# RESEARCH THE COGNITIVE AND PATHOLOGIC CONATIVE CHARACTERISTICS OF HANDBALL PLAYERS FROM DIFFERENT COMPETITION LEVEL

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The research was conducted on a sample of 180 handball players classified in 3 subsamples of 60 athletes, who are competing in I, II and republic handball Serbian league, and 15 variables (3 cognitive and 12 conative) were applied. The aim was to estimate if there are significant differences between athletes from different competition level. Data processing was conducted using canonical discriminative analysis, and the results showed that statistically significant difference exist between handball players from different competition level in all system (multivariate) estimated by cognitive and conative variables. In cognitive area 91.73% of the significant interclass differences between I league handball players and handball players from other two levels of competition were estimated by efficiency parallel area S1 test. In cognitive area correlations were 0.58 and 0.31, which is 82.82% and 17.11% of variance. In the I league handball players, from all measured parametres, there were only phatological symptoms which refer to depression, hypersensitivity and paranoia, which could be a consequence of greater engagement of cognitive processes and the fear of not fulfilling the expectations set before them, and the complexity of the task, and whether they will continue to pursue their career with even greater success, which is contrary to the results obtained in athletes of the lower ranking, where the pathological concurrent factors are present to a larger extent, indicating a very high level of their somatic anxiety and a higher loading of defense mechanisms and regulators of organic functions.
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## Introduction

There is no sport, no matter how simple, in which cognitive and conative dimensions are not included in the equation that specifies that particular sport. The reason for the increased number of studies which deal with various aspects of the personality of athletes should mostly be sought in the characteristics of the sports activity itself, which place exceptionally strenuous and varied demands on the players, not only in the field of motor abilities, but also in other domains of functioning of an individual. Therefore, the assumption that active and successful participation in certain sports, and therefore in handball, requires a specific group of personality dimensions is justified. These dimensions are one that are best suited for these sports, or at least are groups of personality dimensions suitable for participation in sports as such, and not in other types of activities. Stanković, namely, considers that individuals with the optimal cognitive abilities needed for success in sport achieve success in other activities as well, and that factors such as economic and social status determine orientation towards a particular activity (1).

It is for that reason that increasing the body of knowledge of the structure of cognitive abilities and conative characteristics of athletes is of special importance for the planning and reorganization of work, and the predictions of success in sport. A cybernetic model of cognitive abilities (2) is based on the assumption of Luria regarding the cortical functions, and is similar to the model of Das, Kirby & Jarman (3). As part of this study, intelligence was operationally defined as the effectiveness of the in-

formation processing system in situations when intelligent responses were needed, which takes place through the following seven functional units of the system for information processing: 1) the receptor system; 2) the processor for decoding, structuring and analyzing input which in interaction with other processors, gives effects which can be interpreted as perceptive abilities; 3) units of short-term memory, whose purpose is to temporarily store information which has passed through the input processers, or is being treated by the other processors; 4) units of long-term memory whose basic function is to permanently store already processed units of information; 5) a processor for the serial analysis of information, responsible for sequential cognitive processes, sequential search processes in short-term and long-term memory, and the analysis of information which has been transformed into a symbolic code; 6) a processor for parallel (simultaneous) analysis of information (P) needed for the simultaneous processing of an increasingly larger amount of information flow and the parallel search processes in short-term and long-term memory and 7) a central processor (G) whose basic function is the programming, regulating and control of the work of the other processors, and the integration of the results obtained in these processors. In this model the central processor is also the main one needed to make decisions and control their realization.

Handball represents a structurally complex sports activity from all three aspects of the cognitive functioning of sports activities which were mentioned by Horga: the structural system, which represents all of the requirements, cooperation between players, certain rules and specially defined connections between all the parts of the group, movement (a group of movements which are performed during the activity) and the system of required motor abilities which enable athletes to learn and realize movement structures which are part of a particular sport with above-average success. Also, the more complex the sport based on the first two systems of characteristics, structural and movement, the richer the structure of the required motor abilities, and thus greater the cognitive load of the athletes. In other words, the structural elements will be acquired much faster and organized into a structure more easily by cognitively more efficient athletes. Mejovsek claims that if sports tasks resemble motor tasks with elements of information complexity, any deviations from the usual types of movement, rhythm and equal use of both sides of the body, then we can expect the greater involvement of cognitive potential of the athlete when solving problem situations in the game (4). Therefore, if the structure of the required motor skills belonging to some sport is dominated by abilities such as coordination, precision, rhythmic realization of movement, and balance, the greater the cognitive requirements of that sport.

