruism, compliance, modesty, tender-mindedness), neuroticism (anxiety, aggressive hostility, depression, impulsiveness, vulnerability, self-consciousness), described in the high-low scale. The acronym OCEAN is also used to name supercells. On the basis of this theory, the NEO-FFI personality inventory was created to measure the above features. It is accepted that the above factors are independent of race, culture and gender. They are characterized by a high level of inheritance. The scores obtained using the NEO-FFI Personality Inventory allow for a full description of the subjects' personality [McCrae and Costa, 2003; Costa and McCrae, 2007].

The basic statistical methods used were a one-way analysis of variance and post-hoc tests. The level of significance was set as the probability of  $p < 0.05$ . The statistical analysis was performed using the Statistica 13.1 program.

## Results

Interdependencies in the personality profiles among the three groups of athletes were examined. These groups differed in terms of the manner in which their movement actions are performed. The scores obtained by athletes are illustrated in Fig. 1.

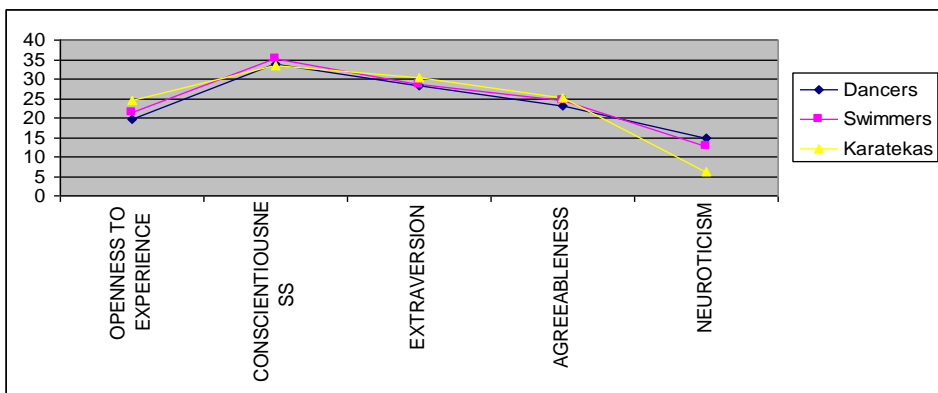


Fig. 1. Personality scores of groups studied

A comparison of the scores revealed the following statistically significant differences: in openness to experience – between dancers and karatekas and between swimmers and karatekas (Table 5), in conscientiousness – no statistically significant differences (Table 6), in extraversion – between dancers and karatekas (Table 7), in

agreeableness – between dancers and karatekas (Table 8), in neuroticism – between all the groups studied (Table 9).

**Table 5.** Summary of differences on the openness to experience scale

No.	GROUP	1 19.633	2 21.367	3 24.333
1	Dancers		0.092458	0.000014
2	Swimmers	0.092458		0.004564
3	Karatekas	0.000014	0.004564	

**Table 6.** Summary of differences on the conscientiousness scale

No.	GROUP	1 33.733	2 35.133	3 33.567
1	Dancers		0.153982	0.864458
2	Swimmers	0.153982		0.111163
3	Karatekas	0.864458	0.111163	

**Table 7.** Summary of differences on the extraversion scale

No.	GROUP	1 28.167	2 28.467	3 30.333
1	Dancers		0.777835	0.043975
2	Swimmers	0.777835		0.081751
3	Karatekas	0.043975	0.081751	

**Table 8.** Summary of differences on the agreeableness scale

No.	GROUP	1 23.100	2 24.633	3 25.233
1	Dancers		0.064791	0.010884
2	Swimmers	0.064791		0.466200
3	Karatekas	0.010884	0.466200	

**Table 9.** Summary of differences on the neuroticism scale

No.	GROUP	1 14.933	2 12.900	3 6.2000
1	Dancers		0.006484	0.000000
2	Swimmers	0.006484		0.000000
3	Karatekas	0.000000	0.000000	

The scores obtained were converted into the sten score scale. Sten scores of 1-3 should be treated as low, those of 4-6 as medium and those of 7-10 as high. Dancers obtained a sten score of 3 in openness to experience, 7 in conscientiousness, 5 in extraversion, 4 in agreeableness and in neuroticism. Swimmers had a sten score of 3 in openness to experience, 7 in conscientiousness, 5 in extraversion, 4 in agreeableness and 3 in neuroticism. For karatekas these scores were as follows: 4 in openness to experience, 7 in conscientiousness, 6 in extraversion and in agreeableness, 1 in neuroticism. The results on the sten scale are depicted in Fig. 2

