

Temperamental determinants of the sports level based on the example of female football players competing in the Ekstraliga

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Abstract:

Temperament is a factor which determines our all behaviours. Study showed that athletes who train, among other things, team sports games are characterised by lower emotional reactivity and perseverance and higher levels of endurance, briskness and activity compared to non-athletes. Therefore the aim of our study was characterising female football players and sports results of teams in which they competed in the Ekstraliga – the top level women's football league in Poland. The study was carried out during the 2019/2020 season on a group of 61 female football players aged 18 to 29 years from four Ekstraliga's teams: Górnik Łęczna (league champion for the last three years), GKS Katowice, TS MITECH Żywiec and Rolnik Biedrzychowice (a team which was relegated from the Ekstraliga in the analyzed season). Data concerning the ranking of the teams during the analysed season was sourced from information published on the website of the Polish Football Association (PZPN). To the psychological study was used the Formal Characteristics of Behaviour – Temperament Inventory (FCZ-KT) by Zawadzki and Strelau (1997). In statistical procedure we used the ANOVA one-way analysis of variance and a post-hoc Tukey's test. The analysis was performed in the Statistica 13.3 program. The analysis of the results showed that: the level of emotional reactivity differentiated the team of MITECH Żywiec and Rolnik Biedrzychowice, female players of GKS Katowice were characterised by a lower intensity of perseverance than players of MITECH Żywiec, and the level of activity was differentiated by the teams of Rolnik Biedrzychowice and MITECH Żywiec. Based on the results obtained, we assume that in the process of selecting and improving mental skills in women's football, it is worth paying attention to the level of temperamental traits such as: emotional reactivity, persistence and activity, as they can have a significant impact on the results of sports teams. Moreover, despite the observed differences in the levels of the three temperament factors, no significant differences were found in the case of the Polish champion, Górnik Łęczna – which may contribute to further research.

Keywords: temperament; women's football; efficiency.

Introduction

Temperament is a factor which determines behaviour in task situations and its traits affect the choice of forms of activity and effectiveness of action (Muniowska, 2006). Therefore, taking into consideration the process of exceeding psychophysical limits which are present during sports competition (Siewierski, 2005), individual temperamental dispositions have been assigned a special role (Łukaszewski & Marszał-Wiśniewska, 2006; Parzelski & Mieñkowska, 2007). It can be assumed that temperament is involved in the regulation of a person with the external environment (Tomczak, 2013).

The Regulatory Theory of Temperament (RTT) defines the concept of temperament in terms of relatively fixed, primarily determined body characteristics which are manifested in formal properties of behaviour (Strelau, 1992; 1998; 2006). Based on the RTT the following six behaviour factors have been identified:

1. Emotional reactivity (RE) – tendency to react intensely to emotion generating stimuli, which is expressed in low emotional resistance, among other things;
2. Activity (AK) – tendency to undertake behaviour which provides strong external stimulation or behaviour of high stimulative value;
3. Sensory sensitivity (WS) – tendency to capture and react to sensory stimuli of low intensity. The lower the intensity, the higher the sensitivity; the higher intensity an individual needs in order to react to a stimulus, the lower his/her sensitivity;
4. Endurance (WT) – an ability to adequately react to strong or long-term stimuli. The limit of endurance is considered to be the point when the directly proportional increase in strength of reaction to an increasing stimulus intensity is disturbed;

5. Briskness (ŻW) – a tendency to maintain a high rate of activity, fast reaction, easy change in behaviour in response to changes in the surroundings;
6. Perseverance(PE) – tendency to repeat and continue behaviour after the stimulus which caused the behaviour ceased.

The first four factors are the energy characteristics of behaviour (indicating i.e. the way energy is distributed), while the last two are time factors (determining the course of the reaction over time).

As the study of Zawadzki and Strelau(1997) showed competitive athletes are characterised by lower emotional reactivity and perseverance and higher levels of endurance, briskness, and activity than persons not involved in sports – it allows them to better cope with the pressure and manifestations of direct sports combat (Gracz&Sankowski, 2007). Also Gracz (1998) demonstrated that teenage athletes doing medium distance and long distance running, winter sports, and lawn tennis show higher levels of excitation process strength (a strong negative correlate of emotional reactivity) and greater mobility of nervous processes (a strong positive correlate of briskness) compared to their peers. He also noted a certain temperamental filter, present from the youngest age, which may be of great significance in early sport selection and training of young sport enthusiasts. The results of the study of O’Sullivan, Zuckerman and Kraft (1998) show that football and hockey players – that is players of team sports – show a higher level of activity and lower levels of neuroticism and anxiety (strong positive correlates of emotional reactivity) compared to the student population. The study of Guskowska(2004) proved that secondary school students doing football, among other sports, show higher levels of briskness, endurance, and activity and lower levels of emotional reactivity compared to non-athletes. On the other hand, Bernatek, Cwyl, Dudziak, Szantarek and Guskowska (2006) showed that martial arts players are more briskness, endurance and active than people training team sports.