Athletes during sports games build up a cognitive structure made up of all the elements of the game. Various strategies and tactical variants are organized in an optimal and systematic manner, and a structure formed in this way provides a faster, and compared to the less experienced players, more

effective evaluation of the current situation in the game. Allard, Graham & Paarsalu studied the perception of structural and non-structural basketball situations among experienced and inexperienced female basketball players and determined that there are significant differences among them in terms of memory and reproduction of structural situations, while the greater use of knowledge of the structure of the game among experienced female players could not help them memorize and reproduce non-structured situations (5). The authors concluded that higher quality players have a greater ability for involuntary learning since they code information on a deeper level.

No athlete is able to perceive all the elements of a situation, nor is that the goal, and instead must be able to recognize what is important and maintain focus on those important signs in accordance with his own cognitive and motor limitations, the amount of information, and the available time. Tenenbaum and Bar–Eli consider that differences in terms of experience are also more prominently expressed in making complex decisions, that is, that more experienced athletes are more skilled since their ability for compiling information is of a higher quality (especially visual surveys of the field), as is their ability to focus on what is in the given moment most important (6). A similar conclusion was reached by Helsen & Starks, that elite athletes, compared to those less experienced ones, manage to, based on smaller amounts of information and over a shorter period of time, recognize the structure of movement, the intention of the opponent, and respond accordingly (7).

However, effectiveness in performing any kind of human activity is not independent of the features which regulate the modalities of behavior. Namely, it is known that some features from conative space directly limit effectiveness in various activities directly, and in others indirectly, for example due to the contaminating effects on some other anthropological features, abilities or characteristics (8). This does not exclude the possibility of the same conative features to in some activities representing a restrictor, while in others a stimulator of effectiveness, especially in situations which take part in the successful performance of certain activities. Accordingly, the rule that there are no two subjects with identical structures of any dimensions, even conative ones, irrespective of their final number, has been proven. At the same time, the conative regulatory mechanisms which have the task of neutralizing the effects of various interferences (that is, to produce adaptable behavior or emotional stability), can themselves become an impediment the moment when they cross a certain threshold of regulation.

For these reasons, knowledge of the complexities of an activity, which includes the space of conative characteristics, is an important assumption of the operationalization of the goals of every activity, including handball, which is of itself a demanding contact, team sport, whose structure contains elementary movements and types of motion such as running, sprinting, jumping, swinging, hitting, blocking and pushing, along with interactive

contact with the opponent during the game (9). According to some authors (10, 11, 12), in the equation of the specification of sports results includes as many as 13 factors (morphological, motor, functional, conative, cognitive, motivational, sociological, health, etc.).

Conative characteristics are responsible for the modalities of human behavior and are determined as the latent structures on which the modalities of responses compared to oneself, other people and society as a whole depend, as do the characteristic modalities of emotional reactions, and determine the manner, form, and stability, but not the intensity of the reaction. What is known of conative characteristics is that they are connected with the reduction or increase in adaptive power, and that they cause disorders in personality integration, which disrupts the balance between the processes of stimulation and inhibition (13, 14), and that they diminish the adaptational and active effectiveness of the individual. The shared characteristic of both types of conative dimensions (normal and pathological) is that they determine the types of human behavior and reactions, and thus influence its effectiveness and success.

That is why the aim of the research is the analysis of the differences between conative and cognitive abilities of the handball players of various rankings, as indicators of their sports success.

## Materials and methods

### Sample of participants

A sample of 180 handball players was divided into 3 subsamples of 60 participants each, members of the I, II and national handball league, on which a system of 3 cognitive and 12 conative variables was applied.