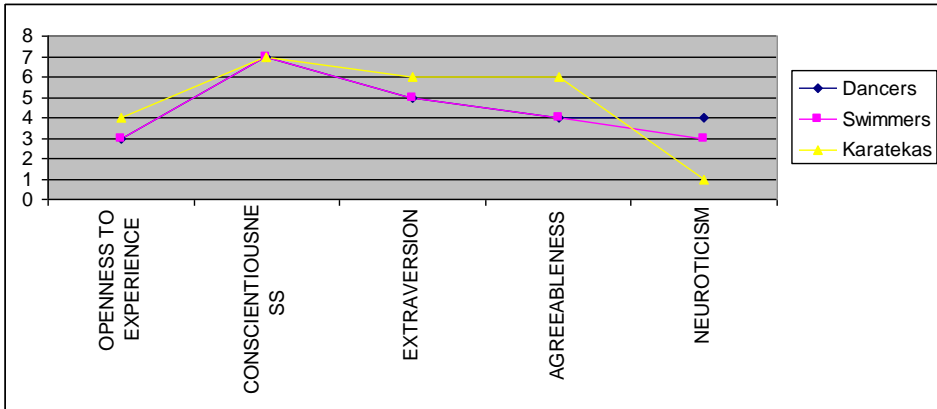


Fig. 2. Personality indicators in the stenographic scale of the studied groups

## Discussion

Sport technique depends on exertion, coordination and movement capacities as well as on motor memory, mobility, motivation, emotions and attitude. In the course of forming an athlete's sport technique, efforts should be made to develop a movement habit that will result in its automatic execution, letting the performer focus on the right timing, place and speed. The more solidified a movement habit is – through precise repetition in different conditions and situations, the less effort is needed by an athlete to perform that technique in sport combat or training. If an athlete has optimal strength resources while performing the technique, he or she will focus on coordination and precision. Therefore, it is sport technique that shapes a given sport discipline, is an integral part of it and determines it.

The scores obtained provide a fairly clear depiction of the differences in the personality of athletes depending on the degree of stabilisation and variability of movement actions in a given sport technique. It is worth noting that all the groups exhibited high conscientiousness, which confirms the existing state of knowledge on the high, developed level of conscientiousness in physically active persons [Piedmont et al., 1999; Backmand et al., 2003; McKelvie et al., 2003; Blecharz and Siekańska, 2005; Ekinci and Hosany, 2006; Shipley et al., 2007; John et al., 2008; Soto et al., 2008; Hill et al., 2010; Allen et al., 2011; Tok, 2011; Tomczak et al., 2013; Allen and Laborde, 2014; Piepiora and Piepiora, 2015; Piepiora et al., 2016b; Piepiora et al., 2016c; Witkowski et al., 2017]. At the same time differences in the level of neuroticism show how anxiety, aggressive hostility, depression, impulsiveness, vulnerability and self-consciousness vary depending on the sport technique specific to a given discipline. Karate shotokan is a combat sport. A karateka cannot fear his or her opponent and, simultaneously, be aggressively hostile, hence the low level of neuroticism. The low level of neuroticism in swimmers (but higher than in karatekas) is the effect of controlling impulsiveness – a state of proper stimulation, i.e. sport readiness, while medium neuroticism in dancers is a manifestation of exerting control over vulnerability. Extraversion and agreeableness were exhibited by all the subjects at a medium level. Openness to experience was low in dancers and swimmers and medium in karatekas. This means that traits such as gregariousness,

warmth, assertiveness, activity, excitement-seeking, positive emotions, trust, straightforwardness, altruism, compliance, modesty, tender-mindedness, fantasy, aesthetics, feelings, actions, ideas and values reflect the specific nature of the sport discipline practised, its goals and challenges [Kajtana et al., 2004; Zdebski and Blecharz, 2004; Anghel et al., 2009; Shrivastava et al., 2010; Fuller, 2011; Ilyasi and Salehian, 2011; Binboga et al., 2012; Tolea et al., 2012; Allen et al., 2013; Boostani et al., 2013; Mirzaei et al. 2013; Terracciano et al., 2013; Piepiora et al., 2017; Piepiora and Witkowski, 2018; Piepiora et al., 2018].

Sport technique should be formed from the first moments of training, in a methodical manner and without errors, as a badly formed technique is extremely difficult to correct. Every sport discipline has a basic technique standard, generally accepted and taught, which is a model that a beginner is supposed to imitate. That standard technique must comply with the principles of biomechanics and its effectiveness depends on the physiological capabilities of a person's body. One must not confuse the basic (model) technique with the master technique. A master will, after learning the basic technique, adapt it to his or her own needs and psychomotor capabilities. A beginner must not follow it uncritically. After mastering the basics everyone customises technique to suit his or her talent, which is why there are differences in the personality profiles of athletes depending on the manner in which movement actions are performed, their degree of stabilisation and variability.

The obtained test results have great practical value. They show the personality of athletes due to differences in sports technique in a given discipline as a specific pattern of behavior. This knowledge will allow the trainer to choose precise goals and training loads and will serve as a scheme for dealing with specific athletes, also in the field of trainer-player communication.

## Conclusions

Sport technique is a determinant of athletes' personality. In addition, sport technique, depending on the degree of stabilisation and variability of movement actions, is a differentiator of athletes' personality. Therefore, athletes practising different sport disciplines are characterised by different personalities. The group of subjects with a significant degree of stabilisation of the kinematic structure of sport technique (breakdancers) exhibit low openness to experience, high conscientiousness, medium extraversion, agreeableness and neuroticism. The group with a significant degree of stabilisation of the dynamic structure of sport technique (swimmers) are characterised by low openness to experience, high conscientiousness, medium extraversion and agreeableness, low neuroticism. Finally, the group with a significant degree of variability of sport technique (shotokan style karatekas) demonstrate medium openness to experience, high conscientiousness, medium extraversion and agreeableness, low neuroticism.

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