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ASPECTS OF THE SYSTEMIC MANAGEMENT COMMUNICATIONS OF SCHOOL SPORTS CLUB ORGANIZATIONS: A NECESSARY DEVELOPMENT FROM A CENTRALISED TO A DECENTRALISED NETWORK

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Abstract. In the communications theories, there are presented models of communication networks established according to the status and position of the participants in the organizational communication process. These models (patterns) can be correlated with the levels of subordination and the hierarchical and functional relationships through which organizations are involved in social systems. The 130 existing school sports clubs in Romania are organizations with complex functionality, being equally educational organizations and sports structures, with implications for the management of external communication circuits. Implementation of the General Decentralisation Strategy will determine an evolution from the centralised network with the “double-circuit Y” model (a bureaucratic and unwieldy one) to the decentralised “multichannel star” network (focused on the beneficiary, i.e. the sports school club) by identifying current areas of communicational “fracture” and then “filling” them with new communication routes. The immediate and necessary solution is to conclude protocols/institutional partnerships both laterally, at the same hierarchical level, and obliquely, between entities located on different levels, in order to facilitate and stimulate performance sports activities.

Keywords: communication network, organization, school sports club, decentralisation, evolution.

Introduction

The main purpose of management communication is to unify activities for a synergic action. Activities are both internal and external to entities, on different levels in terms of hierarchical relationships. The school sports club’s manager has to make decisions based on the flow of information received, control their execution, stimulate the cooperation and involvement of members in achieving the objectives, evaluate the achievement of the results and also report periodically (as an outward-facing action). This last action, reporting, differentiates school sports clubs (abbreviated as CSS in Romanian) from other sports structures, because it reveals their specificity and communication positioning in certain types of networks, determined by the existing levels of management at the system level and by the formal organizational relationships established through the legislation in force.

The school sports clubs functioning nowadays in Romania are equally school organizations and sports structures. As a sports structure, the club must be registered in the Sports Register administered by the relevant ministry (the Ministry of Youth and Sports, abbreviated as MTS in Romanian) and, in this regard, apply the provisions of the Law on Physical Education and Sports no. 69/2000 (Parlamentul României, 2018). As an educational organization, the club operates on the basis of the National Education Law no. 1/2011 (Parlamentul României, 2016) and is an educational institution subordinated to the Ministry of National Education (abbreviated as MEN in Romanian).

Considering the three-level management pyramid, the following lines are established:

(1) in top management, the school sports clubs are connected with two ministries – the Ministry of National Education and the Ministry of Youth and Sports – so they subscribe to two communication channels;

(2) in middle management, the school sports clubs have reporting obligations to School Inspectorates (abbreviated as ISJ in Romanian), on educational line, and to Local Councils (abbreviated as CL in Romanian), on administrative line, and interact in ascending line with the County Sports Directorates (abbreviated as DJS in Romanian) and in oblique line with the County Associations (abbreviated as ASJ in Romanian) by branch of sport;

(3) horizontal communication is done with local and national sports structures, as well as with professional sports clubs, by branch of sport.

Formal communication networks in which school sports clubs are involved are currently identified either with the “Y” model or the “star” model; both of them are specific to centralised networks, at the core being the organization that transmits information and reports to supervising entities at the local or central level or to similar entities with which it is in professional collaboration relationships. The prospect of decentralisation, as a national trend, will impact school sports clubs, altogether with formal organizational relations in which they are involved, and will cause a pattern change corresponding to a new communications model – it is not necessarily a repositioning of school sports clubs, but a de-multiplication of communication channels. In communication
theories, the “circle” model is associated with participatory management style and is generally considered more efficient. But, more recently, this model is competing with another, the “multichannel star”, which reflects institutional maturation in a system with a high level of decentralisation.

The present study does not propose an axiological approach that would reveal which model is good (knowing that no model is absolute and that it has both advantages and disadvantages), but aims to highlight the relationship between the positioning change of an institution in a functional hierarchy and the consequent changes at the level of the communication networks in which the institution is engaged, a relationship that any political decision must take into account.

The current level reflected in the literature

For any organization involved in a particular social system, communication, as a process of transmission of information through specific channels, is positioned at the basis of coordination as a function of management (Niculescu & Verboncu, 2008, p. 285). The organization sends messages across many communication networks, through formal and informal channels, determined by its specificity and hierarchical relationships. Communication networks are the set of channels of communication whose analysis, correlated with the hierarchical institutional relations, leads to their configuration model. Based on these networks, the manager coordinates the segments that make up the organization chart of the institution, as well as the main activities that follow the institutional mission. In turn, the manager, as a representative of the entity in a particular social system, is subject to coordination by superordinate institutions to carry out actions at the systemic level in order to achieve strategic goals.

Organizational management literature has taken on and nuanced specific concepts in communication science, creating correlations between organizational structures and information systems. In the 1970s, organizational communication was defined as “a process of creating and exchanging messages within a network of interdependent relationships to comply with environmental uncertainty” (Goldhaber, quoted by Van Cuijlenburg, Scholten, & Noomen, 2000, p. 110).

For organizational communication, it is important to know how the communication process works, who communicates with whom, which instances are central or marginal, within two types of networks: (1) networks which centralise (with information going to the centre and suitable for relatively simple tasks) and (2) networks which decentralise (the share of information does not have a matrix, it is suitable for complex activities; these networks are also the employees’ favourites). Subsequently, the role of networks in the evolution of organizations has been valued in various theories, of which that of contagion by cohesion or by structural equivalence greatly widens the area of presentation, from the theories of communication to sociology. Thus, the group members of a network develop similar attitudes and behaviours and can even influence each other (Pânișoară, 2015, p. 65). In a group, there are circular relations between cohesion and performance (they influence each other), but in the field of sports, it seems that a greater influence is manifested from the direction of performance towards increasing cohesion (Predoiu, 2016, p. 126).

In specialised papers in Romania, the diversity of communication networks correlates with the diversity of communication typologies. Compared to the works in the European area, there is also a slight terminological difference, apparently meaningless, but basically emphasising only the social and cultural distance. Thus, Niculescu and Verboncu, as parents of the Romanian management, present two types of decentralised and centralised networks, each of them comprising several models, with distinct effects (2008, pp. 288-289).

Decentralised networks include “circle” and “chain” models (Figure 1) and centralised networks include “Y” and “star” models (Figure 2).

![Figure 1. (a) “Circle” network; (b) “Chain” network](image-url)
Within decentralised networks, group members are equal in hierarchy level, participatory management is facilitated and communication is not only effective (result-oriented), but also efficient (maximal result with minimal resources). However, power and authority are scattered, and failure to specify responsibility and the exercise of coordination may create problems for different organizations.

Centralised networks are specific to hierarchical relationships which imply levels of superordinate and subordination management. Their specificity is the authoritarian style of management, and communications can only be effective under the required formalities (standard format, different templates etc.), depending on the databases in which this information will be aggregated. However, uniform decisions are made, the responsibility is specified, and coordination and control functions are well represented (Mihăilă & Paraschiva, 2018).

The typology of communication networks is based on the interactive communication model of circular shape, in which the communication process is considered to be ongoing. Within this interactive model, the two components of communication – the transmitter and the receiver – change each other’s roles continuously, transforming, as appropriate, from the transmitter into the receiver and vice versa. The most important feature of this model was to introduce the concept of information flow, which represents the amount of information (message) that is transmitted and retransmitted in the time unit (Rus, 2002). Several types of indices, based on which an entity’s relationships within the network are measured – connection indices, centrality indices, periphery indices, can characterise a communication network to highlight how an entity is organized in terms of concentration of authority and the way members communicate with each other.

This type of analysis is all the more important as a new comprehensive network model is emerging, respectively the “multichannel star” network (Figure 3), where each member can communicate freely and openly, without discrimination, the management style being permissive and using all resources to achieve their goals.

**Issues addressed**

Communication to and from an organization involves a good knowledge of social systems, the way they are organized, the typology of institutions and the hierarchical relationships established between them, according to the legislation in force.

One of the major objections now in Romania is the bureaucracy, understood in diverse ways, but which consists in overlapping reports holding similar content or on different communication streams, without immediately perceptible and useful feedback to the transmitter. The transmission of data and information by sports education organizations is often perceived (by them) as a formal obligation of unclear utility; the process is disturbed by delays and the transmitted data lack the quality and completeness (Mihăilă & Paraschiva, 2018).
In the Romanian literature in the field of management, the “upstream communication” phrase appeared, with reference to super-ordination in the aspect of organizational communication flow (Nicolescu & Verboncu, 2008). The effectiveness of “upstream communication” to transmit data and information depends on both the communication system used and the quantity, the frequency of transmission, determined by the location of the organization in the network. With regard to school sports clubs, the “upstream communication” is determined by the level of hierarchical relationship stipulated by the legislation in force. Thus, in Romania, supplementary sports education is organized for children and students with skills in a sports discipline, aiming at achieving sports performance. At present time, there are 130 school sports clubs in Romania, 66 of them having legal personality and 64 being structures attached to other educational units (MEN, 2017).

Therefore, supplementary sports education includes independent school sports clubs and school sports clubs/sections within other educational establishments. The educational establishments in which supplementary sports education is organized are operating on the basis of general and specific legislation – the normative acts developed by the Ministry of National Education, the decisions of the school inspectorates and the internal rules of each educational unit.

The following elements characterise school sports clubs:

1. they are set up by the Ministry of National Education, at the proposal of the county school inspectorates; the independent school sports club is an educational unit with legal personality, which cumulatively fulfils several conditions – has a fiscal code, own budget, treasury account, draws up financial statements and holds a name, firm, stamp, seal and other insignia; these organizations can organize sections/groups by sports discipline throughout the entire county, not only in their home town;

2. they are designed to select, prepare and promote children and students with skills in a sports discipline, organizing and carrying out their work on the basis of a specific educational framework plan that includes school curricula by sports discipline, having a strict schooling plan approved by the Ministry of National Education and respecting a regulation that is also drafted by this institution;

3. they participate in official and friendly national and international competitions included in the sports calendar of the Ministry of National Education, national sports federations, as well as in its own sports calendar and other sports organizations; to participate in competitions organized by national sports federations, school sports clubs must register in the Sports Register and join the national sports federations;

4. the management of the independent school sports club is provided by the board of directors, and decisions are implemented by a headmaster, supported, where appropriate, by the deputy headmaster (working permanently with the teaching council, the parent committee and the local public administration); the management of the non-independent school sports club is provided by the headmaster of that educational unit, who is helped, where appropriate, by a deputy director or a coordinating teacher;

5. the teaching activity is carried out by teachers and coaches with specialisations in different sports disciplines, who are responsible for the quality of the work performed and the achievement of the objectives set by the management of the educational unit.

This legal outline for describing institutional functioning, correlated with the specificity of clubs’ functioning as sports structures, is illustrative for a centralised network with the “Y” model adapted to the two communication circuits in which these institutions are involved, as follows:

![Figure 4. Centralised communication network of school sports clubs: current model “2 Y” with double circuit](image-url)
Shaping the communication of the school sports clubs, based on the analysis of the current hierarchical relationships, is illustrative for the institutional evolution at the central level, with an impact on the functioning of the institutions at the base. Separating the competences of the line ministries (the evolution in the past 10 years from an integrating ministry that juxtaposes education and sport to two ministries with distinct attributions, an aspect that multiplies the organizational relations and the network of communication channels) has generated more “fractures”; the “double-circuit Y” model has two “fractures” inside the communication circuit, one on the first level, between the ministries, and the second on the local county level, between the school inspectorates and the sports associations (Figure 5, red lines). Also, considering the General Decentralisation Strategy (through which the local public administration authorities will exercise new competences, including in the field of youth and sport), it is necessary to develop the lateral and transversal communication relations for the benefit of the entities and to provide citizens with better quality public services (Figure 5, green lines) (Guvernul României, 2017).

So, in terms of decentralisation, the communication network that includes school sports clubs will suffer a necessary mutation, an evolution from the “double-circuit Y” model to the “multichannel star” model.

![Figure 5. The decentralised communication network of the sports clubs: the desirable “multichannel star” model](image)

The “multichannel star” model could lead to an immediate measure, namely the establishment of inter-institutional protocols/partnerships with regard to collaborations and joint activities, meeting the need for sports performance instrumented for educational purposes.

Conclusions

The different social policies determine new realities in terms of organizational management, associated with new models of communication networks. The “multichannel star” network corresponds to a decentralised environment, which begins to emerge with regard to the school sports clubs in our country, through the gradual transformation of the current “double-circuit Y” network.

This study introduces the notion of “double-circuit Y” network, generated by the current state of art of the school sports clubs. The desirable model to which it tends is that of a “multichannel star”, which exists in the specific literature in the fields of communication and management; it is applied for the first time to these organizations in order to prepare their reality in the near future.

Communication efficiency and synergistic action of the 130 school sports club organizations (with or without legal personality) are conditioned by the new systemic realities predicted in Romanian society. The successful implementation of the General Decentralisation Strategy must be accompanied by measures which will lead to an evolution from the centralised network with the “double-circuit Y” model (a bureaucratic and unwieldy one) to the decentralised “multichannel star” network (focused on the beneficiary, i.e. the sports school club). The modelling done in this study has led to the identification of the current areas of communicational “fracture” that require “filling” them with new communication routes.

The immediate and necessary solution is to conclude inter-institutional protocols/partnerships both sideways, on the same hierarchical level between the line ministries, as well as obliquely, between entities located on different levels – school inspectorate, local council, county sports association – in order to facilitate and stimulate performance sports activities.
References


INTELLECTUAL AND PSYCHOMOTOR STRENGTHS AND WEAKNESSES IN THE CASE OF ATHLETES – MEMBERS OF THE ROMANIAN GRECO-ROMAN AND FREESTYLE WRESTLING OLYMPIC TEAM

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Abstract. As members of the research team for the grant “Optimizing the psycho-physical training of athletes who practice Greco-Roman and freestyle wrestling to achieve a medal at the Olympic Games (2012 Edition)”, during the period June 2010 - July 2012, we conducted a series of tests with senior athletes, members of the Romanian Greco-Roman and freestyle wrestling Olympic team – 8 boys and 6 girls. Computerised testing (levers, desks with buttons, pedals) was used to achieve a psychomotor and intellectual profile, in the case of athletes, based on which their strong and weak points could be highlighted, representing the scientific support for future interventions of the coach, as well as personal ones; at the same time, computerised testing also aimed to stimulate/develop important skills in Greco-Roman and freestyle wrestlers: procedural memory, topographical memory, learning ability, attention – speed of responses, attention – correctly issued responses, vigilance, perceptual field inspection, simple reaction time, discrimination and complex reaction time, accuracy and speed in tasks requiring intersegmental and eye-hand coordination, resistance to disruptive factors (from the environment) and resistance to time pressure (when the dynamics of situations increases) in tasks requiring intersegmental and eye-hand coordination.