### Measuring instruments

To evaluate the cognitive abilities, the following variables were applied from KOG 3 battery (15):

1. test IT–1 for the evaluation of the effectiveness of the perceptive processor – taken from MFBT. It was designed with the intention of measuring perceptive ability, which represents a synthesis of the group of perceptive abilities of analysis, structuring and identification. It consists of 39 multiple choice tasks. The participant is required to evaluate which of the 4 test-images is identical to the criterion. The duration of the test is limited to 4 minutes;

2. test AL–4 for the evaluation of the effectiveness of the serial processor – a test of synonyms and antonyms taken from the revised form of the ALFA battery of F.L. Wells and meant to evaluate verbal understanding. It consists of 40 tasks, each made up of a pair of words. The participants are required to determine whether the words in the pair have the same or opposite meaning. The test belongs to the group of speed tests. The duration of the test was limited to 2 minutes;

3. test S–1 for the evaluation of the effectiveness of the parallel processor – is a constituent part of the SVPN-1 battery. The intentional subject matter of the measurement is visual specialization. It numbers 30 multiple-choice tasks. Each consists of a drawing of a three-dimensionally arranged group of bricks, as well as 4 transversal projections of that group. The task of the participant is to find that transversal projection which is suited to the group of bricks viewed from the given direction. It belongs to the category of tests of strength. The duration of the test was limited to 8 minutes.

The pathological conative characteristics were operationalized through the scores on selected scales of the test of pathological conative characteristics (16), C.I.-N4:

• the effectiveness of the system for the regulation and control of organic functions (HI) - 1. cardiovascular conversion (K10), 2. gastro-intestinal conversion (G11), 3. inhibitory conversion (I7), 4. hypochondria (H13),

• the effectiveness of the system for the regulation and control of the defense reactions (ALPHA) - 5. anxiety (A1), 6. obsession (O3), 7. hypersensitivity (S5), 8. phobias (F2),

• the effectiveness of the system for the regulation and control of the attack reactions (SIGMA) - 9. impulsivity (N14), 10. aggression (T15) and

• the effectiveness of the system for the coordination of regulatory functions (DELTA) - 11. paranoia (P18), 12. depression (D6).

### Methods of data processing

With the aim of finding the differences in the cognitive and conative functioning of handball players of various rankings, the data were analyzed using the canonical discriminant analysis from the statistical package STATISTICA for Windows 8.0 (StatSoft, Inc., Tulsa, OK).

## Results

The results of the discriminant analysis of the cognitive variables indicate that the tested athletes differ significantly in relation to their ranking. By condensing the variables in the cognitive space, we isolated two discriminant variables which separate groups of athletes based on the discriminant coefficients of which only one is statistically significant and whose canonical correlation has a value of .38. The significance of this discrimination was tested using Wilks' test and Bartlett's $\chi 2$ test (Table 1).

The first discriminant function explains the differences with 91.73 % of the intergroup variability in the cognitive space of the applied discriminant variables. By analyzing Table 2, we noted that the first discriminant function separates athletes based on the S-1 test which in terms of its basic subject matter of measurement is meant to evaluate the effectiveness of spatial relations. This factor is, actually, superior to the mechanism responsible for determining relations among the elements of a structure and the necessary characteristics of such structures in solving those problems in which the proces-

ses of determining and reconstructing are independent of the previously acquired amount of information (this is the widely known mechanism for parallel processing). Based on the value and sign of the centroid projections on the first discriminant function, we can conclude that the handball players of the Serbian First League of Handball have the most developed abilities for determining the relations among elements of some structure and necessary characteristics of such structures, and then the handball players of the Serbian Second League and finally the Handball League of Serbia (Table 3).

**Table 1.** Canonical discriminant funtion of cognitive and conative variables

| Fcn | Eigen V. | % of Var | Can Corr | Wilks L | $\chi^2$ | df | p |
|---|---|---|---|---|---|---|---|
| Cognitive Variables | | | | | | | |
| 1 | 0.17 | 91.73 | 0.38 | 0.83 | 31.84 | 4 | 0.00* |
| 2 | 0.01 | 8.27 | 0.12 | 0.98 | 2.82 | 1 | 0.09 |
| Conativne Variables | | | | | | | |
| 1 | 0.52 | 82.89 | 0.58 | 0.58 | 91.06 | 20 | 0.00* |
| 2 | 0.10 | 17.11 | 0.31 | 0.90 | 17.86 | 9 | 0.03* |

