

Sex-and sport related differences in the personality traits students in volleyball, basketball and judo athletes

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Abstract

Purpose: Psychology is a very important field of knowledge in every area of human life, and personality and temperament have a large impact on the quality of human life, including mental and physical health, and indirectly on the results achieved in elite sport. The purpose of the study was to verify the assumption that there are differences in the psychological profile of professional sportsman students depending on the gender and type of sports discipline.

Material: The research covered athletes of both sexes belonging to academic sports clubs practicing volleyball, basketball and judo. The size of each of the six groups was 24 people. Standardized psychological tests were used to determine the levels of selected personality and temperamental traits: trait anxiety, neuroticism, extraversion, briskness, perseverance, sensory sensitivity, emotional reactivity, endurance, activity, and six components of aggressiveness: physical aggressiveness, verbal aggressiveness, indirect aggressiveness, negativism, suspiciousness, resentment, irritability, overall and guilty sense. Two-way analysis of variance (sex * sport) was used to assess the differences between the groups.

Results: Women showed higher trait anxiety, extraversion, perseverance, emotional reactivity results and lower physical aggressiveness levels compared to men. Basketball practitioners had the lowest levels of aggressiveness components, and the highest levels of briskness.

Conclusions: The results suggest that the psychological profile of women participating in competitive sports may account for a higher emotional cost than men in terms of competition and failure. This fact should be taken into account by the coaches of female sports teams. The differences between sports may be due to the different structure of the task.

Keywords: volleyball, basketball, judo, gender, personality

Introduction

Personality and temperament greatly affect the quality of human life, including mental and physical health and interpersonal relationships. To assess the psychological profile, questionnaires examining the intensity of individual features are used, which allows to some extent to predict the behavior of the respondent in various circumstances. In the case of athletes, getting to know the personality may be important, in the case of problems in the player-coach relationship, excessive arousal before the competition, i.e. poor coping with pre-competition stress, reduced motivation for performance or excessive perfectionism. Many observations were made in team sports, because in this case the type of player's personality determines the quality of team cooperation. Research conducted in volleyball players of various teams showed differences in the levels of neuroticism, extraversion and conscientiousness depending on the sports class [1], while in basketball, "The Big Five" differed slightly between players in different positions [2].

The level of state anxiety accompanying the competition correlates with the trait anxiety trait, therefore this parameter, determined in neutral conditions,

can be used as a predictor of situational anxiety during the competition. The study of anxiety during volleyball and basketball competitions showed a statistically non-existent lower level of the variable (by 9%) in basketball players [3]. Comparisons between the group of martial arts (wrestling, karate, judo, kick boxing, taekwondo and MMA) and the group of team games (football, basketball, volleyball and handball) showed significantly higher levels of self-esteem and neuroticism of game players [4].

Comparing the personalities of adult athletes of various sports raises doubts as to the extent to which the observed differences are the result of many years of experience in a sports career, and what is the share of psycho-physical predispositions in adolescents in the choice of a given sport. Partial explanation of this problem can be obtained by selecting for research such sports in which the requirements for somatic structure are the same. This criterion is met by basketball and volleyball. In both sports, high growth determines the selection at the beginning of the sports career, while the specific psycho-motor performance is formed by appropriate training measures. The physical performance parameters in both sports must correspond to the structure of the task. Basketball players cover a distance several times longer during a match than in a similar time volleyball players

[5-7], as a result, blood lactate concentration, which is a marker of exercise intensity, is almost twice as high [8, 9].

The players of both sports games are exposed to injuries both during competitions and training. The most common among volleyball players are ankle joint and knee joint injuries as a result of repeated maximum jumps during attack and defence [10-12]. Basketball is a contact sport, hence one of the causes of injuries are collisions with an opponent [13, 14]. As a result, in basketball players the incidence of injuries is many times higher during matches than during training, while for volleyball players the relationship is opposite [15].

Interestingly, women who practice basketball are more likely than men to be at risk of lower limb injuries [16]. It should be emphasized that in basketball players injuries caused by the opponent are not intentional, as fouls are punished. On the other hand, the offensive style of play, which is one of the causes of injury, is also one of the conditions for gaining an advantage over the opponent. In the case of judo, the sport of combat, the energy expenditure during a single fight lasting a few minutes is small, while the intensity of this effort estimated on the basis of blood lactate concentration is very high [17]. However, during one-day competition, athletes perform a lot of maximum effort, which leads to an accumulation of fatigue at the end of the tournament and a partial loss of the ability to maximum muscle contraction [18].