The training and competition process is more effective when the conditions correspond to athlete’s needs of stimulation which may result from his/her emotional reactivity, among other things. Athletes with a low intensity of this temperamental characteristic easily acquire skills during various types of competitions and do not experience discomfort being under an influence of a large number of stimuli which have to be processed in a short time(Zawadzki, 1991; Magier & Magier, 2015). For such so called low-reactive athletes it is troublesome to perform monotonous technical exercises (which do not provide appropriately high stimulation) and they develop through participation in various types of small games (using situational changeability and pressure based tasks). High-reactive athletes react in the opposite way, as when acquiring new skills they must spread their acquisition over time, which may contribute to the decrease in endurance they experience(Magier& Magier, 2015). Besides, high-reactive persons work better in training conditions which do not force them to compete (Zawadzki, 1991).

As regards other temperamental characteristics studies were carried out by Jankowski and Zajenkowski(2009) who emphasise that high endurance and low intensity of emotional reactivity may determine high efficiency in coping with stimuli, whereas low endurance threshold with high emotional reactivity are characteristic for individuals with low abilities to process stimulation. High endurance and a high level of activity contribute also to an increase in athlete’s expectations and a probability of meeting them(Magier& Magier, 2015), which is important when performing tasks in difficult or demanding conditions. This gains special significance in a game situation when a player is under an influence of many stimuli and must keep adjusting to a changing situation in the field.

Taking into consideration the above theoretical reports the aim of our study was to determine the relationships between the traits presented in the Regulative Theory of Temperament (RTT) characterising female football players and sports results of teams in which they competed in the Ekstraliga. The obtained results may have practical implications for improving the selection process and enriching the training process (Piepiora, 2015; Piepiora, Supinski, & Witkowski, 2015).

Material&methods

Participants

The study was carried out during the 2019/2020 season on a group of 61 female football players aged 18 to 29 years(M=23,29; Me=23; SD=3,33)playing in the Ekstraliga– the top level women’s football league in Poland. The following teams were invited to participate in the study:

1. GórnikŁęczna – the Polish Champions in the 2017/2018, 2018/2019 and 2019/2020 seasons. In 2020 the players finished the competition without losing a game. The mean age of the players was 23.13 years(Me=23; SD=3,20);
2. GKS Katowice – in the 2018/2019 and 2019/2020 seasons the team was ranked 6th at the end of the competition. The mean age of the players was 23.06 years(Me=23; SD=3,43);
3. TS MITECH Żywiec – in the 2019/2020 season the team finished 10th – the last place above the relegation zone. The mean age of the players was 24.5 years (Me=24; SD=3,57);
4. Rolnik Biedrzychowice – a team which was relegated from the Ekstraligain the 2019/2020 season and from the 2020/2021 season has played in the 1st division. The mean age of the players was 22.8 years(Me=22; SD=3,13).

Measure/Instruments/Procedure

Data concerning the ranking of the teams during the analysed season was sourced from information published on the website of the Polish Football Association (Polski Związek Piłki Nożnej, PZPN) (laczynaspilka.pl; access: 16/06/2020). In order to carry out the psychological study the Formal Characteristics of Behaviour – Temperament Inventory (FCZ-KT) (Zawadzki & Strelau, 1997) was used which includes 120 statements describing various types of behaviour and reactions (they concern the six characteristics described in the Regulative Theory of Temperament: emotional reactivity, activity, sensory sensitivity, endurance, briskness, and perseverance). The psychometric value of the FCZ-KT scales is satisfactory (Terelak & Rudzki, 2005).

Statistical analysis

In order to determine the relationship between temperament characteristics of female football players and the rank of the team (its sports level) the ANOVA one-way analysis of variance and a post-hoc Tukey's test were carried out. The analysis was performed in the Statistica 13.3 program.