* - statistical significance at $p < 0.05$ level

**Table 2.** Matrix of structure of cognitive and conative variables

| Variable | Cognitive | | Variable | Conative | |
|---|---|---|---|---|---|
| | D1 | D2 | | D1 | D2 |
| S-1 | .95* | .31 | A1 | .76* | -.22 |
| IT-1 | -.22 | .97* | O3 | .58* | .01 |
| AL-4 | .17 | .17 | F2 | .58* | .19 |
| | | | T15 | .47* | .01 |
| | | | H13 | .40* | -.12 |
| | | | K10 | .19* | -.17 |
| | | | D6 | .24 | -.47* |
| | | | S5 | .31 | -.41* |
| | | | P18 | .11 | -.31* |
| | | | I7 | .23 | .27* |
| | | | G11 | .17 | .27* |
| | | | N14 | -.16 | .17* |

D1, D2 – discriminant function;
* - statistically significant correlation coefficients with a discriminant functions

**Table 3.** Centroid of groups in cognitive and conative variables

| Group | Cognitive | | Conative | |
|---|---|---|---|---|
| | D1 | D2 | D1 | D2 |
| G-1 | .39 | .13 | -.02 | -.46 |
| G-2 | .18 | -.16 | -.87 | .24 |
| G-3 | -.58 | .03 | .89 | .22 |

G–1, G-2, G-3 – centroid of groups;
D1, D2 – discriminant function

The results of the discriminant analysis in the conative space are shown in Tables 1-3, and a careful analysis can be used to determine that the two obtained significant canonical correlations (0.58 and 0.31) which explain 82.89% that is 17.11% of the valid variance of the overall system of the evaluated space.

The first discriminant function is defined by anxiety, obsession and phobias – and was used to evaluate the mechanism for the regulation and control of defense reactions, Aggression – for the evaluation of mechanisms for the regulation and control of attack reactions, hypochondria and cardiovascular conversion which is used to evaluate the effectiveness of the system for the regulation and control of organic functions.

Based on the size and sign of the centroid of the first discriminant function, we can note that the handball players of the Serbian First League of Handball have the ability to adequately model tonic

stimuli based on the programs transferred by genetic code or formed under the influence of learning, which are located in the centers for the regulation and control of defense and attack reactions. The handball players of the Serbian First League of Handball are able to coordinate functionally and hierarchically different subsystems and to effectively make a bridge between the subcortical regulatory functions of organic systems and cortical systems which perform their regulation and control. The handball players of the Handball League of Serbia are characterized by lowered excitation in the higher centers for coordination and control. It is clear that the asthenic syndrome is the dimension which decreases adaptation in general, and thus in sport as well, since it deactivates precisely those structures of the nervous system which are responsible for adaptational reactions. The handball players of this ranking are overly sensitive, have great performance anxiety, struggle with effort. and their training ability is decreased compared to the handball players of higher ranking. The second function is defined by depression, hypersensitivity, paranoia, inhibitory conversion, gastrointestinal conversion and impulsivity. Based on the size and sign of the centroids, for the second discriminant function it can be noted that the handball players of the Serbian First League of Handball are able to adequately model the excitatory-inhibitory processes which achieve better results compared to the handball players of lower ranking. The handball players of the Serbian Second League of Handball and the Handball League of Serbia are characterized by a disorder of the mechanism for the regulation of the functions of the vegetative system, where the primary central disorder of the nervous system is manifested in the work of certain organs or functions of organs.

**Discussion**

In the cognitive space, based on the value and sign of the centroid projections on the first discriminant function, we can conclude that the handball players of the Serbian First League of Handball have the most developed abilities for determining the relations among the elements of a structure and the necessary characteristics of such structures, followed by the handball players of the Serbian Second League of Handball and finally the Handball League of Serbia. That is why we can conclude that visual spatialization is directly related to the quality of the performance and ranking in handball. Namely, handball is a sports game in which the result depends not only on the adopted techniques and abilities, primarily motor and functional, and also on the solution of complex tactical tasks, and the obtained results of the discriminant analysis are probably the consequence of the of the selection of handball players, but also their sports experience. It was Momirović, Gredelj & Hošek (17) who determined that was is most responsible for success in sport is the better adaptation of cognitive abilities, especially among elite athletes. The second discriminant function exhausts the smaller variance and cannot sensibly be interpreted, since it is not statistically significant.