The risk of injury to judo athletes during the official fight results, among others from the very idea of competition, which assumes gaining a physical advantage over the opponent in direct confrontation as a result of immobilization by placing a lever on the elbow joint (arm lock) or using throwing techniques. The *o-soto-gari* and *o-uchi-gari* techniques may athletes (*uke*) cause serious head injuries [19, 20].

The analysis of the frequency of injuries during the high morning of the competition showed a greater risk in the group of men in heavy weight categories, and in women in lighter weight categories, while the overall frequency of injuries was lower in female athletes [21]. The above characteristics of the mentioned sports with a different task structure in the mentioned ones, and the risk of injury depending on the sex, prompts us to formulate a hypothesis about the causal relationship between the athlete's psychological profile and the sports discipline practiced by him. The premise for this assumption is the results of personality studies conducted on men in four Far Eastern martial arts, differing in the degree of risk of serious head injury [22, 23].

Data analysis showed that the greatest tendency to aggressive behavior was shown by participants in shotokan karate, where no body protection, including head protection, is used against kicks. The results could suggest that the level of aggressiveness was proportional to the number of physical contacts resulting in injury. The aim of the presented study was to compare an extended personality analysis of men and women practicing volleyball, basketball and judo.

Material and Methods

Participants. Psychological research covered athletes of both sexes, aged 22-26, who trained volleyball, basketball and judo on a daily basis in various academic clubs. Some of them were the backbone of the national team and took part in central training camps, and then participated in international competitions of the highest rank. These people used a wide range of diagnostic biomedical tests, including psychological tests carried out at the Institute of Sport in Warsaw. The size of each of the six groups was the same ($n = 24$).

Research design. Psychological studies were conducted to determine the psychological profile, which consisted of relatively constant personality traits: Level of anxiety (TA), neuroticism (Ne), extroversion (Ex), general aggressiveness (OA) and its components, physical aggressiveness (PA), verbal aggressiveness (VA), indirect aggressiveness (IA), negativity (Ng), suspicion (Su), aversion (Re), irritability (Ir) and guilt (GS). In addition, selected characteristics of temperament were determined: briskness (Br) perseverance (Pe) sensory sensitivity (SS) emotional reactivity (ER), endurance (En) and activity (Ac). For these studies, standardized psychological tests were used: State / Trait Anxiety Spielberger (Polish version), Buss AH Durkee A Inventory (Polish version), MPI test by Eysenk: neuroticism and extroversion (Polish version) and the FCZ-KT by Strelau and Zawadzki inventory of temperamental traits. The research was carried out in the morning (9:00-11:00) in conditions ensuring concentration, without time pressure. The respondents agreed to participate and the research protocol was approved by the Ethics Committee at the Institute of Sport.

Statistical analysis. Two-way ANOVA (gender x sport) was used to compare the differences in the results of these variables. The assumptions of this test, the normality of the distribution for variables were checked with the Shapiro-Wilk test and the homogeneity of variance with the Leven test. Calculations were made on logarithm data, and then Bonferroni's post-hoc test was applied to determine the significance of differences ($p < 0.05$) between groups for each variable.

Results

Table 1 shows the means and standard deviations for each of the six groups separately; i.e. men training basketball (MB), volleyball (MV), judo (MJ) and women from the same disciplines, FB (Females, Basketball), FV (Females, Volleyball) and FJ (Females, Judo), respectively. The mean values of psychological variables in sports in terms of gender were compared. The variables differentiating the statistically studied sports groups and gender are marked in bold with an index indicating the differences between the groups.

Table 2 shows the means, standard deviations, and mean differences between the sexes for the combined sports and between sports for the combined genders. Variables statistically differentiating genders and sports are marked in bold.

Table 1. Data of personality traits scores in six groups *n=24, two sexes *n=72 and three sports*n=48. Between-groups comparisons of the variables by sexes and sports.