Keywords: coordination, reaction time, attention, memory, Greco-Roman and freestyle wrestling.

Introduction

Freestyle and Greco-Roman wrestling are part of the heuristic sport disciplines: “It is very difficult for an athlete to attack and defend at the same time, to hide his intentions and guess the opponent’s thoughts, to show cold blood when nerves are tense, to take decisions in fractions of a second, ... not to fall into an unrecoverable time crisis, to be supple in tactical actions and, at the same time, consistent with the strategic goal proposed during the confrontation” (Federaţia Română de Lupte, 2018). During the match, under uncertainty, athletes are inventive, using all their psycho-physical, technical, tactical and energy resources in their quest to find the best solutions to achieve their performance goals. Throughout a Greco-Roman or freestyle wrestling competition, the dynamics of situations is difficult to be predicted and the speed of actions is very high. Under these circumstances, it becomes self-evident the major importance of the cognitive (intellectual) and psychomotor abilities of athletes, such as focused attention, topographical memory, simple reaction time, discrimination and complex reaction time, eye-hand and intersegmental coordination.

These are the aspects that we will address in this paper, our goal being to support coaches and athletes interested in the level at which such psychomotor and cognitive dimensions are manifested in the case of the Greco-Roman and freestyle wrestlers, members of the Romanian Olympic team. We mention that we have chosen to publish this data now (after the London 2012 and Rio de Janeiro 2016 Olympics) in order not to jeopardise the chances of an Olympic medal by the Romanian athletes participating in these competitions. For the current generations of athletes practicing the freestyle and Greco-Roman wrestling, the results from this paper should be a starting point for identifying their strengths and weaknesses at the cognitive and psychomotor levels. Once identified, coaches and sports psychologists can support athletes in an individualised manner for their professional and personal development.

Coordination is the ability to perform precise, fine and controlled movements (O’Sullivan, Schmitz, & Fulk, 2014, p. 206). In the opinion of Weineck and Platonov (quoted by Tüdös & Mitračhe, 2006), coordination is the effect of cooperation between the central nervous system and the skeletal muscles, giving us the opportunity to perform complicated and unexpected motor actions. Coordination is also seen as “the association between different systems or subsystems in order to achieve a coherent action or task fulfilment” (Larousse, 2006, p. 266). Achieving a correct execution depends on the accuracy of information from different analysers – perceptual sensory factors occupy a central place (Pelin, 2001).

It is noted (depending on the involved limbs) the existence of hand-hand, hand-leg and hands-legs coordination (Anitei, 2007). The coordinated movements are characterised by the existence of an appropriate rhythm, direction, speed and muscle tension (Raj, 2006, p. 60) involving, in a high degree, the perception, the anticipation capacity...
and the concentration. The literature (Ackland, Elliott, & Bloomfield, 2009, p. 320; Cojocaru et al., 2015; Predoiu, 2015; Grigore et al., 2012) underlines the great importance that both eye-hand coordination and intersegmental coordination have in attaining high performance sports.

Topographical memory involves the formation of a visual mental map that constitutes “a characteristic type of knowledge stored [...] in the form of spatial representations” (Richard & Richard, quoted by Zlate, 1999, p. 219). This ability to temporarily retain and manipulate information about visual and spatial aspects of the environment is an essential cognitive component of human memory (Pearson, Ball, & Smith, 2014). Different authors highlight the importance of spatial memory in sport, including the ability to retain different routes, in the sports activity being necessary to understand the complex situation in relation to one’s own action (Epuran, Holdevici, & Toință, 2001; Predoiu, Ramsey & Arsenescu, 2016; Tüdös, Predoiu, & Predoiu, 2015; Predoiu, 2015). Referring to the second cognitive skill approached in this paper, namely focused attention, in 1890, W. James (quoted by Styles, 2006, p. 7) considered that “everyone knows what attention is”, more precisely, when we take possession of our own mind and retreat from one activity to engage in another. Maybe closer to the truth would be that no one knows what attention is. The complexity of attention lies in the existing sinuosities over time in its approach. We can consider attention as “the psychological phenomenon (the psychological function) that designates the activity of selective orientation, of focusing the mental energy on an object for the purpose of more profound knowledge and effective action” (Horghidan, Mitrache, & Tüdös, 2001, p. 149). Research shows the importance of a high level of attention in order to achieve sports performance (Hisieh, Huang, & Hung, 2010; Grigore, Predoiu, & Păunescu, 2015). Vigilance was called by Guillaume (quoted by Cosmovici, 1996, p. 68) “attention in expectation” – when we expect a specific event or signal to react promptly.

Regarding the reaction time, in 1865, the physiologist Donders (quoted by Kantowitz, Roediger, & Elmes, 2015) established three types of reaction, which he called A, B and C:

- reaction A (simple reaction) – there is only one stimulus and one response; simple reaction time measures the base time (the speed of the nerve impulse);
- reaction B – there are more stimuli, and for each stimulus there is a single and unique response; it measures the base time (the speed of nerve impulse transmission) and the time needed for the mental operations of identifying the stimulus and selecting the response (we are talking, in this case, about complex reaction time);
- reaction C – there are several stimuli found, but the subject has to react only to one, the rest being ignored (for example, when an athlete waits to be called to enter the field in a competition, he/she will react only when hearing his/her name); it measures the base time (the speed of nerve impulse transmission) and the time needed for the mental operation of identifying the stimulus (it does not require the choice of the response since only one response is compatible) – we are talking, in this case, about the discrimination reaction time.

The literature (Cashmore, 2008; Grigore et al., 2015; Grigore, Mitrache, & Predoiu, 2016) mentions the importance of rapid discrimination between stimuli in sports. Thus, athletes (in most sports) must be able to react to important stimuli and ignore irrelevant auditory or visual stimuli.

**Materials and methods**

**Participants**

A total of 14 athletes (8 boys and 6 girls) aged between 21 and 29 years, members of the Romanian Greco-Roman and freestyle wrestling Olympic team, took part in this study (between 2010 and 2012). In the case of the 8 boys, 4 were Greco-Roman wrestlers, and 4, freestyle wrestlers, while all the girls were freestyle wrestlers.

**Instruments**

The tests used to investigate the cognitive and psychomotor dimensions of the athletes were: RCMV (intersegmental coordination), TUD (eye-hand coordination), MT (topographical memory), CMA (attention concentration), TRS (simple reaction time) and TRD (discrimination reaction time), within PSISELTEVA tests created by RQ Plus. Computerised tests involve the use of levers, desks with buttons and pedals. We are referring to instrumental movements (Aniței, 2007). Researchers discuss about the importance of using simulators, devices, computerised programs (Murărețu, Petre, & Teodoru, 2018), virtual or augmented reality in the evaluation of athletes (Mihăilă, 2018).

In the case of the RCMV test, the software presents, at variable time intervals and in a randomised order, different images – square-shaped centrally-left/right, upward/downward positioned. Also, a green-coloured
upward-right positioned circle becomes red at variable time intervals (Figure 1a). The participants must respond through a motor reaction of their lower limbs (pedal pushing) and upper limbs (button pressing), depending on the number and position of the displayed squares. Considering the red circle (in the upward-right corner), only the right hand (button pressing) is used. The RCMV test also offers information about the complex reaction time.

The second test to evaluate coordination was the TUD test. In this case, a target, under the shape of a yellow square, moves on the monitor’s screen on different trajectories – left/right, up/down. The subjects must follow the signal-stimulus (the target), by maintaining it into a space – a red square named **collimator** (Figure 1b).

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![Figure 1. (a) RCMV test (intersegmental coordination); (b) TUD test (eye-hand coordination)](image)

The tests selected to investigate the cognitive abilities of the athletes were MT and CMA. MT offers many possibilities to move through the space between 2 points placed in the extremities of an image (Figure 2a). The athletes must respond after they memorise the relevant stimuli – a certain route given by the computer. Regarding the CMA test, we can find four squares – one set in the centre and three below on the horizontal, inside of which 2, 3, 4 or 5 triangles are placed (Figure 2b). The participants must choose, from the three squares situated on the horizontal, the square which has an identical content with the model-square (placed in the centre).

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![Figure 2. (a) MT test (topographical memory); (b) CMA test (attention concentration)](image)

TRS and TRD tests provide data about the simple and discrimination reaction times of the athletes. TRS is made up of 50 sequences (signal-stimuli). Every time a red circle appears on the screen, the subjects must push a lever as fast as they can (using the dominant hand). TRD measures the discrimination reaction time. The appearance of the red square represents the signal-stimulus. At random time intervals, in the centre of the screen, nine images appear in turns: green square, red square, yellow square, green circle, red circle, yellow circle, green triangle, red triangle or yellow triangle. Only when the red square appears, the athletes must push a lever as fast as they can.
Procedure

The six computerised tests were applied to the athletes in the same order, within three days, from 10:00 to 17:00. Testing was performed individually and lasted about 70 minutes. The athletes did not carry out intense physical activity (training) at least one hour before the evaluation. Each athlete had access to their own results and the global profile (obtained after performing all computerised tests).

Results

We present below (Tables 1 and 2) the performances achieved by the athletes at group level (the anonymity of the participants and the confidentiality of the data being ensured) – separately for boys and girls. The analysis of the results reveals the strengths, but also the weaknesses of the athletes (the score 10 meaning good performance; see also Predoiu, 2018). Field specialists (but also athletes) can thus pay attention to the development of the appropriate psychomotor and/or cognitive dimensions (after these aspects are known at an individual level).

Table 1. Results for boys – members of the Romanian Greco-Roman and freestyle wrestling Olympic team (at group level)

<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural memory</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Topographical memory</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Learning ability</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Attention - speed of answers</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Attention - correctly issued answers</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Vigilance</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Perceptive inspection of the environment</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Simple reaction time</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Discrimination reaction time</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Complex reaction time</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Coordination (eye-hand and intersegmental) - accuracy</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Coordination (eye-hand and intersegmental) - speed</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Resistance to disruptive factors (from the environment) in tasks requiring eye-hand and intersegmental coordination</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Resistance to time pressure (the dynamics of the situations increases) in tasks requiring both type of coordination</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>
Table 2. Results for girls – members of the Romanian freestyle wrestling Olympic team (at group level)

<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
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<td>Procedural memory</td>
<td>12345678910</td>
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<tr>
<td>Topographical memory</td>
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<tr>
<td>Learning ability</td>
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</tr>
<tr>
<td>Attention - speed of answers</td>
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</tr>
<tr>
<td>Attention - correctly issued answers</td>
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</tr>
<tr>
<td>Vigilance</td>
<td>12345678910</td>
</tr>
<tr>
<td>Perceptive inspection of the environment</td>
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</tr>
<tr>
<td>Simple reaction time</td>
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</tr>
<tr>
<td>Discrimination reaction time</td>
<td>12345678910</td>
</tr>
<tr>
<td>Complex reaction time</td>
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</tr>
<tr>
<td>Coordination (eye-hand and intersegmental) - accuracy</td>
<td>12345678910</td>
</tr>
<tr>
<td>Coordination (eye-hand and intersegmental) - speed</td>
<td>12345678910</td>
</tr>
<tr>
<td>Resistance to disruptive factors (from the environment) in tasks requiring eye-hand and intersegmental coordination</td>
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</tr>
<tr>
<td>Resistance to time pressure (the dynamics of the situations increases) in tasks requiring both type of coordination</td>
<td>12345678910</td>
</tr>
</tbody>
</table>

We synthesise the above-mentioned results in Figure 4.

Figure 4. Results for boys and girls - members of the Romanian Greco-Roman and freestyle wrestling Olympic team (at group level)

Conclusions

Analysing the results obtained by the members of the Romanian freestyle and Greco-Roman wrestling Olympic team, we can outline the following aspects: the performance, in the case of the procedural memory, is at a medium-high level for boys and an average level for girls – it is recommended to improve the ability to retain, operate promptly and correctly with procedural knowledge (knowledge about the action, procedures in the execution of a task, creation and assimilation of new procedures of action); the athletes recorded a medium-high
level (the boys) and a medium level (the girls) for the topographical memory – we recommend the development of visual imagery ability through guided imaging exercises, mental training; the learning ability is at a medium-high level for boys and a good level for girls – faster adaptation of movements, of athletes’ responses to new perceptual conditions is required; the attention speed in responses is at a very good level for both boys and girls (in other words, the athletes show a very good speed of scanning and processing the information content, providing very fast responses); in the case of attention – correctly issued responses, a medium-high level was recorded by the boys and a high level by the girls – we recommend the development of the level of conscious and voluntary activation of selective attention in tasks that, under demanding conditions given by the dynamics, unpredictability, content and volume of relevant information, require complementarity between the attention parameters (concentration, mobility, commutativity, distributiveness, volume and stability).

Also, a good score for vigilance and the perceptual field inspection ability is noted in the case of boys, as well as for the girls, meaning that, in order to improve their performance, athletes should be asked to rapidly detect specific and random changes which take place in the content of the task and issue proper responses suited for that situation (specialists can use exercises involving the rapid change of eye-fixing points to detect relevant information in the environment). In the case of the reaction time, a medium level for both the simple and discrimination reaction times (boys and girls) and a medium-high level for the complex reaction time (boys and girls) were observed. Thus, it is recommended: to exercise simple reaction time (measures the speed of the nerve impulse); a faster awareness of specific environmental stimuli (implies the speed of nerve impulse transmission plus the time needed to identify the relevant stimulus); to improve the ability of triggering and performing motor operations within optimal periods (complex reaction time includes the speed of nerve impulse transmission, the time needed to identify the stimuli of interest and the time needed to select appropriate responses, depending on the situation).

Regarding eye-hand and intersegmental coordination, it is noted: a medium-high level of accuracy in the case of boys and a medium level for girls in tasks that require intersegmental coordination and eye-hand coordination; a medium-high level of speed for both boys and girls in tasks requiring the two types of coordination; a high level (for boys) and a very high level (for girls) of resistance to disruptive factors (from the environment) in tasks that require intersegmental and eye-hand coordination; a medium-high level (for boys) and a medium level (for girls) of resistance to time pressure (when the dynamics of situations increases) in tasks that require eye-hand and intersegmental coordination. Thus, we recommend: the development of intersegmental and eye-hand coordination in terms of accuracy of movements and speed of execution; the improvement of psychomotor reorganization ability under intense stress from unpredictable signal-stimuli, distraction of attention, alternating brightness; the development of the ability to trigger and perform motor operations under specific required tempo conditions (involves voluntary regulation of own movements in the context of increased dynamics of situations).

Further, we would like to highlight some differences identified between the athletes who practice freestyle wrestling and those practicing Greco-Roman wrestling, as well as between boys and girls, only in terms of eye-hand coordination, the skill being undoubtedly of major importance in competitions (Predoiu et al., 2011):

- athletes practicing Greco-Roman wrestling recorded better performances regarding eye-hand coordination, compared to male and female athletes practicing freestyle wrestling;
- male athletes (practicing Greco-Roman and freestyle wrestling) achieved higher performances concerning eye-hand coordination, compared to female athletes (freestyle wrestling);
- disruptive factors had the lowest negative impact in the case of female athletes – thus showing a better adaptation of girls to disruptive factors (modifications occurred in the environment).