**Table 4.** Comparison of the results of athletes from different sports on KOG 3

|  | IT1 | | AL4 | | S1 | |
|---|---|---|---|---|---|---|
|  | M | SD | M | SD | M | SD |
| handball players from I league (N = 60) | 25.00 | 5.56 | 35.53 | 5.46 | 26.30 | 3.53 |
| handball players from II league (N = 60) | 23.38 | 6.45 | 34.70 | 3.81 | 24.96 | 4.78 |
| handball players from republic league (N = 60) | 25.78 | 7.30 | 34.41 | 3.77 | 21.86 | 5.40 |
| football players from I league (N = 136) - Malacko (30) | 20.79 | 4.92 | 27.83 | 5.67 | 16.22 | 5.58 |
| boxers from different categories (N = 92) - Blažević (31) | 33.25 | 3.30 | 35.97 | 2.55 | 22.11 | 3.03 |
| handball players from I and II league (N = 50) - Ilić (24) | 23.02 | 6.61 | 29.42 | 7.41 | 20.62 | 6.57 |
| Volleyball players from I and II league (N = 50) - Ilić (24) | 25.00 | 5.72 | 31.78 | 6.19 | 22.92 | 5.84 |
| basketball players from I and II league (N = 50) - Ilić (24) | 24.34 | 5.61 | 31.32 | 6.21 | 20.74 | 5.90 |
| football players from I and II league (N = 50) - Ilić (24) | 21.20 | 5.18 | 28.54 | 6.07 | 19.94 | 5.87 |

**Table 5.** Comparison of conative characteristics of athletes

| | Handball players I league (N = 60) | | Handball players II league (N = 60) | | Handball players republic league (N = 60) | | Young volleyball players (N = 126) of various rankings – Ivanović M, Milosavljević and Ivanović U (32) | |
|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | M | SD |
| Cardiovascular conversion | 2.55 | 2.36 | 0.98 | 0.77 | 3.61 | 2.25 | 13.01 | 8.61 |
| Gastrointestinal conversion | 0.48 | 0.79 | 0.18 | 0.39 | 1.05 | 1.17 | 0.85 | 1.33 |
| Inhibitory conversion | 1.06 | 1.31 | 0.46 | 0.50 | 1.06 | 1.20 | 1.29 | 1.30 |
| Hypochondria | 0.40 | 0.92 | 0.03 | 0.18 | 0.33 | 0.68 | 0.23 | 0.80 |
| Anxiety | 0.26 | 0.82 | 0.10 | 0.30 | 0.46 | 0.76 | 0.19 | 0.68 |
| Obsession | 0.36 | 0.68 | 0.36 | 0.51 | 0.63 | 0.75 | 0.30 | 0.90 |
| Hypersensitivity | 0.16 | 0.52 | 0.20 | 0.40 | 0.40 | 0.96 | 0.39 | 0.90 |
| Phobias | 1.36 | 1.71 | 0.56 | 0.67 | 1.88 | 1.72 | 1.24 | 1.50 |
| Impulsiveness | 0.50 | 0.89 | 0.10 | 0.35 | 0.95 | 1.04 | 0.60 | 0.90 |
| Agression | 0.38 | 0.69 | 0.55 | 0.50 | 0.36 | 0.68 | 0.49 | 0.84 |
| Paranoia | 0.90 | 1.39 | 0.45 | 0.67 | 1.41 | 1.25 | 1.51 | 1.49 |
| Depression | 1.25 | 0.93 | 1.01 | 0.59 | 1.16 | 0.64 | 1.17 | 0.70 |

But, if we bear in mind that in addition to the findings obtained in some previous studies, regarding the fact that athletes achieved higher scores on the g factor compared to non-athletes (18, 19), the result itself, achieved on tests which measure the g factor, does not suffice for the precise prediction of the success in sport as such, and even less so for a particular type of sport, and especially not for the evaluation of the success of a specific position or discipline. Lazarević claims that various situations in sport also require developed specific abilities such as perception of space, differentiation of the schedule and the position of other players, anticipation of their movement, making decisions, etc., which should also be studied, along with the general ability which combines them and which influences the successful performance of each of the cited individual abilities (20). That is why the results of the importance of the abilities of visual spatialization for the differentiation of handball players of various levels of success were obtained in this study agree with his results as well, but also the assumptions of authors such as Rushall (21), Bushan & Agarwal (22) and Straub (23), that athletes, based on their cognitive abilities and personality features, differentiate not so much based on the types of sport, as based on their success in it.