Personality Traits (Abbreviations)	Sport*Sex Groups					
	Basketball (B)		Volleyball (V)		Judo (J)	
	Males (MB)	Females (FB)	Males (MV)	Females (FV)	Males (MJ)	Females (FJ)
Trait anxiety (TA)	36.7±6.4	39.1±4.5	37.4±4.5	37.0±4.9	35.2±4.4	40.2±5.9
Neuroticism (Nu)	19.9±9.2	25.7±8.7	26.4±10.0	19.3±6.5	22.5±8.4	28.6^{MB}±7.9
Extraversion (Ex)	29.9±10.0	32.4±7.9	26.4±10.4	36.6^{MV}±9.0	31.7±9.8	30.3±10.7
Briskness (Br)	16.5±2.3	17.5^{FV}±2.0	15.3±2.5	15.1±1.9	15.5±2.5	15.8±3.9
Perseveration (Pe)	12.0 ^{FB} ±3.9	15.5±3.1	14.3±2.9	14.3±2.6	12.7±3.4	13.2^{FB}±2.9
Sensory sensitivity (SS)	14.5±3.7	15.9±1.6	16.0±1.8	15.8±1.9	14.9±3.4	15.0±4.0
Emotional reactivity (ER)	7.1±3.9	9.8±4.1	9.0±4.0	8.5±4.2	6.8±3.0	11.8^{MJ}±3.5
Endurance (En)	11.3±5.6	12.5±5.2	6.4±5.1	7.0±1.8	11.1±3.9	11.0±4.8
Activity (Ac)	11.1±4.8	13.9^{MB}±3.6	13.0±3.2	14.0±2.8	14.1^{MB}±4.8	12.5±4.4
Overall aggressiveness (OA)	61.4±22.6	69.4±24.7	79.5±14.1	77.2±25.1	76.5±26.4	79.1±20.1
Physical aggressiveness (PA)	7.7^{MJ}±4.0	7.3±3.4	10.2±3.1	7.8±5.1	13.8±5.1	9.8^{MJ}±3.9
verbal aggressiveness (VA)	10.7±5.6	13.0±6.1	13.2±4.9	13.8±5.3	12.6±5.7	12.7±5.1
Indirect aggressiveness (IA)	7.1±4.2	7.5±4.2	9.3±3.2	8.8±4.2	7.4±3.8	10.3±3.4
Negativism (Ne)	9.9±5.5	10.9±5.2	13.6±3.0	14.6±4.6	13.8±5.0	14.7±4.9
Suspiciousness (Su)	6.5±3.1	9.8±4.8	9.5±3.8	8.6±4.8	9.0±5.8	9.6±4.3
Resentment (Re)	5.4±3.2	7.1±5.2	8.1±2.3	6.9±4.2	6.6±3.9	6.9±3.2
Irritability (Ir)	12.8±6.0	14.3±6.3	15.7±5.0	16.8±5.6	13.3±6.6	15.2±6.4
Guilty sense (GS)	13.5±4.6	13.4±3.3	13.8±4.7	12.3±2.5	11.7±4.1	13.3±5.7

Note: Statistical difference between variables was set at p<0.05 and was marked in bold.

Table 3 and 4 present in detail results of analysis of variance.

The results of the variables and comparisons between the genders within each sport and between sports revealed significant differences for the Br Ex and Ac indices. The

data in Table 2 shows that a group of women (n = 72) practicing three sports had statistically higher scores for the following features: TA by 13.4%, Ex by 13.0%, Pe by 10%, ER by 31.6% and lower PA level by 21.7%. The remaining components of aggressiveness in women (VA,

Table 2. Data of personality traits scores and their overall comparisons by sex and sport

Personality Traits	Sex		Sport		
	Males	Females	Basketball	Volleyball	Judo
Trait anxiety (TA)	36.1±5.2	38.8^M±5.2	37.4±5.5	37.2±4.6	37.7±5.7
Neuroticism (Nu)	23.0±9.6	24.5±8.5	23.8±9.3	22.8±9.2	25.6±8.6
Extraversion (Ex)	29.3±10.2	33.1 ^M ±9.2	31.2±9.0	31.6±10.8	31.0±9.9
Briskness (Br)	16.1±2.6	16.2±2.7	17.0±2.2	15.2^B±2.1	16.2±3.2
Perseveration (Pe)	13.0±3.4	14.3^M±3.0	13.7±3.2	14.3±2.7	13.0±3.2
Sensory sensitivity (SS)	15.1±3.1	15.6±2.7	15.2±2.8	15.9±1.9	15.0±3.7
Emotional reactivity (ER)	7.6±3.7	10.0^M±4.1	8.5±4.2	8.8±4.0	9.3±4.1
Endurance (En)	9.6±5.4	10.2±4.8	11.9^V±5.4	6.7±3.8	11.1^V±4.3
Activity (Ac)	12.7±4.4	13.5±3.7	12.5±4.4	13.5±2.9	13.3±4.6
Overall aggressiveness (OA)	72.4±22.9	75.2±23.7	79.5±14.1	77.2±25.1	77.2±25.1
Physical aggressiveness (PA)	10.6±4.8	8.3 ^M ±4.3	7.5±3.7	9.0±4.3	11.8 ^{V,B} ±5.0
Verbal aggressiveness (VA)	12.2±5.5	13.2±5.5	11.8±5.2	13.5±5.2	12.7±5.3
Indirect aggressiveness (IA)	7.9±3.8	8.9±4.1	7.3±4.2	9.0±3.7	8.9±3.9
Negativism (Ne)	12.4±5.1	13.4±5.2	10.4±5.0	14.1^V±3.9	14.3^V±5.1
Suspiciousness (Su)	8.3±4.5	9.3±4.6	8.1±4.4	9.1±4.3	9.3±4.9
Resentment (Re)	6.7±3.3	6.9±4.2	6.3±4.3	7.53.4	6.7±3.5
Irritability (Ir)	13.9±5.9	15.4±6.1	13.5±6.2	16.2±5.2	14.3±6.4
Guilty sense (GS)	13.5±4.6	13.3±4.0	13.4±3.7	13.5±3.8	12.5±5.0