The data provide coaches with useful information for the training strategy, as regards the perfectible aspects of the coordination ability, with the purpose of scientifically conducting the sports training.

The results are also a topic of reflection for the future choice of possible criteria in the selection of athletes for the Romanian freestyle and Greco-Roman wrestling Olympic team.

Authors’ Contributions

All authors contributed equally to this study and should be considered as main authors.

References

PERFORMANCE CAPACITY IN HANDBALL

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Abstract. During the sports training period, it is important to know the players’ performance. In this paper, we want to address and graphically represent the components that can influence performance in handball. To represent graphically the factors that influence sport performance in handball, we can compare this process with the image of a handball ball. In the composition of the handball ball, there are several hexagons that are united and form a whole. In the case of our representations, the hexagons are also united together as in case of the handball ball. The distinction is that they are denoted by the component they directly influence. As in the case of the ball, to be able to use it in the game, it must be appropriate. Therefore, the performance capacity components must be represented accordingly so that we can reach the intended result. The intended result is to achieve the planned sport performance. The proposed objectives can be achieved, can be surpassed or, for different reasons, cannot be achieved. The results obtained, the information received during the whole training period can influence the player in his/her approach. The feedback information received throughout a sports training cycle is useful, because it can help the player when starting a new preparatory phase.

Keywords: performance capacity, handball, handball ball.

Introduction

Performance capability can be considered as the self-assertion of a subject during motor performance. Engaging all possibilities during motor performance is quantified by the points obtained, by taking a place in the ranking, by scoring a goal etc. (Dragnea, 1996, p. 62).

Over time, it has been demonstrated that people like to compare with others (Epuran, 1990, p. 30).

People like to race. We can see that, in both the field of sport and other fields, they try to be the best in the field in which they work. The term “performance” can be found in several areas of activity.

In the sporting field, the term “sport performance” can be represented by the result obtained by players in a competition. This result is based on a whole sports training process (Dragnea, 1996, p. 60).

The graphical representation of performance capacity has been achieved by many theorists and specialists. All of them put their mark on the visions they had. Graphical representations include components of performance and factors that influence sport performance.

Purpose and appropriateness of the work

The present paper is a theoretical study showing the importance and specificity of performance in handball. In the context of the evolution of handball and the increasing level of requirements, developing the performance capacity becomes mandatory, with special aspects particularly at junior level. In the analysis, we used the documentation method.

Topic addressed

To represent the performance capability with all its components, we can imagine a handball ball with the combined hexagons that make up a whole.

Handball cannot be played without a ball and, without the hexagons required for a ball, it cannot be used properly. As with the use of a handball in order to achieve a good result, all the hexagons represented in Figures 1 and 4 are needed. If a hexagon is missing, the instructive-educational process can continue, but with negative influences on the objectives pursued. In practice, one can use balls that do not fit properly, but this is not allowed in competition.

Let us imagine our handball ball in two parts, halves. Halfway, we place the Performance component (Figure 1) in the centre hexagon, and on the opposite side, the Player (Figure 4). We took into consideration that these two are the essential components in the training of the player. We believe that the two components can be essential in handball sports training. The other hexagons, represented by the components that influence the central component, can be found around these two central hexagons.

In order to achieve our goals, we thought it might be useful and necessary to know the course that the player should follow. We also thought it might be necessary to set real goals and monitor them throughout the training period. To obtain positive results, we must take into account the internal factors (skills, attitudes, somatic,
morphofunctional and psychological indicators), as well as those from the external environment (the training and competition in which the player participates, the ambience of the environment where preparation takes place, the achievement of a result in competition, the achievement of some numerical or performance objectives (Teodorescu, 2009, p. 31).

A representation of the factors influencing performance in handball is described in Figure 1, in the middle of the ball that has the central hexagon with the keywords: performance, competition, result, objectives.

Around it, we placed circularly the 4A of performance, with the morphofunctional, somatic and psychological indicators (Epuran, 1990, pp. 30-44).

Figure 1. Representation of factors influencing performance in the handball game has PERFORMANCE in the centre of the ball

Knowing each other’s attitudes helps us a lot in the handball game. Each player is different by his/her structure and genetic background. Each individual has anatomic, physiological and psychological particularities. We have taken into consideration that the skills influencing sport performance are genetically or environmentally determined. We took this into account in their graphical representation in Figures 2 and 3 (Epuran, 1990, p. 42).

Skills can be developed throughout the training period at all levels of training. Knowing the players’ skills can influence the coach’s decision on player specialisation. The coach must know the possibilities that each player has. Knowing the player’s ability to use his/her skills during the game can solve many game situations.

Figure 2. Genetically determined skills influencing sport performance
Attitude can be a key factor in achieving a positive result. We have taken into account that a player’s attitude during the training or competition can be influenced by the following:

- Self-confidence and confidence in the ability to implement acquired knowledge during the game;
- Confidence in the coach and co-workers throughout the training period;
- Player motivation throughout his/her training and especially during the competition. We thought that it was necessary to know what the player wanted at the time. It is important to know how to motivate them to have the right attitude during the game. Motivation can be intrinsic, as the desire for self-assertion, or extrinsic, like winning a medal, receiving a reward etc. Each player is different, so knowing how he/she can be motivated influences sport performance (Colibaba-Evuleț & Bota, 1998, p. 111).

Training can be considered as an instructive-educational process for the player to participate in competitions. It is well known that sports training is a pedagogical process carried out by specialists. It can be planned systematically, according to periodisation, which is based on the continuity of sports training.

Within the sports training lessons, the themes and operational objectives pursued during that period can be planned. The player must strictly adhere to the sports training program in order to achieve the proposed objectives. The ambiance component can be determined by the environment in which the player lives and operates. We have taken into account that it can influence sport performance. The factors that can influence the environment might be the family, school, society or entourage. The player can be influenced positively or negatively. It has been taken into consideration that the support of those around for the development of the player is important (Dragnea, 1996, pp. 71-73).

We thought it was possible to influence the players’ performance through the somatic, morphofunctional and psychological indicators. These can be done by means of measurements or tests. Knowing the data obtained at certain child and junior records is necessary and useful. They are in the growth and development stage and one can follow the entire process. The information is also useful to seniors, especially that related to handball-specific parameters for each indicator. Among the indicators that could influence sport performance, we mention:

- Somatic indicators: height, weight, somatic type, muscle fibre type;
- Functional indicators: type of superior nervous activity, vital capacity, O2 consumption, endocrine type;
- Psychomotor indicators: general coordination, segmental coordination, static and dynamic balance, body schema, laterality, ambidexterity, space-time perceptions, kinaesthetic synthesis, reaction rate, repetition and anticipation; psycho-intellectual indicators: attention, thought, imagination, memory; psycho-affective indicators: emotional balance, stress resistance; psycho-regulatory volitional indicators: volitional effort, perseverance, combativeness, pain resistance (Epuran, 1990, p. 42).

On the opposite side, the handball ball shows the PLAYER in the centre (Figure 4). If we look at the handball ball from the opposite side, we find the hexagon called PLAYER in its centre. The player’s sport performance can be influenced by: family, education, society, vocation and talent, genotype and personality.

All these hexagons form a unitary one, they are united to each other and lead to the development of the player and then to sport performance. Therefore, we can say that the main hexagon is the player, who follows a complete training process, which leads them to achieve results that then return to them through the merits obtained. In order to achieve the desired sport performance, the player must take into account all these hexagons.
Figure 4. Representation of factors influencing performance in handball has the PLAYER in the center of the ball

We have taken into consideration that each player has his/her particularities. Knowing them may or may not help in achieving sport performance. The player can be primarily influenced by the FAMILY. The environment in which the player lives can be a good context to achieve good results. Life support is very important for a player’s life. The player should be understood, tolerated in certain situations and helped when needed. The family should be the main support of the player.

We thought that another influential component of the player could be EDUCATION. We refer to the school and sporting environment in which the player spends much of his/her time. Within these two climates, the player learns, develops and creates new relationships with individuals of near age. The player finds out new things and can develop professionally. The educational environment can be a factor influencing their performance. For example: disappointment if a school prevents students from practicing a performance sport, which may lead them to give out practicing that sport. It is necessary for the school and sporting environment to help the athlete develop nicely and provide them with everything they need to perform in the field in which they can evolve.

In addition to the school and the sports club where the player performs, another component could be the SOCIETY in which they live. Friends, community and other people who come in direct contact with the co-worker can be a factor influencing the player. Society can influence him/her through different decisions and the way it behaves.

We also considered the following components: VOCATION, TALENT, GENOTYPE and PERSONALITY. We chose them because we thought that they strictly referred to the particularities of each individual.

Throughout a person’s life, the body changes from birth to old age. There are three stages in the evolution of a child’s body from 0 to 18 years of age. The first stage of growth is characterised by changes in organs, body segments, weight gain and volume. The second step is the differentiation process characterised by morphological and physiological changes; in this stage, the body will help the child in physical and intellectual activities. The third stage is the development process, which is the sum of the processes of growth and differentiation. The growth and development of a child manifests at the same time, but not uniformly (Negulescu et al., 2017).

The personality of an individual has several stages. From the first three years of life, the child discovers “self-consciousness” and uses the personal pronoun “me”. From 4 to 6 years, the child finds and identifies with other people, and the “relational ego” appears. Between the ages of 8 and 12, when the thought and will develop, the “Personalised self” is outlined. The preadolescent and adolescent face a major problem: “Self-identity” and “Self-Consciousness”. He or she always asks: “Who am I?” The identification of the individual is accomplished on
several levels: physical identity, sexual identity, intellectual identity and social identity (Clinciu et al., 2007, pp. 18-22)

Performance capability is seen as an interrelation between skill - talent - vocation.

It is known that a skilled player, who is talented and has a vocation for an activity, is capable of performing. In handball, we can exemplify a player’s skills to practice this game: he/she is very talented in the actions performed and has the vocation to play Left Back (Teodorescu, 2018, pp. 32-33).

Conclusions

Performance capability is considered as the self-assertion of a subject during motor performance by engaging all his/her possibilities.

The graphical representation of factors that influence sport performance is a starting point for improving the training process. We think that the coach needs to have a clear picture of the goal pursued, the objectives proposed and the way he/she can achieve them.

In this context, accepting the ball image as a unitary one, in which each hexagon is a component of the player’s performance, can guide the concept of training. The components presented in each hexagon are interconditioned and lead specifically to the development of the player and implicitly to sport performance.

References

STUDY REGARDING THE CORRELATION BETWEEN TEACHER’S AND COLLEAGUES’ EVALUATION AND SELF-EVALUATION IN PHYSICAL EDUCATION LESSONS FOR THE 7TH GRADE PUPILS

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Abstract. The present research is represented by an experimental study which has as a main topic the correlation between teacher’s evaluation, colleagues’ evaluation and subjects’ self-evaluation during physical education lessons. The subjects involved in this study are 61 pupils, of whom 30 are part of the experimental group (7th grade - classroom D) and 31 make up the control group (7th grade - classroom C). The experiment was conducted during the 2016-2017 school year and aimed to assess pupils in three standard tests included in the National School Evaluation System for the Physical Education and Sports Subject. The three tests were: acrobatic line (acrobatic gymnastics), squat jump on the gymnastics box placed transversally, followed by jump with extension and landing, and the technical-tactical basketball structure. For the experimental group, an initial evaluation was applied, followed by three intermediate evaluations and a final evaluation including teacher’s evaluation, colleagues’ evaluation and subjects’ self-evaluation. The statistical method (Pearson’s coefficient) was used in this research. The initial evaluation showed a poor correlation between teacher’s grades, colleagues’ grades and individual grades. The values of the correlation coefficients fit between medium and high correlation, which indicates that colleagues’ grades and individual grades are close to teacher’s grades. Regarding the final evaluation, the correlation coefficients of all three standard tests reach the highest level of correlation.

Keywords: evaluation, self-evaluation, tests, physical education lesson.

Introduction

The present paper aims to approach the issue by using evaluation in physical education lessons for 7th grade pupils. Our intention was to highlight ways of evaluation in order to optimise the physical education lessons.

Lately, both at national and international levels, the concerns to solve the problems raised by the evaluation process have been more and more obvious. In this regard, at the international level, authors concerned with the issue are Landsheere (1978), Barrow and McGee (1979), Baumgartner (1998), Morrow et al. (2006). At the national level, it can be noticed the interest of authors such as Lisievici (2007), Radu (2001), Dragnea (1984), Horghidan (1998), Tudor (2013).

Brown (2005) states that evaluation is probably the most important thing we, as teachers, can do to help our pupils to learn. They say that evaluation practices and methods help rather than obstruct the learning process.

Morrow et al. (2006) assert that measurement, test and evaluation refer to specific elements of the decision-making process. Although the three terms are related, each has a distinct meaning and should be used correctly. Measurement is the act of assessing. Usually, this results in assigning a number to the character of whatever is assessed. The test is an instrument or tool used to make a particular measurement. Evaluation is a statement of quality, goodness, merit, value or worthiness about what has been assessed. The authors conclude that evaluation implies decision-making.

David and MacFarlane-Dick (2007) conducted a research on formative evaluation and feedback. The research has been reinterpreted in order to show how these processes can help pupils to take control of their own learning process, meaning to become self-controlled. An important argument is that the subjects are involved in their own evaluation. Through the feedback process, pupils are creating their own proactive role, with profound implication for the way teachers are organizing the evaluation process and supporting the learning process.

In physical education, there have been created, based on research and various studies conducted by specialists, evaluation systems that were and still are the basis for giving grades and ratings relying on objective criteria. Morrow et al. (2006) admit that the goal of program evaluation is to demonstrate the successful achievement of program objectives to superiors.

Materials and methods

The research was conducted during the 2016-2017 school year at the Middle School no. 56 in Bucharest. The evaluated learning units were planned for both semesters as follows: first semester – basketball, first cycle of lessons (October-November) and acrobatic gymnastics (November-December), and second semester – the jumps
(January-February) and basketball – second cycle of lessons (March-May). The research involved 61 pupils in the 7th grade. The presence of two groups was identified: the experimental group (7th grade - classroom D) and the control group (7th grade - classroom C). 30 pupils are included in the experimental group and 31 pupils are part of the control group.

The research used three standard tests included in the National School Evaluation System for the Physical Education and Sports Subject (Ministerul Educației Naționale, 1999).