However, comparing the results obtained on the KOG 3 in various sports also indicates that these authors were not completely right when they claimed that athletes of various sports do not differ to a great extent in terms of cognitive abilities. Ilić in his study determined that the highest scores on the tests of the KOG 3 battery are achieved by volleyball players, then basketball players, handball players, and the lowest scores by football players (24). When comparing the handball players of all three rankings of competition with athletes from other sports (Table 4), we can see that on all three tests, the lowest scores are achieved by the football players, while handball players competing in the Serbian First League of Handball achieve significantly higher scores than all the other groups on the test of visual spatialization S1. The results of all three categories of handball players are quite even on the test of verbal comprehension AL 4, meant for the evaluation of the effectiveness of the serial processor, and are in agreement with the scores achieved by boxers. On the other hand, boxers achieve by far the highest scores on the IT–1 test for the evaluation of effectiveness of the perceptive processor, that is, the perceptive ability of analysis, structuring and identification.

All this speaks in favor of the results which were obtained by numerous authors (25, 26, 27, 28) that athletes who compete in higher rankings of competitions achieve significantly better results on tests of cognitive abilities, compared to athletes who compete at lower rankings of competition.

In the case of the factor structure, in our research we determined that the cognitive structure of the handball players was explained to the greatest extent by the test of strength S-1 which is essentially meant to evaluate the effectiveness of spatial relations. This factor is actually superior to the mechanism responsible for the determination of the relations among the elements of a structure and the necessary characteristics of such structures in solving of problems in which the processes of determination and reconstruction is independent of the previously acquired amount of information (this is a well-known mechanism for parallel processing). Ilić determined that the first discriminant function separates athletes involved in team sports to the gre-

atest extent based on the IT-1 test which was meant to evaluate perceptive reasoning (24), while Nešić, Fratarić, Banić & Goranović also determined that among kumite karatekas (N = 100, various rankings) there is one general cognitive factor which to the greatest extent is explained by the AL-4 test of synonyms and antonyms for measuring the effectiveness of the serial processor, which belongs to the group of speed tests (29). The obtained findings speak in favor of the hypothesis that athletes who come from various sports still differ more in terms of the quality than the quantity of their cognitive abilities, which is directly conditioned by the requirements of the sports they are involved in.

The results obtained in the space of pathological conative variables are such that the differences which are obtained between the handball players of various rankings of competition were also explained by two discriminant functions. The first discriminant function is defined by anxiety (to the greatest extent), obsession and phobias – which were used to evaluate the mechanism for the regulation and control of defense reactions, aggression – for the evaluation of the mechanisms for the regulation and control of attacks, hypochondria and cardiovascular convulsions which are used to evaluate the effectiveness of the system for the regulation and control of organ functions. The second function, which explains the remainder of the variance is defined by the absence of depression, hypersensitivity and paranoia, with a mild presence of inhibitory gastrointestinal conversion and impulsivity.

The handball players of the Serbian First League of Handball do not show to any great extent symptoms of anxiety, obsession, phobia, aggression, hypochondria, cardiovascular conversion, inhibitory and gastrointestinal conversion and impulsivity, but in their case we also find the presence of indicators of depression, hypersensitivity and paranoia. Unlike them, the handball players of the Serbian Second League of Handball are characterized by an almost complete absence of symptoms of anxiety, obsession, phobias, aggression, hypochondria, cardiovascular conversion, but also depression, hypersensitivity and paranoia, while we find the presence of symptoms of inhibitory and gastrointestinal conversion and impulsivity. The handball players of the Handball League of Serbia are characterized, unlike the handball players of higher ranking competitions, by a very pronounced presence of symptoms of anxiety, obsession, phobia, aggression, hypochondria, and cardiovascular conversion, which results in the disorder of the mechanisms for the regulation and control of defense reactions, for the regulation and control of attack reactions, and the functions of the vegetative system where the primary central disorders of the nervous system are manifested by a disorder in the functions of certain organs or functions of organs. At the same time, even in their case we have a pronounced presence of depression, hypersensitivity, and paranoia.