Note: Statistical difference between variables was set at $p < 0.05$ and was marked in bold.

IA, Ne, Su, Re and Ir were insignificantly higher than in men, therefore the general aggressiveness (OA), which is an algebraic sum of all components, is slightly higher in the group of women. Temperament parameters: average

Br results, En is differentiated by three sports. Similarly the components of aggressiveness, PA and Ne are also different in three sports disciplines. The lowest values of these indicators were noticed in basketball.

Table 3. Detailed results of variance analysis for selected personality traits

Personality traits	Source of the variance	F-value	P-value	η square	observed test power (α)
trait anxiety	Sport	0.107	0.888	0.002	0.066
	Sex	9.99	0.002	0.068	0.881
	interaction	3.62	0.029	0.050	0.661
neuroticism	Sport	1.65	0.196	0.023	0.343
	Sex	1.16	0.282	0.008	0.188
	interaction	9.30	0.000	0.119	0.976
extraversion	Sport	0.026	0.974	0.000	0.054
	Sex	5.57	0.020	0.039	0.549
	interaction	4.44	0.014	0.060	0.755
briskness	Sport	5.89	0.004	0.079	0.869
	Sex	0.052	0.820	0.000	0.056
	interaction	1.18	0.310	0.017	0.256
perseveration	Sport	1.94	0.148	0.027	0.396
	Sex	6.50	0.011	0.045	0.716
	interaction	3.98	0.021	0.055	0.705
sensory sensitivity	Sport	1.32	0.272	0.019	0.281
	Sex	0.952	0.330	0.007	0.163
	interaction	0.992	0.374	0.014	0.220
emotional reactivity	Sport	0.538	0.585	0.008	0.137
	Sex	15.0	0.000	0.098	0.971
	interaction	6.22	0.003	0.083	0.888
endurance	Sport	18.1	0.000	0.208	0.999
	Sex	0.555	0.458	0.004	0.115
	interaction	0.270	0.764	0.003	0.092
activity	Sport	0.862	0.425	0.012	0.196
	Sex	1.48	0.226	0.011	0.027
	interaction	3.43	0.035	0.047	0.636

Note: Statistical difference between variables was set at $p < 0.05$ and was marked in bold.

Table 4. Detailed results of variance analysis for components of aggressiveness

Personality traits	Source of the variance	F-value	P-value	η square	observed test power (α)
overall aggressiveness	Sport	5.13	0.007	0.069	0.817
	Sex	0.546	0.461	0.004	0.114
	interaction	0.665	0.516	0.009	0.160
physical aggressiveness	Sport	12.9	0.000	0.158	0.997
	Sex	10.3	0.002	0.069	0.889
	interaction	2.47	0.088	0.035	0.490
Verbal aggressiveness	Sport	1.13	0.326	0.016	0.246
	Sex	1.16	0.284	0.008	0.188
	interaction	0.532	0.588	0.008	0.136
Indirect aggressiveness	Sport	3.01	0.052	0.042	0.576
	Sex	2.22	0.138	0.016	0.316
	interaction	2.56	0.081	0.036	0.505
Negativism	Sport	9.53	0.000	0.122	0.979
	Sex	1.39	0.240	0.009	0.216
	interaction	0.000	0.999	0.000	0.050
Suspiciousness	Sport	0.938	0.394	0.013	0.210
	Sex	1.72	0.191	0.012	0.256
	interaction	2.75	0.067	0.038	0.536
Resentment	Sport	1.36	0.260	0.019	0.289
	Sex	0.094	0.757	0.001	0.061
	interaction	1.81	1.68	0.026	0.373
Irritability	Sport	2.60	0.078	0.036	0.511
	Sex	2.14	0.145	0.015	0.307
	interaction	0.047	0.954	0.001	0.057
Guilty sense	Sport	0.941	0.393	0.013	0.210
	Sex	0.278	0.599	0.002	0.0082
	interaction	0.744	0.476	0.011	0.174

Note: Statistical difference between variables was set at $p < 0.05$ and was marked in bold.