The three tests were: acrobatic line (acrobatic gymnastics), squat jump on the gymnastics box placed transversally, followed by jump with extension and landing, and the technical-tactical basketball structure:

- acrobatic line – is made up of elements acquired in previous years and new elements as pencil roll, forward roll from crouched position to crouched position, forward roll to straddle, backward roll from crouched position to crouched position, backward roll to straddle, shoulder stand, the bridge from high or low position – for girls, headstand – for boys, sideways cartwheel, handstand roll, Y leg stand, Y knee stand. It was followed the basic mechanism of acrobatic elements, the accuracy, fluidity, rhythm and expressivity of the execution.
- different jumps – squat jump on the gymnastics box placed transversally, followed by jump with extension and landing.
- basketball – executing a technical-tactical structure with the following elements: passing the ball with two hands from the chest while standing, with a static partner, running, getting free, pivoting, stopping while catching the ball, dribble, dribble with shooting.

The aim consists in knowing and executing the basic mechanism of the component process, performing the technical-tactical structure smoothly and scoring points.

During the experiment, the two groups worked using the same training content, under the guidance of the same teacher. For the experimental group, an initial evaluation was applied for each test, pupils being evaluated by the teacher and colleagues and by themselves (self-evaluation). At the end of each lesson cycle, a final evaluation for all three tests was made by the teacher and colleagues and through self-evaluation. During the lesson cycles, three intermediate evaluations were applied to the experimental group, all ending up with the final evaluation made by the teacher and colleagues and through self-evaluation.

The results were recorded in a type sheet specifically designed to highlight the evaluation process. After each evaluation, the results were processed, interpreted and presented to the experimental group. Discussions were based on the criteria used to assess executions, so that the evaluation could be more and more objective.

**Hypothesis.** If, during a school year, in addition to teacher’s evaluation, a self-evaluation and colleagues’ evaluation are set, than an improvement in pupils’ performances will be achieved in all tests.

**Results**

In the present research, we used the Pearson correlation coefficient in order to determine the degree of correlation between teacher’s grade, colleagues’ grades and self-evaluation in physical education lessons.

To calculate the value of r1, X variable was replaced one at a time with each grade given by the teacher, and Y variable was replaced with self-evaluation grades. To calculate the value of r2, X variable was replaced one at a time with each grade given by the teacher, and Y variable represented the mean of colleagues’ grades. To calculate the value of r3, X variable was replaced with the mean of colleagues’ grades, and Y variable took the value of diagonal grades (self-evaluation). To establish the final Pearson correlation coefficient, a mean of three “r” was made as follows: \( r = \frac{(r1+r2+r3)}{3} \).

Initial testing (Table 1) shows a poor correlation between teacher’s grades, colleagues’ grades and self-evaluation grades. This is because pupils are not accustomed to the level of requirements for the 7th grade and because they have the tendency to overrate themselves at the first repetitions, but also to underestimate or overrate their colleagues, based on personal criteria. In the initial evaluation, both poor grades and very high grades can be found, which proves, besides the mentioned explanation, that pupils do not know about the scoring system applied for each assessment, their evaluation relying on personal criteria or criteria borrowed from the rest of the pupils.

The intermediate evaluations (Table 1) were only applied to the 7th grade - classroom D, which was the experimental group. To better reveal the evolution of the correlation between teacher’s grade, colleagues’ grades and individual grades, three intermediate evaluations were used, with a visible increase in the correlation coefficients compared to the initial evaluation. The values indicate a medium to high correlation, which means that the grades of each pupil and their colleagues’ grades have values close to teacher’s grades. In this stage, pupils demonstrate that they can assimilate the key aspects of performing various exercises, improving their performance.
From now on, they have the ability to judge correctly the evolution of their colleagues. Poor grades appear less, the tendency to penalise or overrate colleagues being moderate.

The results of the final evaluation (Table 1) show the pupils’ high level of understanding of the mechanisms that should be respected for the successful execution of an exercise, but also their correct evaluation of colleagues’ progress.

The correlation between the grades given by pupils and those given by the teacher obviously increased in the 7th grade - classroom C, but due to going also through the intermediate evaluation, the 7th grade - classroom D recorded values of the correlation coefficient much higher than the 7th grade - classroom C. The correlation coefficients in all three tests for the 7th grade - classroom D fit into the standards used for the highest correlation, while the correlation coefficients for the 7th grade - classroom C are at a medium level. From these, it results that the experimental group pupils have reached, in this final evaluation stage, a high level of improvement in applying the acquired knowledge for their good development and evaluating their colleagues, while the control group pupils, in the same final evaluation stage, are just beginning to understand the mechanism of a correct evolution and appreciation.

Table 1. Values of the correlation coefficient obtained at the initial, intermediate and final evaluations by the experimental and control groups

<table>
<thead>
<tr>
<th>Test</th>
<th>7th grade - classroom D</th>
<th>7th grade - classroom C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial evaluation</td>
<td></td>
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<tr>
<td>Acrobatic gymnastics</td>
<td>0.337</td>
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<td>Jumps</td>
<td>0.334</td>
<td>0.349</td>
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<tr>
<td>Basketball</td>
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<td>0.359</td>
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<tr>
<td>Intermediate evaluation 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrobatic gymnastics</td>
<td>0.562</td>
<td>-</td>
</tr>
<tr>
<td>Jumps</td>
<td>0.559</td>
<td>-</td>
</tr>
<tr>
<td>Basketball</td>
<td>0.574</td>
<td>-</td>
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<tr>
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<td></td>
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<tr>
<td>Acrobatic gymnastics</td>
<td>0.715</td>
<td>-</td>
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<tr>
<td>Jumps</td>
<td>0.713</td>
<td>-</td>
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<tr>
<td>Basketball</td>
<td>0.727</td>
<td>-</td>
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<tr>
<td>Intermediate evaluation 3</td>
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<tr>
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<td>0.854</td>
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<tr>
<td>Jumps</td>
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<td>-</td>
</tr>
<tr>
<td>Basketball</td>
<td>0.810</td>
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<tr>
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<td>Jumps</td>
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<tr>
<td>Basketball</td>
<td>0.914</td>
<td>0.495</td>
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</tbody>
</table>

The number of maximum grades (10) obtained at the final evaluation by pupils in the experimental group (Figure 1) is higher than the number of maximum grades obtained by pupils in the control group at the same final evaluation. This proves that the experimental group pupils, who also got through the intermediate evaluation, have improved their performance much more than the control group pupils in all three tests.

Regarding the acrobatic gymnastics, at the initial evaluation, the experimental group recorded a number of 4 maximum grades, while, at the final evaluation, the number of maximum grades was 19. The control group had, at the initial evaluation, 3 maximum grades and 14 at the final evaluation.

Regarding the jumps over the gym bench, pupils in the experimental group did not obtain any maximum grade at the initial evaluation, but obtained 18 at the final evaluation. The control group had a number of 4 maximum grades at the initial evaluation and 11 at the final evaluation.

For basketball, pupils in the experimental group obtained a number of 2 maximum grades at the initial evaluation and 16 maximum grades at the final evaluation, while pupils in the control group obtained a number of 5 maximum grades at the initial evaluation and 8 maximum grades at the final evaluation (Figure 1).
Tables 2 and 3 show the frequency of teacher’s grades for both the experimental group (7th grade - classroom D) and the control group (7th grade - classroom C). The scoring scale includes grades from 5 to 10. Analysing the data, we can conclude that pupils in the experimental group obtained superior results at the final evaluation applied by the teacher for acrobatic gymnastics, jumps over the gym bench and basketball.

Table 2. Frequency of teacher’s grades for the 7th grade - classroom D

<table>
<thead>
<tr>
<th>Sample</th>
<th>Acrobatic gymnastics</th>
<th>Jumps</th>
<th>Basketball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>IE</td>
<td>IE 1</td>
<td>IE 2</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3. Frequency of teacher’s grades for the 7th grade - classroom C

<table>
<thead>
<tr>
<th>Sample</th>
<th>Acrobatic gymnastics</th>
<th>Jumps</th>
<th>Basketball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>IE</td>
<td>FE</td>
<td>IE</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>16</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>14</td>
<td>4</td>
</tr>
</tbody>
</table>

Pupils in the experimental group gave grades to their colleagues and themselves at the initial evaluation and intermediate evaluations 1, 2 and 3, but also at the final evaluation. Pupils in the control group gave grades to their colleagues and themselves at the initial and final evaluations. Tables 4 and 5 present the frequency of grades given at the colleagues’ evaluation. Analysing the results and comparing them with the grades given by the teacher, we can conclude that pupils in the experimental group have understood the mechanism of giving grades during the physical education lessons. Their evaluations were fair and based on the motor performance, the subjective motives being excluded.
Table 4. Frequency of grades given by pupils to their colleagues (7th grade - classroom D)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Acrobatic gymnastics</th>
<th>Jumps</th>
<th>Basketball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>IE</td>
<td>IE 1</td>
<td>IE 2</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>58</td>
<td>62</td>
<td>58</td>
</tr>
<tr>
<td>9</td>
<td>151</td>
<td>184</td>
<td>222</td>
</tr>
<tr>
<td>10</td>
<td>668</td>
<td>636</td>
<td>602</td>
</tr>
</tbody>
</table>

Table 5. Frequency of grades given by pupils to their colleagues (7th grade - classroom C)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Acrobatic gymnastics</th>
<th>Jumps</th>
<th>Basketball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>IE</td>
<td>FE</td>
<td>IE</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>29</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>79</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>9</td>
<td>162</td>
<td>197</td>
<td>194</td>
</tr>
<tr>
<td>10</td>
<td>684</td>
<td>662</td>
<td>659</td>
</tr>
</tbody>
</table>

Conclusions

Through the active participation of pupils in the physical education lessons, which allows them to continuously evaluate and self-evaluate, they become more involved in the physical education lessons, succeed to understand the execution mechanisms thoroughly, are aware of the mistakes they make and correct them quickly.

The results show that there is an increased correlation in all three tests used in the experiment. These correlations are poor at the initial evaluation, medium at the intermediate evaluations and reach a very high correlation at the final evaluation. This shows that the intermediate evaluations are of a great help for pupils in building their skills to evaluate others and especially to self-evaluate. Through these evaluations, pupils become more aware of the activity they perform during the physical education lessons, correct their executions easier and catch the execution mistakes from the small to the big ones.

For the control group, the recorded correlation values were never higher than medium for all three tests. This proves that pupils in this group fail to form their own skills to evaluate and self-evaluate correctly.

Getting through the present experiment, we could see that pupils, by interactively participating in physical education lessons, develop their critical and self-critical spirit, their interest in the lessons is much higher, they become more aware of what they do, correct their mistakes continuously, improve their performance and acquire an excellent ability to self-evaluate and evaluate others over time.

The research demonstrates the effectiveness of such an evaluation. Therefore, we recommend all physical education teachers, and not only, to also use self-evaluation of pupils and evaluation between pupils in order to increase their performance, as well as their conscious and active participation in the lesson, for an optimised achievement of the goals set by the teacher in his/her lesson activity.

Authors’ contributions

All authors contributed equally to this study and should be considered as main authors.

References


PERSPECTIVES OF EMPLOYMENT IN PHYSICAL EDUCATION AND SPORTS

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Abstract. The economic and social changes, as well as the need for a better correspondence between the educational process and the employers’ requirements, entail more attention to be paid by the education institutions to the educational act and appropriate training. The issue of the professional insertion of graduates in the field of physical education and sports requires the establishment of strategies to facilitate the access to a job, which is a defining element of the mission of universities. This paper aims to identify the employment prospects of students and graduates in the field of physical education and sports, according to their expectations, acquired knowledge and the insertion rate. In this respect, two questionnaires were developed: an online questionnaire distributed to graduates of the year 2017, six months after graduation, and a second questionnaire applied using paper and pencil, which was addressed to first-year students. The main variables observed are the motivation in terms of choice of the educational institution, the usefulness of the knowledge and skills acquired during studies, the employment rate in the field and the expectations of students regarding the profession for which they are trained. The conclusions of the paper highlight the need to intensify cooperation between universities and employers, the importance of harmonising the transition from graduate to employee status, the role of professional experience gained during the years of study and the advantage of graduating from a prestigious institution in the field.

Keywords: career, labour market, higher education.

Introduction

The challenge to the academic environment, from the perspective of inserting graduates into the labour market, aims to inform, guide and counsel the generations of students not to drop out of university, simultaneously with setting their best career paths. This desideratum can only be achieved by harmonising the link between higher education institutions and economic agents, respectively the labour market.

At national level, the lack of vision of labour market demands, the low level of pre-university education, the low motivation of students, the difficulties of attracting and involving employers and career guidance and counselling services have been identified as the main obstacles to the process of transition from graduate to employee status (Mocanu, Zamfir, & Pirciog, 2014).

The professional environment associated with the field of physical education and sports includes a variety of occupations requiring different levels of training. If some of them involve routine activities and a minimum level of training, others require in-depth knowledge of the field, increased abilities, specific skills and experience gained in practical activities.

The permanent change in labour market demands requires students to change their mentality regarding the expectations they have when admitted to studies in the field of physical education and sports, as well as to assimilate, from the very first year, the phrase “learning to learn” (Tani, 2013). The practical nature of the activities is the main motivational element that leads the high-school graduates to choose to specialise in physical education and sports. However, in order to become a professional in the field, the student must overcome previous school experiences or society’s perception of physical education and sports. This requires the student to consult specialised information in databases, access digital libraries or attend the traditional ones, participate in conferences or other scientific activities.

Occupations for graduates in the field of physical education and sports, according to the International Standard Classification of Occupations (ISCO-08), are grouped in different categories, depending on the specialisations. For graduates from physical education programmes, occupations are gathered under code 23, for graduates from kinesitherapy programmes, under code 2264, and for those from sports and motor performance programmes, under code 342 (International Labour Office, 2012). Other occupations, such as fitness trainer, personal trainer, teacher of extracurricular activities, professional athlete or sports event organizer, are also mentioned as subcategories of those listed above.

Campos-Izquierdo, González-Rivera and Taks (2016) highlight that Spanish specialists in physical and sports activities mention that the occupations of physical education teacher, sports manager, personal trainer and expert in retraining and rehabilitation through sports activities are the most stable and consequently the most sought after in the field. The same study reveals an increase in employment as a personal trainer, fitness trainer or physical trainer, while the coaching occupation is on a downward trend. Santos, Moreira and Brito (2018) emphasise the profile of the Brazilian graduate in the field, as regards the directions of employment: 40% of graduates work in
school physical education, 32% become coaches with different specialisations, 9% are personal trainers, 7% aerobics instructors, 6% dance instructors, and 6% work in the academic environment. The same coordinates are also identified in other studies; thus, the most sought-after occupations, according to the completed programme, are those of physical education teacher and personal trainer (Vasiliu & Ciolcă, 2014; Furtado & Santiago, 2015; Para & Para, 2016).

On the other hand, the social recognition of the profession, the facilities provided by the education system and the constant counselling of students are the most important factors in choosing the teaching career (Stănescu, Ciolcă, & Stoicescu, 2011).