Results

First of all, mean results for levels of temperamental characteristics of players of the Ekstraliga teams, ranks of their teams in the 2019/2020 season, were compared.

Table 1. Intensity of temperamental characteristics of teams playing in the Ekstraliga (ANOVA one-way analysis of variance)

Variables	SS	MS	F	p
RE	21.872	7.291	4.259	0.009
WS	13.332	4.444	1.894	0.141
PE	24.406	8.135	2.772	0.050
ŻW	6.425	2.142	0.926	0.434
AK	24.451	8.150	3.674	0.017
WY	0.731	0.244	0.230	0.875

Note. Statistically significant results with $p < 0.05$ in bold.

RE – Emotional reactivity; WS – Sensory sensitivity; PE – Perseverance; ŻW – Briskness; AK – Activity; WY – Endurance.

The one-way analysis of variance (ANOVA) for temperamental characteristics in the participants showed that among football teams with different sports results three statistically significant differences can be noted in the level of such factors as: emotional reactivity ($F=4,259$; $p < 0,01$), perseverance ($F=2,772$; $p < 0,05$) and activity ($F=3,674$; $p < 0,05$). The next step was a post-hoc Tukey's HSD test for three temperamental characteristics (emotional reactivity, perseverance and activity) presented in table 1, significantly differentiating the studied football teams. The results are shown in Tables 2-3.

Table 2. The level of emotional reactivity in players competing in the Ekstraliga

Variables	Test Tukey's HSD: RE MS=1,712; df=57,00				
	Rank	Górník M=2,800	GKS M=3,867	MITECH M=2,688	Rolník M=4,000
1	Górník				
2	GKS	0,127			
3	MITECH	0,995	0,069		
4	Rolník	0,069	0,992	0,035	

Note. Statistically significant results with $p < 0.05$ in bold.

Górník – Górník Łęczna; GKS – GKS Katowice; MITECH – MITECH Żywiec; Rolník – Rolník Biedrzychowice.

As shown in the post-hoc test in terms of results for emotional reactivity, MITECH was characterised by statistically significantly lower results than Rolník ($p < 0,01$). The differences between the two teams which ranked higher in the table were statistically insignificant.

Table 3. The level of perseverance in players competing in the Ekstraliga

Variables	Test Tukey's HSD: PE MS=2,935; df=57,00				
	Rank	Górník M=3,400	GKS M=3,133	MITECH M=4,750	Rolník M=4,067
1	Górník				
2	GKS	0,974			
3	MITECH	0,138	0,043		
4	Rolník B.	0,712	0,449	0,685	

Note. Statistically significant results with $p < 0.05$ in bold.

Górník – Górník Łęczna; GKS – GKS Katowice; MITECH – MITECH Żywiec; Rolník – Rolník Biedrzychowice.

The post-hoc test carried out for the indicated variable (perseverance) showed that GKS Katowice was characterised by a significantly lower mean of the studied variable than MITECH Żywiec ($p < 0,05$). No statistically significant differences were noted between other teams.

Table 4. The level of activity in players competing in the Ekstraliga

Variables	Test Tukey's HSD: AK MS=2,219; df=57,00				
	Rank	Górnik M=5,867	GKS M=7,000	MITECH M=5,750	Rolnik M=7,133
1	Górnik				
2	GKS	0,171			
3	MITECH	0,996	0,102		
4	Rolnik B.	0,104	0,995	0,048	

Note. Statistically significant results with $p < 0,05$ in bold.

Górnik – Górnik Łęczna; GKS – GKS Katowice; MITECH – MITECH Żywiec; Rolnik – Rolnik Biedrzychowice.

The female teams of the Ekstraliga differed between each other in terms of the mean level of activity. It was shown that for this characteristic MITECH had statistically significantly lower results than Rolnik ($p < 0,05$).

Discussion

Taking part in sports activity is linked to experiencing pre-start, start, and post-start situations, as well as tolerance of loads related to the training process, its volume, and intensity. The ability to process stimuli depends largely on situation specifics, psychophysical states experienced by players, and their individual characteristics, where special role is played by temperament which is a sort of moderator between situation and reaction. Therefore, the participation of temperamental characteristics in effective action is often emphasised in wide studies of relationships of temperaments characteristics and various measures of effectiveness (Rychta, 2004).