In the case of handball players of this ranking of competition, among whom this warm type of behavior is more pronounced, who are more polite, attentive towards others, there is an increase in the scores for depression, as in the case of those who expressed more pronounced liveliness and impulsivity and expressivity. The handball players who more often manifest dominant, competitive, assertive or even aggressive behavior are more prone to anxiety. Those who are more morally inclined and who have more respect for the rules are more prone to hypersensitivity, and those who are fearless and more adventurous have higher scores for obsession. Tense, energetic, impatient handball players often develop gastrointestinal conversion, hypochondria, and phobias.

Stanković cites that in his research of handball players of the Serbian First League of Handball, he determined that the factor of gastrointestinal conversion functions as a separate entity, while on the sample of handball players of the Handball League of Serbia, this is characteristic of the factor of impulsivity, and among the handball players of the Serbian Second League of Handball, there is a high correlation between depression and obsession (28).

**Conclusion**

Handball is a sports game in which the result does not depend only on the adopted technique and abilities, primarily motor and functional ones, but also on the solution of complex tactical tasks.

Based on these results, we can conclude that the differences in terms of pathological conative variables are far bigger in terms of quality than in terms of intensity when it comes to ranking, unlike cognitive abilities. In the case of handball players who play in the most elite league, of all the measured parameters we only found the pathological symptoms of depression, hypersensitivity and paranoia, which speaks of the greater engagement of cognitive processes, the fear of whether they will fulfill the expectations before them and live up to the challenge, or whether they will be able to pursue their career in a more successful foreign club or national team. These findings are quite opposite to the results obtained for the lowest ranked handball players, where the pathologically conative factors are present to a great extent, with the absence of depression, hypersensitivity and paranoia, which indicates a very high level of their somatic anxiety and greater load on the defense mechanisms and regulators in charge of the optimal functioning of organic functions. The handball players of the Serbian Second League of Handball, unlike the two other groups, to a great extent are characterized by impulsivity when making decisions and a propensity for converting psychological difficulties into physiological ones, which could be suited to the development of psychosomatic conditions, if the regulatory mechanisms in charge of their regulation are exposed to excessive work of a prolonged duration. Somatic and cognitive anxiety in this ranking of competition are not of decisive importance for the development of pathological conative functions.

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# ISPITIVANJE KOGNITIVNIH I PATOLOŠKIH KONATIVNIH KARAKTERISTIKA RUKOMETAŠA RAZLIČITOG RANGA TAKMIČENJA

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Na uzorku 180 rukometaša podeljenih u 3 subuzorka po 60 ispitanika koji pripadaju I, II i republičkoj rukometnoj ligi Srbije bio je primenjen sistem od 15 varijabli (3 kognitivne i 12 konativnih) sa ciljem da se utvrdi da li postoje statistički značajne razlike između sportista koji pripadaju različitim rangovima takmičenja. Obradom podataka pomoću kanoničke diskriminativne analize, dobijeni rezultati su pokazali da između rukometaša različitih rangova takmičenja u celom sistemu (multivarijantno) primenjenih kognitivnih i konativnih varijabli postoji statistički značajna razlika. U kognitivnom prostoru 91.73% intergrupne razlike je pokazalo da test za procenu efikasnosti paralelnog procesora S 1 statistički značajno izdvaja rukometaše I lige od rukometaša druga dva ranga takmičenja. Na konativnom planu korelacije su (0.58 i 0.31) što je 82.82% tj. 17.11% varijanse. Kod rukometaša I lige od svih merenih parametara prisutni su samo patološki simptomi depresivnosti, hipersenzitivnosti i paranoidnosti, koji govore o većoj angažovanosti kognitivnih procesa i strahu od toga da li će ispuniti pred njih postavljena očekivanja i biti na visini zadatka i da li će uspeti dalje da nastave karijeru sa još većim uspehom, što je suprotno rezultatima dobijenim kod rukometaša najnižeg ranga takmičenja, gde su patološki konativni faktori prisutni u velikoj meri, što ukazuje na veoma visok nivo njihove somatske anksioznosti i veće opterećenje odbrambenih mehanizama i regulatora organskih funkcija.

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***Ključne reči:*** *inteligencija, ličnost, kognitivne karakteristike, konativne karakteristike, rukomet*