Another study investigated the relationship between the personality of graduates in the field of physical education and sports and the employer expectations. After applying the personality questionnaires, the research results have highlighted that an important role for the professional integration in the field is played by some characteristics, such as the graduates’ levels of neuroticism and extraversion, their openness to new experiences and their consciousness (Grigore et al., 2017).

Material and methods

Purpose of the paper

The paper aims to identify the employment prospects of students and graduates in the field of physical education and sports, according to their expectations, acquired knowledge and the insertion rate.

Methods

To achieve our purpose, two questionnaires were developed: an online questionnaire distributed to graduates of the year 2017, six months after graduation, and a second questionnaire applied using paper and pencil, which was addressed to first-year students. The main variables observed are the motivation in terms of choice of the educational institution, the usefulness of the knowledge and skills acquired during studies, the employment rate in the field and the expectations of students regarding the profession for which they are trained.

The questionnaire addressed to first-year students, Bachelor’s programme, included the following items:

Q1. What is your main reason for choosing to study at the Faculty of Physical Education and Sport? Q2. To what extent do you think you will engage in the activity areas related to your Bachelor’s studies? Q3. To what extent do you think you will use the knowledge and skills acquired during your studies at UNEFS in your professional activity? Q4. What is the occupation/profession for which you are trained at the Faculty of Physical Education and Sports? Q5. What is your current professional situation?

These questions were addressed to 90 students, 68 boys and 20 girls.

Results

The respondents’ main motivation to study at the Faculty of Physical Education and Sports is that of becoming coaches, followed by the improvement in the field, the passion for sport and continuing the performance sport they have practiced (Figure 1). Fewer and fewer students are motivated to become physical education teachers.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>To become a teacher</td>
<td>14%</td>
</tr>
<tr>
<td>The pleasure to work with children</td>
<td>8%</td>
</tr>
<tr>
<td>To improve my knowledge in the field</td>
<td>20%</td>
</tr>
<tr>
<td>To become a coach</td>
<td>22%</td>
</tr>
<tr>
<td>The passion for sport</td>
<td>19%</td>
</tr>
<tr>
<td>To continue performance activity</td>
<td>17%</td>
</tr>
</tbody>
</table>

Figure 1. Reasons for choosing to study at the Faculty of Physical Education and Sports
Most UNEFS students in the first year of Bachelor’s programme (69%) do not yet have a very good perception of a possible future employment on the labour market in the field. Only 28% of them state they are firmly decided on this. Among the areas of activity related to the Bachelor’s studies they follow, the teaching profession is on the first place, followed by that of coach and finally that of fitness trainer/physical trainer (Figure 2 and 3).

Of the first-year students, 23% are employed, the rest being involved in courses or activities specific to the initial training process (Figure 4).
Of the 2017 graduates, Bachelor’s programme, 55% are employed in the field, 23% are employed in other areas, and 22% had no job at the time of testing (Table 1).

Table 1. Graduate insertion into the labour market – Bachelors of Physical Education and Sports, 2017

<table>
<thead>
<tr>
<th>Bachelor’s programme</th>
<th>Number of graduates</th>
<th>Contacted graduates</th>
<th>Graduates employed in the field</th>
<th>Graduates employed in other areas</th>
<th>Graduates with no job</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of graduates</td>
<td>Number of graduates</td>
<td>%</td>
<td>Number of graduates</td>
</tr>
<tr>
<td>Physical education</td>
<td>28</td>
<td>23</td>
<td>11</td>
<td>48%</td>
<td>5</td>
</tr>
<tr>
<td>Sport</td>
<td>52</td>
<td>50</td>
<td>29</td>
<td>58%</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>73</td>
<td>40</td>
<td>55%</td>
<td>17</td>
</tr>
</tbody>
</table>

As regards the Bachelor’s programmes, 58% of graduates from Sports and motor performance and only 48% of those from Physical and sports education are employed in the field (Figure 5). Although the option for the teaching profession was the highest at the beginning of the first year in the Bachelor’s programme, it gradually decreased by the end of the third year, the motivation of the surveyed students being the low salary in the education system and the quite difficult tenure examination.

Figure 5. Labour market insertion rate of graduates in the field (Bachelor’s degree, 2017)

For the 2017 graduates, Master’s programme, the records showed that 79% of them were employed in the field, 14% were employed in other areas, and 7% had no job (Table 2).

Table 2. Labour market insertion rate of graduates (Bachelor’s degree, 2017)

<table>
<thead>
<tr>
<th>Master’s programme</th>
<th>Number of graduates</th>
<th>Contacted graduates</th>
<th>Graduates employed in the field</th>
<th>Graduates employed in other areas</th>
<th>Graduates with no job</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of graduates</td>
<td>Number of graduates</td>
<td>%</td>
<td>Number of graduates</td>
</tr>
<tr>
<td>Physical education</td>
<td>18</td>
<td>15</td>
<td>11</td>
<td>73%</td>
<td>3</td>
</tr>
<tr>
<td>Performance sports</td>
<td>30</td>
<td>22</td>
<td>17</td>
<td>76%</td>
<td>3</td>
</tr>
<tr>
<td>Sports management</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>42</td>
<td>33</td>
<td>79%</td>
<td>6</td>
</tr>
</tbody>
</table>

As regards the Master’s programmes, 73% of graduates from Physical education and leisure motor activities and 77% of those from Sports performance are employed in the field, while for the Management and marketing in the sports structures, activities and events, the percentage is 100% (Figure 6).
Concerning the use of the knowledge and skills acquired during initial training at the workplace, 46% of the first-year students working in the field have mentioned that they are useful to a very large extent; the percentage drops to 36% for Bachelor’s graduates and 33% for Master’s graduates (Figure 7). In this context, Para and Para (2016) highlight that 71% of the surveyed Polish subjects questioned about the skills acquired during their years of study in the field of physical education and sports state that they are well and very well prepared to get a job.

Although the insertion rate on the labour market in the field is only 55% among Bachelor’s graduates, they state, in a very large percentage (70%), that they would attend the same faculty. This is not the case for Master’s graduates in the field, where, of the 79%, only 58% say that they would attend the same Master’s specialisation. (Figure 8) The same percentage (58%) of students who would choose the same field of study can also be found in a survey conducted in Poland (Para & Para, 2016).
Discussion and conclusions

Student information, counselling and awareness of employment opportunities on the labour market must be a priority of the university since admission or the first year of studies.

Nowadays, more and more students are focused, from the beginning of university courses, on finding a job, without taking into account their field of study. If previous generations of students or graduates aimed at the teaching profession, one can see that today’s generations are mostly interested in earning money, regardless of the job specifics. Also, the current social context leads graduates to focus on occupations such as fitness trainer or group fitness trainer/yoga instructor, which are highlighted as the main reasons for attending a university.

The students’ desire to have a teaching career gradually decreases from the first year to the years of Master’s studies and after, because fewer and fewer jobs are open to competition in the education system and the tenure competition is quite difficult, but also due to the fact that the professional environment associated with the field of physical education and sports includes a variety of occupations.

However, the employment rate in the field of physical education and sports is higher (79%) among Master’s graduates compared to Bachelor’s graduates (55%).

Although the level of specific knowledge, abilities, skills and experience in the practical activities provided by the university is high, there are significant differences between the number of graduates and the number of those who actually work in the field. The current socioeconomic challenges increasingly leave their mark on the characteristics of the process of finding a job and being employed, to the detriment of initial training in the same field. The university must identify the strengths and weaknesses of its strategies in relation to educational offers and correlate them with the labour market.

A controversial issue refers to employment opportunities during university studies. It is obvious that the professional experience gained during studies fosters a better transition to employee status through the acquired practical knowledge. Also, the absenteeism generated by the employed student status leads to a low level of assimilation of the theoretical and practical knowledge provided in the academic environment.

The inventory, data analysis and dissemination of results on the graduate insertion into the labour market must be done, using various instruments, by the university through reports to the ministry, ARACIS, UEFISCDI, but also by the counselling centre and student associations.

Authors’ contributions

All authors contributed equally to this study and should be considered as main authors.

References


THE RELATIONSHIP BETWEEN CERTAIN FITNESS COMPONENTS AND ANTHROPOMETRY IN BASKETBALL DEFENCE FOR JUNIORS

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Abstract. This paper aims to identify the most important relationship between anthropometric measurements and fitness components, on the one side, and the basketball defence against shooting for junior players, on the other side, and to identify the notable relationship between all independent variables (anthropometric measurements and fitness components) and dependent variables (BDAS) for junior players. The hypothesis of the study is that there are different correlations between independent variables (anthropometric measurements and fitness components) and dependent variables (BDAS for junior players). The research followed 60 participants, ages 14 to 16, testing the following components of fitness: agility, endurance (VO_2 max), flexibility, strength speed for hands, vertical jump test, strength speed for abdomen and 30m transition speed. The study also includes three anthropometric measurements: measurement of thigh circumference, measurements of shoulder width and upper arm circumference. One test for BDAS was also conducted. There were significant relations, less than 0.05, between shoulder width measurement and endurance VO_2 max (step test), with a value of 0.009. There were significant relations, less than 0.05, between endurance VO_2 max (step test) and vertical jump test (Sargent), with a 0.025 value. There were significant relations, less than 0.05, between flexibility and BDAS, with a value of 0.041. The other relations are higher than 0.05.

Keywords: fitness components, anthropometry, basketball, junior.

Introduction

In terms of junior basketball, endurance, strength, speed, agility and flexibility are very important skills. Between the ages fourteen to sixteen, the second stage of training begins. This phase includes the identification of talent, fundamental technical skills improvement, competitions, athletic development and essential tactical skills development (Bompa, 2000). According to Holm (1987), in a basketball game, there are on average 1050±51 different movements. In this context, agility is a very important skill. The game takes place on a relatively small court and the game situations are not typical, which requires very fast direction changes. Therefore, basketball practice must include agility exercises that build sprint, strength, decision-making, perception and technique (Young & Farrow, 2006). Cronin, McNair and Marshall (2003) consider that the focus of basketball coaches should be on developing physical fitness through intense and short exercises, such as short distance sprints (30m). The recommended tests are the agility, T-test and vertical jump test. Professional senior basketball players are very quick, flexible, agile and powerful.

Motor qualities are native and their initial manifestation depends on the genetic background. Their further development, as well as the formation of motor skills, is achieved with the evolution and development processes, influenced by the specifics of the activities carried out, the living conditions, heredity, geographical and climatic environments.

In a more complex definition, Ardelean (1990) considers that the motor quality - endurance is the ability of man to cope with physical exertion caused by muscular activity carried out within an effort of specified intensity and determined regime, without modification of exact intensity. The main factor limiting and affecting it is fatigue.

Measurements are a matter of great importance, because they study the phenomena individually in order to understand, explain and predict the relationship between anthropometric variables, fitness components and technical components, as well as to identify the nature of these relationships and their impact on defence for junior basketball players.

Authors have based their studies on the establishment of the athlete’s anthropometric profile (Dezman, Trninic, & Dizdar, 2001). For the basketball selection process, the player’s anthropometric profile is an essential element (Hoare, 2000). This profile is used to predict the future performance of the player. The position of the players on the court is determined by their height (Dezman et al., 2001).

The aim of the present study:
1. Identifying the most important relationship between anthropometric measurements and fitness components, on the side, and the basketball defence against shooting for junior players, on the other side.
2. Identifying the mutable relationships between all independent variables (anthropometric measurements and fitness components) and dependent variables (basketball defence against shooting for junior players).
The hypothesis of the study can be stated as follows:

There are different correlations between independent variables (anthropometric measurements and fitness components) and dependent variables (basketball defence against shooting for junior players).

Materials and methods

The study took place on the Al Qadisiya’s basketball court in Al Qadisiya. The equipment of the gym is adequate to meet the requirements of the basketball training program, and the recording, processing of the obtained results and their interpretation were made at the Al Qadisiya University.

The participants were the players from the National Basketball Sports Care Centre team in Al Qadisiya and the Al Qadisiya Junior Educational team. 60 players aged 14-16 were involved in the research. The research took place between 04.02.2017 and 02.03.2017, and the investigation covered three phases:

1. initial testing and anthropometric measurements for basketball players through three measurements attended by 60 players divided equally into three groups. This phase included the anthropometric measurements: measurement of thigh circumference, measurement of shoulder width, measurement of upper arm circumference;

2. components of fitness: agility, endurance (VO₂max), flexibility, strength speed for hands, vertical jump test, strength speed for abdomen and 30m transition speed;

3. basketball players’ technical skills testing. This stage included a test for basketball defence against shooting.

Results

Table 1 presents the results obtained by the 60 athletes participating in these tests: the arithmetic mean, the standard deviation, the difference between the highest and the smallest percentage, the coefficient of variation (%) etc., for all parameters (thigh circumference, shoulder width, upper arm circumference, agility, endurance VO₂max, flexibility, strength speed for hands, vertical jump test – Sargent, strength speed for abdomen, 30m transition speed, basketball defence against shooting).