Due to the above the aim of our study was to search for relationships between the levels of six temperamental characteristics (emotional reactivity, activity, sensory sensitivity, endurance, briskness, and perseverance) of the players of the Ekstraliga and the results achieved by the teams represented by them. The study was carried out in four teams: Górnik Łęczna (Polish champion in the 2019/2020 season), GKS Katowice, TS MITECH Żywiec, and Rolnik Biedrzychowice (a team that was relegated from women Ekstraliga in the 2019/2020 season). The study was carried out using the Formal Characteristics of Behaviour – Temperament Inventory (FCZ-KT) (Zawadzki & Strelau, 1997). One-way analysis of variance and post-hoc HSD Tukey's test were used for statistical analysis.

The analysis of the results showed that the level of emotional reactivity differentiated the team of MITECH Żywiec and Rolnik Biedrzychowice, that is the team with average results and the team of newcomers to the Ekstraliga. This may mean that players of the teams which have been competing in the Ekstraliga for longer are characterised by lower levels of emotional reactivity than teams which begin competing in the top division, which may be explained with the results reported by Zawadzki and Strelau (1997), Gracz (1998), O'Sullivan, Zuckerman and Kraft (1998) and Guskowska (2004), among others. This specific result indicates that the teams which have played in league for longer are made up of more experienced players who have been through a more thorough selection process, are characterised by greater resistance to stimuli, higher thresholds of optimal excitation, and maintain optimal level of concentration more easily. Such a psychological profile allows them to make better decisions in stress situations (Magier & Magier, 2015) and to act more effectively compared to high-reactive persons who can have similar level of technical and tactical skills. Athletes with a stronger nervous system are also more effective thanks to employing a more effective style of relieving tension. Confirmation of this analysis may be sought in the work of Blecharz and Siekańska (2007) who studied highly effective football players and basketball players and indicated many relations between temperament and styles of coping with stress, where the style focused on emotions positively correlated with emotional reactivity (a moderately strong relationship in basketball players and a strong relationship in football players) and perseverance (moderately strong relationships).

Players of GKS Katowice were characterised by a lower intensity of perseverance than players of MITECH Żywiec and achieved much better results in the season; this may be referred to the results of the study of Zawadzki and Strelau (1997) who compared football players with non-athletes, less thoroughly selected in terms of physical activity. Better sports results of players from Katowice may be therefore supported not only with better tactical and technical skills, but also with a lower level of the characteristic which is manifested through replaying of reactions caused by earlier stimuli (this is related to the time of releasing energy). In a match situation such a stimulus can be for example a situation causing increased nervous excitement: a foul, a verbal skirmish, or an unfair decision of the referee. The level of perseverance may also play a significant role in predicting effectiveness in sport, because a player reflecting on the situations in which she failed may lose her self-confidence and as a consequence make even simple mistakes more often or be reluctant to make more

daring decisions. A lower level of perseverance characterising the players of GKS Katowice may also have a positive effect on their readiness to take risks and apply a larger number of creative solutions.

The result concerning the level of activity differentiating the teams of Rolnik Biedrzychowice and MITECH Żywiec may indicate that in women football not only is it significant how much work a player performs on the pitch, but also what the quality of the work is. Players must perform the tasks given to them by the coach, not necessarily by doing as much as possible, but rather by making good decisions. A lower level of this characteristic in individuals ranking higher in the league table may also indicate that these players are less inclined to search for thrills and display only risky behaviour (Studencki, 2004; Stawiarska-Lietzau, 2006; Simiński & Truszczyńska, 2013), which in practice may be related to a lower number of fouls in the field and related consequences for the teams. Moreover, the obtained result reflects to some extent the results showing a higher level of expectations of athletes characterised by higher levels of activity (Magier & Magier, 2015), where the team promoted to the top division could have had great expectations related to competition with the best teams in Poland, which was not the case for a team with experience in competing in the Ekstraliga.

Conclusions

On the basis of the results of the study the following final conclusions were formulated:

A references review showed, that we can be stated that the athlete's temperamental profile particularly often describes a harmonized structure associated with a high processing capacity of stimulation– characterized by better adaptability and more effective regulation of stimulation.

In the process of selection and improvement of mental skills in women football it is worth paying attention to the level of such temperamental characteristics as: emotional reactivity, perseverance, and activity, as they may have significant effect on the sports results of teams– as shown by the results of own research.

In spite of the differences noted in the levels of the three temperamental factors, no significant differences were found with regard to the Polish champion, Górnik Łęczna. It would be worthwhile to perform further analyses of the significance of other psychological variables determining the success of this team in domestic competition.

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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