Discussion

The reasons for the differences in some of the examined features between sports are the different structure of the sports task, the starting and training load and the different risk of injury, as mentioned in the introduction. In men, similar rates of anxiety were reported across all three sports. It should be noted that due to the too small size of the studied groups, the analysis of the influence of the players' position on the personality was omitted. In both sexes, the categories of average weight were most numerous in women from 57 to 70, and in men from 73 to 90 kg. Such an uneven distribution makes it impossible to assess the influence of body weight on personality. An additional factor that hinders the interpretation of the results obtained is the lack of information on injuries, especially those that excluded players from sport for a longer period and / or required medical intervention. Research on the impact of an injury and the level of anxiety provides ambiguous conclusions. Athletes with an injury experience, concussion, or orthopedic trauma exhibited a similar state and trait anxiety. Both groups declared the importance of psychological support from the family, doctor or trainer as a factor alleviating anxiety during rehabilitation [24, 25].

Serious injuries cause psychological anxiety/tension, as well as anger and hostility, the greater and the more serious the injury. Also in this case, mental support reduces the intensity of negative emotions [26]. After the rehabilitation period, the fear of renewing a past injury delays return to sport, and also has a negative impact on the level of performance of sports tasks [27, 28].

The results of studies by other authors are surprising, who noted slightly lower anxiety in athletes with an injury history related to practicing sports and sports competitions [29].

In this case, it can be assumed that players with an increased level of anxiety engage in sports tasks with greater caution (precautionary measures) so as not to risk injury. In our research, the anxiety trait level is generally higher in women in contact sports. Taking into account the indicator of this dimorphism, which is the anxiety of women: fear of men, this parameter is the highest in judo (1.142), slightly lower in basketball (1.065) and in volleyball it reaches the value of 1. These results are consistent with the observations of anxiety as a state among the elite of Polish players and judo players in the 4-day period immediately preceding the start in high-level competitions. Pre-contest anxiety increased in both genders, but the differences between the sexes deepened, reaching the highest level on the day of the start [30].

Parallel changes have been noted in blood cortisol levels, which is considered a manifestation of somatic anxiety. Observations carried out on a large NY population in 2002 [30], or one year after the terrorist attack and then 15 years after this event [31], revealed a greater severity

of post-traumatic stress disorder (PTSD) in women. The same pattern was found in children in Japan after a strong earthquake [32].

This suggests a stronger perception of the state of emergency in them. Gender differences were also noted in the levels of emotional reactivity (RE). The parameter reflects, similarly to TA, the tendency to strong emotional reactions in response to external stimuli. The level of both indicators has a biological basis and the role here is played by the level of testosterone in the circulation, which is much lower in women. This may result in a lower propensity to be physically aggressive and a higher level of extroversion (Ex). It should be noted that the lower level of aggressiveness in women is compensated for by a slightly higher level of verbal and indirect aggressiveness, so with these indicators which, although destroying interpersonal relations, theoretically do not pose such a high risk of physical confrontation in the event of a conflict with the environment. The explanation is the high level of aggressiveness in volleyball players, lower level of physical aggressiveness (PA) in basketball players than in volleyball players, although the former often have to physically fight their opponent for the ball. It can be assumed that the rules of sports competition in this contact game do not allow fouls, and moreover, the very high intensity of the match dissipates negative emotions, while volleyball players do not have such opportunities.

Genetic and environmental factors are responsible for the level of temperamental traits [33]. It can be concluded that in our research the environmental factor was specific and different in the sports studied, training measures used for over a dozen years, which resulted in lower levels of Br and En in volleyball players compared to these variables noted in basketball and judo. Significant correlations between temperament and the strength and time of reaction confirm the role of temperament variables in shaping psycho-motor features [34]. The reason for these differences is the relatively low intensity of the starting effort in the retina, as shown in the introduction. They can also affect the quality of life sportsman [35].

Conclusions

1. The research revealed sport-related differences in selected personality and temperamental traits.
2. Women showed a greater intensity of those negative personalities that indicate a higher emotional cost in stressful situations. Trainers of female sports teams should be informed about this psychological sexual dimorphism.

Conflict of interests

The authors declare that there is no conflict of interests.

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