Table 1. Results of mean, median, standard deviations, minimum, maximum and coefficient of variation

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Thigh circumference</th>
<th>Shoulder width</th>
<th>Upper arm circumference</th>
<th>Agility</th>
<th>Endurance VO₂max</th>
<th>Flexibility</th>
<th>Strength speed for hands</th>
<th>Vertical Jump Test (Sargent)</th>
<th>Strength speed for abdomen</th>
<th>30m transition speed</th>
<th>Defence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>52.32</td>
<td>44.3</td>
<td>29.77</td>
<td>8.66</td>
<td>48.89</td>
<td>12.63</td>
<td>12.93</td>
<td>39.37</td>
<td>22.12</td>
<td>4.57</td>
<td>17.23</td>
</tr>
<tr>
<td>Median</td>
<td>52.5</td>
<td>44</td>
<td>30</td>
<td>8.65</td>
<td>49.17</td>
<td>12</td>
<td>13</td>
<td>39</td>
<td>22</td>
<td>4.56</td>
<td>17</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.99</td>
<td>1.81</td>
<td>1.64</td>
<td>0.511</td>
<td>3.87</td>
<td>3.38</td>
<td>2.77</td>
<td>5.83</td>
<td>3.13</td>
<td>0.4</td>
<td>1.908</td>
</tr>
<tr>
<td>Minimum</td>
<td>48</td>
<td>40</td>
<td>26</td>
<td>7.54</td>
<td>42.45</td>
<td>8</td>
<td>8</td>
<td>26</td>
<td>16</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Maximum</td>
<td>56</td>
<td>48</td>
<td>34</td>
<td>9.9</td>
<td>54.21</td>
<td>22</td>
<td>17</td>
<td>56</td>
<td>27</td>
<td>5.54</td>
<td>21</td>
</tr>
<tr>
<td>Coefficient of variation</td>
<td>3.81%</td>
<td>4.10%</td>
<td>5.51%</td>
<td>5.90%</td>
<td>7.93%</td>
<td>26.76%</td>
<td>21.49%</td>
<td>14.82%</td>
<td>14.15%</td>
<td>8.71%</td>
<td>11.07%</td>
</tr>
</tbody>
</table>
Table 2. Analysis of the results using mathematical regression (Regression weight)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>The effect</th>
<th>Dependent variables</th>
<th>VR standardized</th>
<th>Estimate</th>
<th>SE</th>
<th>CR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Shoulder width measurement</td>
<td>Endurance test VO(_2)max (step test)</td>
<td>BDAS</td>
<td>-0.318</td>
<td>-0.678</td>
<td>0.259</td>
<td>-2.617</td>
<td>0.009</td>
</tr>
<tr>
<td>2 Endurance test VO(_2)max (step test)</td>
<td>Vertical Jump Test (Sargent)</td>
<td>ESTIMATE</td>
<td>0.282</td>
<td>0.425</td>
<td>0.190</td>
<td>2.238</td>
<td>0.025</td>
</tr>
<tr>
<td>3 Flexibility test</td>
<td>BDAS</td>
<td>ESTIMATE</td>
<td>0.251</td>
<td>0.143</td>
<td>0.070</td>
<td>2.041</td>
<td>0.041</td>
</tr>
<tr>
<td>4 Strength speed for abdomen</td>
<td>BDAS</td>
<td>ESTIMATE</td>
<td>-0.171</td>
<td>-0.105</td>
<td>0.076</td>
<td>-1.392</td>
<td>0.164</td>
</tr>
<tr>
<td>5 Thigh circumference measurement</td>
<td>Endurance test VO(_2)max (step test)</td>
<td>ESTIMATE</td>
<td>0.162</td>
<td>0.315</td>
<td>0.236</td>
<td>1.336</td>
<td>0.182</td>
</tr>
<tr>
<td>6 Strength speed for hands</td>
<td>BDAS</td>
<td>ESTIMATE</td>
<td>-0.147</td>
<td>-0.102</td>
<td>0.085</td>
<td>-1.195</td>
<td>0.232</td>
</tr>
<tr>
<td>7 Upper arm circumference</td>
<td>30 M transition speed</td>
<td>ESTIMATE</td>
<td>0.099</td>
<td>3.777</td>
<td>4.912</td>
<td>0.769</td>
<td>0.442</td>
</tr>
<tr>
<td>8 Agility test (Barrow - zig-zag)</td>
<td>Strength speed for hands</td>
<td>ESTIMATE</td>
<td>0.085</td>
<td>0.460</td>
<td>0.703</td>
<td>0.654</td>
<td>0.513</td>
</tr>
<tr>
<td>9 Agility test (zig-zag)</td>
<td>Flexibility test</td>
<td>ESTIMATE</td>
<td>0.081</td>
<td>0.537</td>
<td>0.857</td>
<td>0.626</td>
<td>0.531</td>
</tr>
<tr>
<td>10 Upper arm circumference</td>
<td>Strength speed for hands</td>
<td>ESTIMATE</td>
<td>0.054</td>
<td>0.092</td>
<td>0.219</td>
<td>0.417</td>
<td>0.676</td>
</tr>
<tr>
<td>11 Flexibility test</td>
<td>30 M transition speed</td>
<td>ESTIMATE</td>
<td>0.051</td>
<td>0.945</td>
<td>2.384</td>
<td>0.397</td>
<td>0.692</td>
</tr>
<tr>
<td>12 Thigh circumference measurement</td>
<td>Vertical Jump Test (Sargent)</td>
<td>ESTIMATE</td>
<td>0.048</td>
<td>0.142</td>
<td>0.369</td>
<td>0.385</td>
<td>0.701</td>
</tr>
<tr>
<td>13 Strength speed for hands</td>
<td>Vertical Jump Test (Sargent)</td>
<td>ESTIMATE</td>
<td>0.045</td>
<td>0.094</td>
<td>0.261</td>
<td>0.360</td>
<td>0.719</td>
</tr>
<tr>
<td>14 Shoulder width measurement</td>
<td>Strength speed for abdomen</td>
<td>ESTIMATE</td>
<td>0.037</td>
<td>0.064</td>
<td>0.237</td>
<td>0.273</td>
<td>0.785</td>
</tr>
<tr>
<td>15 Endurance test VO(_2)max (step test)</td>
<td>Strength speed for abdomen</td>
<td>ESTIMATE</td>
<td>0.034</td>
<td>0.027</td>
<td>0.111</td>
<td>0.244</td>
<td>0.807</td>
</tr>
<tr>
<td>16 30 M transition speed</td>
<td>BDAS</td>
<td>ESTIMATE</td>
<td>-0.026</td>
<td>-0.001</td>
<td>0.004</td>
<td>-0.212</td>
<td>0.832</td>
</tr>
<tr>
<td>17 Vertical Jump Test (Sargent)</td>
<td>BDAS</td>
<td>ESTIMATE</td>
<td>0.020</td>
<td>0.007</td>
<td>0.041</td>
<td>0.164</td>
<td>0.869</td>
</tr>
<tr>
<td>18 Upper arm circumference</td>
<td>Flexibility test</td>
<td>ESTIMATE</td>
<td>0.008</td>
<td>0.016</td>
<td>0.267</td>
<td>0.061</td>
<td>0.952</td>
</tr>
</tbody>
</table>

Standard value of independent variables vs. dependent variables

BDAS: Basketball defence against shooting
ESTIMATE: Regression weight
SE: Standard error for regression weight
CR: Calculated T
P: Level of significance
VR standardised: Standard regression values

Based on the analysis of the regression weight value, the regression weight is significant (acceptable) if the value of P is less than 0.05. The most important aspect indicated in the above table is the regression weight, which is significant in the relationship between the variables (anthropomorphic and motor qualities and basketball defence against shooting for basketball junior players, according to the model). Each variable has effect on another variable, which reflects the negative effect of an inverse relationship, meaning that the increase is inversely proportional, and this is true for each parameter.
The following variables are in negative relations: shoulder width measurement with endurance test VO₂max (step test) (-0.318); strength speed for abdomen with basketball defence against shooting (-0.171); strength speed for hands and basketball defence against shooting (-0.147); 30m transition speed and basketball defence against shooting (-0.026).

The following variables are in positive relations: endurance VO₂max with vertical jump test (Sargent) (0.282); flexibility with basketball defence against shooting for junior basketball players (0.251), thigh perimeter with endurance test VO₂max (step test) (0.162); upper arm circumference with 30m transition speed (0.099); agility test – Barrow (zig-zag) with strength speed for hands (0.085), agility test (zig-zag) with flexibility test (0.081); upper arm circumference with strength speed for hands (0.054); flexibility with 30m transition speed (0.051); thigh circumference measurement with vertical jump test (Sargent) (0.048); strength speed for hands with vertical jump test (Sargent) (0.045); shoulder width with strength speed for abdomen (0.037); endurance test VO₂max (step test) with strength speed for abdomen (0.034); vertical jump test (Sargent) with basketball defence against shooting (0.02); upper arm circumference with flexibility (0.008).

A positive relationship indicates that a variable growth determines the growth of the other variable as well. Weight gain indicates the effect size of the variable in the shoulder width measurement, and this shows which of the impacts was mostly used. The standard weight method makes it possible to compare the effect, as shown in Table 2. The results in the table indicate the following effects:

1. The greatest impact was 0.009 for the negative relation between shoulder width measurement and endurance test VO₂max (step test). The value is below 0.05. The effect size index indicates a large effect, standardised regression values (-0.318) and CR calculated T-value (-2.617). (Figure 1)
2. Another positive relationship is indicated between the variables endurance test VO₂max (step test) and vertical jump test (Sargent), with a value of significance 0.025, less than (0.05). The effect size index indicates a significant effect, the standardised regression value is 0.282, and the CR calculated T-value is 2.238. (Figure 2)
3. There is a positive relation between the variables flexibility and basketball defence against shooting, with a significance level of 0.041, less than 0.05. The effect size index indicates a large effect, the standardised regression value is 0.251, and the CR calculated T-value is 2.041. (Figure 3)
4. There is a negative relation between the variables strength speed for abdomen and basketball defence against shooting, with a significance level of 0.164, higher than 0.05. The standardised regression value is -0.171, and the CR calculated T-value is -1.392.
5. There is a positive relation between the variables thigh circumference and endurance test VO₂max (step test), with a significance level of 0.182, higher than 0.05. The standardised regression value is 0.162, and the CR calculated T-value is 1.336.
6. There is a negative relation between the variables strength speed for hands and basketball defence against shooting, with a significance level of 0.232, higher than 0.05. The standardised regression value is -0.147, and the CR calculated T-value is -1.195.
7. There is a positive relation between the variables upper arm circumference and 30m transition speed, with a significance level of 0.442, higher than 0.05. The standardised regression value is 0.099, and the CR calculated T-value is 0.769.
8. There is a positive relation between the variables agility test – Barrow (zig-zag) and strength speed for hands, with a significance level of 0.513, higher than 0.05. The standardised regression value is 0.085, and the CR calculated T-value is 0.513.
9. There is a positive relation between the variables agility test (zig-zag) and flexibility, with a significance level of 0.531, higher than 0.05. The standardised regression value is 0.081, and the CR calculated T-value is 0.626.
10. There is a positive relation between the variables upper arm circumference and strength speed for hands, with a significance level of 0.676, higher than 0.05. The standardised regression value is 0.054, and the CR calculated T-value is 0.417.
11. There is a positive relation between the variables flexibility and 30m transition speed, with a significance level of 0.692, higher than 0.05. The standardised regression value is 0.051, and the CR calculated T-value is 0.397.
12. There is a positive relation between the variables thigh circumference and vertical jump test (Sargent), with a significance level of 0.701, higher than 0.05. The standardised regression value is 0.048, and the CR calculated T-value is 0.385.
13. There is a positive relation between the variables strength speed for hands and vertical jump test (Sargent), with a significance level of 0.719, higher than 0.05. The standardised regression value is 0.045, and the CR calculated T-value is 0.360.

14. There is a positive relation between the variables shoulder width and strength speed for abdomen, with a significance level of 0.785, higher than 0.05. The standardised regression value is 0.037, and the CR calculated T-value is 0.273.

15. There is a positive relation between the variables endurance test VO\(_2\)max (step test) and strength speed for abdomen, with a significance level of 0.807, higher than 0.05. The standardised regression value is 0.034, and the CR calculated T-value is 0.244.

16. There is a negative relation between the variables 30m transition speed and basketball defence against shooting, with a significance level of 0.832, higher than 0.05. The standardised regression value is -0.026, and the CR calculated T-value is -0.212.

17. There is a positive relation between the variables vertical jump test (Sargent) and basketball defence against shooting, with a significance level of 0.869, higher than 0.05. The standardised regression value is 0.020, and the CR calculated T-value is 0.061.

![Figure 1. Relationship between shoulder width and endurance test VO\(_2\)max (step test)](image1.png)

There is a negative relation between the variables shoulder width and endurance test VO\(_2\)max (step test), with a significance level of 0.00, lower than 0.05. The effect size index indicates a large effect, the standardised regression value is -0.318, and the CR calculated T-value is -2.617.

![Figure 2. Relationship between endurance test VO\(_2\)max (step test) and vertical jump test (Sargent)](image2.png)

There is a positive relation between the variables endurance test VO\(_2\)max (step test) and vertical jump test (Sargent), with a significance level of 0.025, higher than 0.05. The effect size index indicates a large effect, the standardised regression value is 0.282, and the CR calculated T-value is 2.238.
There is a positive relation between the variables flexibility and basketball defence against shooting, with a significance level of 0.041, higher than 0.05. The effect size index indicates a large effect, the standardised regression value is 0.251, and the CR calculated T-value is 2.041.

We have identified some important and influential relationships between anthropometric variables, motor qualities and technical abilities using a few tests and measurements, which will enable coaches to adapt the training in order to facilitate the development of skills, including basketball defence.

Conclusions

The operational approach of our work focused on the theoretical and practical (testing) study of the relationships between anthropometric indices, motor qualities and basketball defence against shooting for junior basketball players in Iraq (14 to 16 years old). The main aim of the research is to verify the hypothesis presented above.

In terms of anthropometry, coaches must take physical measurements into account when selecting basketball players. It seems that shoulder width measurement and endurance test VO₂max (step test), by the significance level of 0.009, lower than 0.05, has the greatest impact. Thus, the effect size index indicates a significant effect.

Regarding the motor qualities, endurance is the most important of all abilities and is necessary in basketball defence against shooting. There is also a positive relationship represented by flexibility and basketball defence against shooting, with a significance level of 0.041, lower than 0.05. The effect size index indicates a significant effect.

As for the technical components, coaches need to pay special attention to developing skills by specifically using exercises for flexibility, which has a major impact on basketball, in the basketball training program.

References

CORRELATIONS BETWEEN DEPRESSION, ANXIETY AND THE LEVEL OF PAIN PERCEPTION IN ATHLETES WHO SUFFERED INJURIES

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¹ National University of Physical Education and Sports, 140 Constantin Noica Street, Bucharest, Romania
*Corresponding author: radu.rizeanu@yahoo.com

Abstract. Starting from the premise that any injured athlete will have to fight a series of physical, mental, interpersonal and psychosocial criteria during the process of alleviation, healing and recovery, we consider it essential to understand the psychological status and the effects of sports-related injuries, especially basketball-related ones, on the athlete’s life. Given that the coach, the chiropractor and the clinical sports psychologist are people who can provide athletes with useful injury prevention methods, we bring forward a hypothesis related to identifying some significant positive correlations between the level of depression, the level of anxiety and the level of pain perception among athletes. In other words, the higher the overall levels of depression and anxiety, the higher the chances of increased pain perception. In order to test this hypothesis, we analysed a group of subjects made up of young professional basketball players aged 20-32 (N = 30) who had been diagnosed with orthopaedic injuries, and a control group. The results of the test confirmed the hypothesis.

Keywords: depression, anxiety, pain perception, athletes.

Introduction

Sports-related trauma is always difficult to deal with both from a physical and psychological point of view, regardless of the intensity level (Rizeanu, Bratu, & Rizeanu, 2017; Curry & Maniar, 2004). Professional basketball players can reach and maintain a high level of performance when their training programmes include a sport-related repository of knowledge. This includes information coming from the physiology of physical exercise, from intervention programmes devised by chiropractors and physical therapists, from nutrition, sports medicine and, last but not least, from doing exercise based on sports psychology.

Changes in the main functions of the body when playing basketball systematically represent adaptation strategies of the organism when dealing with demanding physical effort (O’Connor et al., 2005). Execution control stimulates proprioceptors, develops body shape, balance and stability, essential factors in the quality of pain perception (Geambaşu, 2018, p. 141).

Objectives and hypothesis

Our objective is to identify a correlation between certain variables that we investigated, such as the anxiogenic status, depression status and personal behaviour, relative to basketball players’ injuries.

Our hypothesis is that we anticipate a significant positive correlation between the level of depression, the level of anxiety and the level of pain perception among our test athlete subjects.

Method

For this research, we used two groups of 30 athletes, a test group and a control group. The test group is made up of 30 professional basketball players who had been diagnosed with orthopaedic injuries, aged 20-32, with a mean age of 23.08 and a standard deviation SD = 3.11. The control group is made up of 22 male subjects and 8 female subjects aged 20-32, with a mean age M = 26.30 and a standard deviation SD = 3.677.

All subjects are of Romanian nationality and come from an urban environment. All subjects from both groups volunteered for the tests taken during the research and were not remunerated in any way for their participation.

We used the following instruments:

- Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983), based on 14 questions, 7 of which focusing on depression and 7 on anxiety.
- Beck Depression Inventory (BDI, Beck et al., 1979) – a test consisting of 21 items; depending on the presence and severity of the symptoms, there are three degrees of intensity: 0, 1, 2.
- Perceived injury behaviour (PCA, Weinberg, Vernau, & Horn, 2016, p. 48): in order to assess participants’ perceptions regarding their behaviour during injuries, we used three items. The questions asked participants to state a) whether they had ever kept playing basketball while injured (minor and moderate injuries); b) whether they currently play while being injured (minor and moderate injuries); c) whether they expect to play basketball while injured (minor and moderate injuries) in the future.

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1* Corresponding author: radu.rizeanu@yahoo.com

| Keywords: depression, anxiety, pain perception, athletes. | Keywords: depression, anxiety, pain perception, athletes. | Keywords: depression, anxiety, pain perception, athletes. | Keywords: depression, anxiety, pain perception, athletes. | Keywords: depression, anxiety, pain perception, athletes. |

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Results

When applying the HADS scale, the test group scored an average of 30.10, a value which indicates a high level of the overall depression and anxiety score (Table 1). The standard deviation of the scores is 1.709, and the value of the mode is 30.

Table 1. Descriptive statistics for HADS scale within the test group (N=30)

<table>
<thead>
<tr>
<th>Descriptive statistics – HADS (overall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard deviation</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

Subjects’ overall depression and anxiety level scores are distributed as follows: 70% of the basketball players scored a moderate overall level of depression and anxiety, and 30%, a severe overall level of depression and anxiety (Table 2).

Table 2. Frequencies for HADS scale – Overall score within the test group (N=30)

<table>
<thead>
<tr>
<th>Frequency table – Overall score, HADS scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequencies</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>27.00</td>
</tr>
<tr>
<td>28.00</td>
</tr>
<tr>
<td>29.00</td>
</tr>
<tr>
<td>30.00</td>
</tr>
<tr>
<td>31.00</td>
</tr>
<tr>
<td>32.00</td>
</tr>
<tr>
<td>33.00</td>
</tr>
<tr>
<td>35.00</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The control group was made up of amateur players who had not been diagnosed by an orthopaedist, and their results for the HADS scale (HADS overall score) showed an average of 21.13, a value indicating a moderate level of depression and anxiety.

The standard deviation of the scores is 4.191; the median value is 21, and the mode value is 18.

When applying the Depression Subscale of the HADS scale, the experimental group subjects’ results show an average of 11.70, a value which indicates a high level of depression. The standard deviation of the scores is 1.342, the value of the median is 11.50, and the value of the mode is 11 (Table 3).

Table 3. Descriptive statistics for HADS Depression Subscale within the experimental group (N=30)

<table>
<thead>
<tr>
<th>Descriptive statistics HADS – Depression Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard deviation</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>
When applying the Anxiety Subscale of the HADS scale, the experimental group subjects’ results show an average of 18.40, indicating a very high (severe) level of anxiety. The standard deviation of the scores is 1.220, and the value of the median and mode is 19 (Table 4).

Table 4. Descriptive statistics for HADS Anxiety Subscale within the experimental group (N=30)

<table>
<thead>
<tr>
<th>Descriptive statistics HADS – Anxiety Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard deviation</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

Regarding the control group, subjects’ overall depression and anxiety level scores are distributed as follows: 92.3% of the basketball players scored a moderate overall level of depression and anxiety, and 9.7%, a mild overall level of depression and anxiety.

![Figure 1. The distribution of HADS scale score within the control group](image)

The Beck Depression Inventory results for the experimental group made up of basketball players diagnosed with orthopaedic injuries show an average of 29.26, a value which indicates a severe level of depression. The standard deviation of the scores is 4.456, the value of the median is 29.50, and the value of the mode is 25. The subjects gave responses between 22 points minimum (moderate level of depression) and 39 points maximum (severe level of depression) (Table 5).

Table 5. Descriptive statistics for Beck Depression Inventory (BDI) within the experimental group (N=30)

<table>
<thead>
<tr>
<th>Descriptive statistics – Beck Depression Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard deviation</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
</tbody>
</table>
The Beck Depression Inventory results for the control group made up of amateur players who have not been diagnosed by an orthopaedist show an average of 19.86, a value which indicates a mild towards moderate level of depression.

The experimental group subjects’ results regarding the perceived injury behaviour show an average of 14.50, a value which indicates a moderate level of perceived injury behaviour (Table 6).

Table 6. Descriptive statistics of Perceived injury behaviour within the experimental group (N=30)

<table>
<thead>
<tr>
<th>Descriptive statistics – PCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard deviation</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

The standard deviation for the perceived injury behaviour is 1.570, and the value of the median and mode is 14. The subjects provided responses between a minimum score of 11 (moderate level of perceived injury behaviour) and a maximum score of 18 (high level of perceived injury behaviour).

The perceived injury behaviour results for the control group made up of amateur players show an average of 11.57, a value which indicates a low to moderate perceived injury behaviour.

Figure 2. The distribution of PCA scale score within the control group

In order to validate our hypothesis, we calculated the correlation coefficient between the HADS level of depression and anxiety, the BDI level of depression and the perceived injury behaviour; the obtained results confirm our hypothesis (Table 7).
Table 7. HADS, BDI and PCA correlations

<table>
<thead>
<tr>
<th>HADS and BDI Depression and anxiety</th>
<th>Perceived injury behaviour (PCA)</th>
<th>( r_{\text{calculated}} )</th>
<th>( r_{\text{calculated}} )</th>
<th>(^{95%\text{ CI}})</th>
<th>( r_{\text{corrected}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression and anxiety level HADS</td>
<td></td>
<td>.59**</td>
<td>.53</td>
<td>.76</td>
<td>.70**</td>
</tr>
<tr>
<td>BDI level of depression</td>
<td></td>
<td>.69**</td>
<td>.49</td>
<td>.74</td>
<td>.73**</td>
</tr>
</tbody>
</table>

Test group: \( N = 30 \). *\( p < .05 \)

Conclusions

Expert studies show that the influence of traumatic events that athletes face can be mediated through a series of social variables such as age, gender, level of education or financial resources (O’Connor et al., 2005). Age could favour the acquisition of more adequate confrontation strategies for professional athletes or could contribute to the development of confrontation resources and endurance. Psychological characteristics may predispose the athlete who suffers an injury to extreme mood changes. Early experiences related to the incidence of traumatic injuries among young professional athletes show that many of those subjects may experience depression or anxiety later on (Bratu & Rizeanu, 2018; Mehrad, 2017).

The way in which professional athletes deal with traumatic injuries can influence their participation in training sessions and competitions more than the events themselves. Traumatic injury confrontation mechanisms aim to either solve problems and control the situation or reduce the emotional response and restore physical and emotional balance (Yang et al., 2007).

The main limitation of the current study comes from the small number of participants involved in the research. For a better presentation of results in the future, it is desirable to include a significantly higher number of professional basketball players in the experimental group.

References


ASPECTS OF PSYCHOMOTRICITY IN WATER POLO PLAYERS – JUNIORS AGED 14-15

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Abstract. The research integrates methods for the analysis and assessment of body coordination ability in junior water polo players aged 14-15, which directly or indirectly influence the position and movement of the body through water, the specific technique, resulting in increased future sports performance. The emphasis is on measuring bilateral coordination and body balance in water polo players through non-specific means and determining the appropriateness of such research. The research includes the measurement and assessment of gross motor skills (body coordination) by applying the Bruininks-Oseretsky Test of Motor Proficiency, Second Edition, to the members of two water polo clubs registered in the Junior National Championship (Steaua School Sports Club 3 and Emil Racoviță Sports College). The tested athletes play all matches at their club teams, are targeted for the national team and are born in 1997. The test was conducted on 07.08.2012 in the sports hall of UNEFS Bucharest. After testing, the following results are noted: of the 24 athletes, 66% (16 athletes) fall into the below-average category, and 33% (8 athletes), into the average category. This research provides valuable information, obtained through non-specific means (on dry land), about the level of body balance and coordination. Such information is necessary for coaches to implement technical exercises on dry land in their workouts and also exercises to sustain the body on water in special conditions (humidity, adversity, passing and receiving force, speed, time pressure), which are aimed to improve the game situation management in order to achieve positive sports results.

Keywords: bilateral coordination, balance, water polo, Bruininks-Oseretsky Test.

Introduction

In the water polo game, acyclic movements with permanent changes in dynamics and motor behaviour predominate (Pinnington et al., 1988, Dopsaj & Matković, 1994, Smith, 1999, cited by Bratusa, Perisic, & Dopsaj, 2010, p. 245). The multifaceted specific technical expression elements are rich in water polo players, and a good knowledge of the competitive and specific technical elements will facilitate the learning of ball-handling techniques and will ensure the individual and collective tactical expression in a creative, modern way ( Marinescu, Frățilă, & Bălan, 2004, p. 3). The game of water polo does not simply involve swimming, but also a large number of other specific movements performed in the horizontal and vertical positions, namely technical elements with and without the ball, with and without an opponent, all this indicating the complexity of both the water polo game and the training itself, with reference to the technical and tactical preparation of players (Snyder, 2008, p. 18). Motricity is a broad concept encompassing a set of physiological, anatomical, neurological and psychological functions that allow the body to move (Bouchard, 2009, cited by Krings, 2014, p. 26). Any type of technical action performed in water, with or without a ball, unconditionally involves manual coordination, balance, bilateral coordination of the lower and upper limbs to ensure a good/efficient position of the player’s body on water in relation to teammates or opponents. The water polo game is characterised by rapid situational changes, and knowledge and stimulation of bilateral coordination and balance implies that, when learning the movement and position of the body on water, the difficulty of problems/exercises is slightly above the level of what athletes already master, in order to induce change/adaptation.

Research hypothesis

Testing bilateral coordination and balance through non-specific means (on dry land) provides information about the in-water sports performance of young polo players (junior III).

Research methods

The research methods used were: experiment – ascertaining pedagogical experiment; test method – Bruininks-Oseretsky Test Battery, Second Edition (BOT-2); graphical method; mathematical and statistical method with the statistical parameters of central tendency – arithmetic mean (X), statistical parameters of dispersion – standard deviation (S), coefficient of variation (CV) (Popa, 2008, pp. 58-74).
Research design

Period, location and subjects of the research

The experiment tested 24 junior athletes, members of two water polo clubs in Bucharest, registered in the National Championship: Steaua School Sports Club 3 (1st place) and Emil Racoviţă Sports College (3rd place). The tested athletes are born in 1997, play all matches at their club teams and are targeted for the national team. Testing was conducted on 07.08.2012 in the sports hall of UNEFS Bucharest (Ticală, 2015, pp. 116-119).

The test used

The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2), is an individually administered test battery based on a series of clearly specified objectives aimed at assessing a wide range of motor skills in subjects aged between 4 and 21 years. This battery was designed for physical therapists, psychologists, physical education teachers and coaches, among others, providing them with an efficient and reliable instrument for measuring fine and gross motor skills. Since the subject has to use his/her preferred hand to perform different tasks during the test battery application, the subject’s preference should be established before administering the test battery (Bruininks & Bruininks, 2005, pp. 1-72). Body coordination: refers to the coordination and control of large muscle groups used to maintain posture and balance.

Description of the subtests (Gozu, 2011, pp. 161-162)

- Subtest 1: Bilateral coordination. This subtest assesses motor skills needed in practicing sports and other recreational activities. The prescribed tasks involve body control concomitantly with sequential and simultaneous coordination of the upper and lower limbs. For each item, the subject performs movement sequences, some of which are familiar (finger pivoting, hopping while clapping hands), while others are totally new to them (simultaneous finger-opposite leg tapping). When the task to be performed is not familiar to the subject, the examiner should use the demonstration and show the images presented in the instruction manual.
  Content:
  - Item 1: touching the nose with the index finger, eyes open;
  - Item 2: hopping with legs apart, simultaneously with raising the arms overhead;
  - Item 3: hopping on the spot – leg and arm on the same side, synchronised;
  - Item 4: hopping on the spot – leg and arm on the opposite side, synchronised;
  - Item 5: pivoting the thumb and index fingers;
  - Item 6: tapping with the finger and leg on the same side, synchronised;
  - Item 7: tapping with the finger and leg on the opposite side, synchronised.

- Subtest 2: Balance. This subtest assesses motor skills involved in maintaining posture at rest, in motion or while performing other common activities. The prescribed tasks address the three areas affecting balance: trunk stability, static and dynamic balance and the use of visual clues. Items related to trunk stability include subtests such as standing on both legs, standing on one leg or standing on the balance beam. Static and dynamic balance is measured using seven items (for static balance) and two items requiring the subject to travel a distance along a line traced on the ground. Three of the tasks are performed with closed eyes, a situation that highlights the extent of subject’s dependence on visual information in maintaining balance.
  Content:
  - Item 1: standing with legs apart along a line traced on the ground, eyes open;
  - Item 2: walking along a line traced on the ground, eyes closed;
  - Item 3: standing on the preferred leg on the ground, eyes open;
  - Item 4: standing with legs apart along a line traced on the ground, eyes closed;
  - Item 5: walking heel to toe along a line traced on the ground;
  - Item 6: standing on the preferred leg on the ground, eyes closed;
  - Item 7: standing on the preferred leg on the balance beam, eyes open;
  - Item 8: standing heel to toe on the balance beam;
  - Item 9: standing on the preferred leg on the balance beam, eyes closed.
Results

The results obtained in subtest 1 are compared with the BOT 2 score profile, which fits the results into the following categories: between 0 – 5 points = much below average; between 5 – 10 points = below average; between 10 – 20 points = average; between 20 – 25 points = above average; between 25 – 35 points = much above average. Table 1 presents the results obtained in subtest 1 – Bilateral coordination, and Figure 1 shows the graphical representation of the average results obtained by the two groups.

Table 1. Results obtained in subtest 1 (Bilateral coordination)

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Emil Racoviţă Sports College</th>
<th>Steaua School Sports Club 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initials</td>
<td>Scale score</td>
</tr>
<tr>
<td>1.</td>
<td>T.I.</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>N.D.</td>
<td>9</td>
</tr>
<tr>
<td>3.</td>
<td>J.A.</td>
<td>11</td>
</tr>
<tr>
<td>4.</td>
<td>B.A.</td>
<td>9</td>
</tr>
<tr>
<td>5.</td>
<td>L.A.</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>C.D.</td>
<td>13</td>
</tr>
<tr>
<td>7.</td>
<td>V.A.</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>M.C.</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>I.F.</td>
<td>8</td>
</tr>
<tr>
<td>10.</td>
<td>P.G.</td>
<td>9</td>
</tr>
<tr>
<td>11.</td>
<td>G.V.</td>
<td>11</td>
</tr>
<tr>
<td>12.</td>
<td>Z.I.</td>
<td>8</td>
</tr>
</tbody>
</table>

Statistical analysis:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>X</td>
<td>9.5</td>
<td>X</td>
</tr>
<tr>
<td>S</td>
<td>±1.567</td>
<td>S</td>
</tr>
<tr>
<td>CV</td>
<td>16.5%</td>
<td>CV</td>
</tr>
</tbody>
</table>

The average score obtained in subtest 1, Bilateral coordination, is X = 9.5 points for Racoviţă athletes and X = 10.2 points for those from Steaua. The difference between the two means is X = 0.7 points in favour of Steaua athletes, thus resulting that, in this subtest, they have obtained a higher score (Table 1 and Figure 1).

The standard deviation is S = ± 1.567 points for Racoviţă athletes and S = ± 2.887 points for those from Steaua. The difference is S = ± 1.32 points in favour of Racoviţă athletes. The coefficient of variation is Cv = 16.5% for Racoviţă athletes, which shows that they form a relatively homogeneous group, with an average dispersion of results. The coefficient of variation is Cv = 28.4% for Steaua athletes, which shows that they form a non-homogeneous group, with a high dispersion of results. The difference is Cv = 11.9% in favour of Racoviţă athletes, which indicates that the degree of dispersion of the results obtained by them is lower compared to the results obtained by Steaua athletes.

Figure 1. Average scale scores obtained in subtest 1. Bilateral coordination
The results obtained in subtest 2 are compared with the BOT 2 score profile, which fits the results into the following categories: between 0 – 5 points = much below average; between 5 – 10 points = below average; between 10 – 20 points = average; between 20 – 25 points = above average; between 25 – 35 points = much above average. Table 2 presents the results obtained in subtest 2 – Balance, and Figure 2 shows the graphical representation of the average results obtained by the two groups.

Table 2. Results obtained in subtest 2 (Balance)

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Emil Racoviţă Sports College</th>
<th>Steaua School Sports Club 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initials</td>
<td>Scale score</td>
</tr>
<tr>
<td>1.</td>
<td>T.I.</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>N.D.</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>J.A.</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>B.A.</td>
<td>15</td>
</tr>
<tr>
<td>5.</td>
<td>L.A.</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>C.D.</td>
<td>12</td>
</tr>
<tr>
<td>7.</td>
<td>V.A.</td>
<td>9</td>
</tr>
<tr>
<td>8.</td>
<td>M.C.</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>I.F.</td>
<td>9</td>
</tr>
<tr>
<td>10.</td>
<td>P.G.</td>
<td>7</td>
</tr>
<tr>
<td>11.</td>
<td>G.V.</td>
<td>7</td>
</tr>
<tr>
<td>12.</td>
<td>Z.I.</td>
<td>9</td>
</tr>
</tbody>
</table>

Statistical analysis

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>9.8</td>
</tr>
<tr>
<td>S</td>
<td>±2.491</td>
</tr>
<tr>
<td>CV</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>S</td>
<td>±2.678</td>
</tr>
<tr>
<td>CV</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

The average score in subtest 2, Balance, is X = 9.8 points for Racoviţă athletes and X = 12.1 points those from Steaua. The difference between the two means is X = 2.3 points in favour of Steaua athletes, thus resulting that, in this subtest, they have obtained a higher score (Table 2 and Figure 2).

The standard deviation is S = ± 2.491 points for Racoviţă athletes and S = ± 2.678 points for those from Steaua. The difference is S = ± 0.187 points in favour of Racoviţă athletes. The coefficient of variation is Cv = 25.5% for Racoviţă athletes, which shows that they form a non-homogeneous group, with a high dispersion of results. The coefficient of variation is Cv = 22.2% for Steaua athletes, which shows that they form a non-homogeneous group, with a high dispersion of results. The difference is Cv = 3.3% in favour of Steaua athletes, which indicates that the degree of dispersion of the results obtained by them is lower compared to the results obtained by Racoviţă athletes.

Figure 2. Average scale scores obtained in subtest 2. Balance

The results obtained for gross motor skills - body coordination are compared with the BOT 2 score profile, which fits the results into the following categories: between 20 – 30 points = much below average; between 30 –
40 points = below average; between 40 – 60 points = average; between 60 – 70 points = above average; between 70 – 90 points = much above average. Table 3 presents the results obtained for gross motor skills - body coordination, and Figure 3 shows the graphical representation of the average results obtained by the two groups.

Table 3. Results obtained for gross motor skills - body coordination

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Emil Racoviță Sports College</th>
<th>Steaua School Sports Club 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initials</td>
<td>Scale score</td>
</tr>
<tr>
<td>1.</td>
<td>T.I.</td>
<td>34</td>
</tr>
<tr>
<td>2.</td>
<td>N.D.</td>
<td>34</td>
</tr>
<tr>
<td>3.</td>
<td>I.A.</td>
<td>40</td>
</tr>
<tr>
<td>4.</td>
<td>B.A.</td>
<td>40</td>
</tr>
<tr>
<td>5.</td>
<td>L.A.</td>
<td>38</td>
</tr>
<tr>
<td>6.</td>
<td>C.D.</td>
<td>43</td>
</tr>
<tr>
<td>7.</td>
<td>V.A.</td>
<td>36</td>
</tr>
<tr>
<td>8.</td>
<td>M.C.</td>
<td>35</td>
</tr>
<tr>
<td>9.</td>
<td>I.F.</td>
<td>34</td>
</tr>
<tr>
<td>10.</td>
<td>P.G.</td>
<td>34</td>
</tr>
<tr>
<td>11.</td>
<td>G.V.</td>
<td>35</td>
</tr>
<tr>
<td>12.</td>
<td>Z.I.</td>
<td>34</td>
</tr>
</tbody>
</table>

Statistical analysis

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>S ±3.088</th>
<th>CV 8.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racoviță</td>
<td>36.4</td>
<td>±3.088</td>
<td>8.5%</td>
</tr>
<tr>
<td>Steaua</td>
<td>40</td>
<td>±3.977</td>
<td>9.9%</td>
</tr>
</tbody>
</table>

The average score obtained in the Body coordination test is X = 36.4 points for Racoviță athletes and X = 40 points for those from Steaua. The difference between the two means is X = 3.6 points in favour of Steaua athletes, thus resulting that, in this test, they have obtained a higher score (Table 3 and Figure 3).

The standard deviation is S = ± 3.088 points for Racoviță athletes and S = ± 3.977 points for those from Steaua. The difference is S = ± 0.889 points in favour of Racoviță athletes. The coefficient of variation is CV = 8.5% for Racoviță athletes, which shows that they form a homogeneous group, with a low dispersion of results. The coefficient of variation is CV = 9.9% for Steaua athletes, which shows that they form a highly homogeneous group, with a low dispersion of results. The difference is CV = 1.4% in favour of Racoviță athletes, which indicates that the degree of dispersion of the results obtained by them is lower compared to the results obtained by Steaua athletes.

Figure 3. Average standard scores obtained for gross motor skills – Body coordination

Conclusions

- Learning/acquiring new forms of behaviour does not coincide with development, but stimulates it by inducing progressive trends favourable to water polo players;
• General and specific land training is particularly important for children and juniors to increase their water-specific motor skills;

• After analysing the data collected from the study, we can state that it is imperative for coaches to implement means stimulating bilateral coordination and balance on dry land in their workouts, in order to achieve a positive transfer to the specific environment (water);

• Although the research results show that athletes fall into a below-average category (66%) and an average category (33%) in terms of gross motor skills - body coordination, we suggest that more emphasis should be put, both during land and water training sessions, on balance and bilateral coordination of the body, in conditions specific to the dynamics of the game, so that players fall into an above-average category for this item;

• Psychomotoricity acquired through non-specific land training achieves a positive transfer towards in-water specific training by improving motor skills and abilities;

• Testing bilateral coordination and balance through non-specific means (on dry land) provides information about the in-water sports performance of young polo players (junior III) – the research hypothesis is confirmed.

• The results obtained in the championship by the athletes from Steaua School Sports Club 3 versus the athletes from Emil Racoviță Sports College corroborate with the results obtained after applying the Bruininks-Oseretsky Test Battery, Second Edition (BOT-2).

Acknowledgments

Our special thanks to the Romanian Water Polo Federation and coaches for the support granted in conducting the research studies.

References


DRAWING UP AN INSTITUTIONAL DEVELOPMENT PROJECT – UNITED FOOTBALL IN 7

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Abstract. Special Olympics introduces the Unified 7-a-side Football, an optimal tool for social inclusion, as the team consists of four children with Special Educational Needs (SEN) and three children from regular families. We propose to promote this sport by developing and implementing the project below within the school units. The subjects of the research are represented by 20 children (boys) with SEN, aged between 16 and 18, from the Gavana Family-Type Centre, Pitești. In the first part of the research, we used the documentary method, direct observation and recording. As a method of processing and interpreting the collected data, we used the t-test for two dependent samples. The evolution of the results in general and specific motricity tests can indicate that, by monitoring the training period under the Unified 7-a-side Football Project and applying periodic tests, there are improvements in the effective results of our subjects through the programs developed and implemented by us.

Keywords: unified football, inclusion, children with SEN, educational establishments.

Introduction

In the current European context, the issue of institutionalised children has returned to the spotlight of European commissions. There are several programs that aim to integrate them and help them acquire the skills they will subsequently use in adult life. Teodorescu, Bota and Stănescu (2002) emphasise that, starting from the fundamental principle of exploiting human diversity, it is necessary to create a system of significant values for the individual and society, a new light for the disabled person.

The European Parliament considers that education for sports and training is an effective tool to socially include disadvantaged groups and multicultural dialogue to promote social values and that they play an active role in fighting against discrimination, intolerance, racism, xenophobia and violence. According to Marcu (2007), these people can practice very well any sport, especially those whose intelligence is below normal, which is 60-70.

Sport, by its competitive nature and particularly by the fact that the activity is performed within a team, can change something inside those who practice it, can change the relationship with people around, because the involvement in sports activities always promotes positive values, reflected in major behavioural and attitudinal changes in present and future daily activities. According to Theberge (1984, p. 57) and Giddens (1979, p. 145), from the perspective of social learning, this aspect is related to the transmission of values, the reception of these values and the shaping of individuals towards prescribed roles. According to Ciolcă and Ciolcă (2008), football played in competitions for people with disabilities, through its characteristics, contributes to the implementation of inclusive education principles, namely: normalisation, ensuring equal rights, equalising opportunities, school, physical, functional and social assertion.

The purpose of our research is to implement an institutional development project in the educational establishment through the game “Unified 7-a-side Football”, thus increasing the general and specific motor skills of institutionalised children.

The goals of our research are:

- identifying strengths and weaknesses in the overall conditions of implementation of the adapted football project;
- applying initial tests to children with SEN in order to know their level of motor development;
- identifying motor development programs in general and specific to adapted football;
- applying motor development programs specific to adapted football during a school year (September 10th - June 15th, 2017);
- conducting final tests and analysing the data obtained.

The hypothesis of our research – we believe that, by drawing up the Institutional Development Project “Unified 7-a-side Football”, we will increase the quality of life of children with SEN and their level of inclusion by developing motor skills in general and specific to adapted football.
Material and method

Participants

The research subjects are represented by 20 children (boys) with SEN, aged between 16 and 18, from the Gavana Family-Type Centre, Pitești.

Procedure

The research was conducted at the Gavana Family-Type Centre located in Pitești. It is a family-type child protection service designed to ensure the protection, growth and care of the child temporarily or permanently separated from his/her parents as a result of establishing, under the law, the placement measure.

The strategy of assessing motor skills for children with special needs in institutionalised centres had two components:
- application of a survey addressed to managers, administrators, psychologists, trainers, physical education and sports teachers working in institutionalised centres in Pitești, in order to obtain the necessary information on the strengths and weaknesses of the human, material, financial and informational resources which directly and indirectly influence the sports activities of children with SEN;
- use of a set of tests to assess general and specific motor skills (adapted after Ciolcă and Ciolcă, 2008, p. 64) and applied to children with SEN in Argeș County.

The survey was drafted between August and October 2016 and applied in October - December 2016, and the responses received were analysed in December 2016.

Thus, within the annual project, we aimed to achieve the following objectives: developing general motor skills and gradually orienting towards those specific to the adapted football game; learning and strengthening the basic technique in conditions as close as possible to the game; learning and strengthening the specialisation in adapted football; learning and strengthening the individual tactical knowledge and the ability to choose the most technical-tactical executions in relation to the game situations; forming the ability to collaborate in the tactical combinations of the team; increasing performance in bilateral play, under special conditions (low playground, reduced number of players); developing the self-leading/decision-making ability in the physical and psychological demands of the game; acquiring theoretical information depending on the individual capabilities of the child and the team.

The annual training plan we made for the adapted football game included one stage, namely the preparatory stage. This annual calendar plan envisaged the period between September 4, 2017 - June 20, 2018, was divided into smaller training structures encompassing intermediate cycles and specific microcycles with distinct operational objectives derived from the objectives of the annual plan mentioned above and included 4 tests (in September - the initial testing, in December - the intermediate testing 1, in March - the intermediate testing 2 and in June - the final testing).

The information obtained from the two sources (survey, tests) was processed to obtain real data on how sports training had been achieved in football adapted to the level of a child with special needs. The data analysis led us to identify the actual state in the field and concretely measure the influence of the programs implemented within the project (Figure 1).

Figure 1. The share of the sports training components during the experimental year 2017-2018

Institutional Development Project of Unified 7-a-side School Football (adapted after Olteanu, 2015):
- focuses on the finality of education: acquiring skills, attitudes and competences;
- encourages increased confidence in their own capabilities and strengths, ensuring professional and personal development;
- develops partnerships inside and outside the educational establishment, involving several factors in education: family (where appropriate), community, educational institutions, federations.

Project goals:
1. Increasing the importance of sports, physical movement and recreational activities in the lives of children with SEN.
2. Providing the necessary structure to develop sports activities for children with SEN at local and national levels.
3. Improving the health status and progressive increase of the quality of life for children with SEN.
4. Ensuring accessibility to national and international official competitions and promoting performance sports among children with SEN.
5. Developing an effective policy to integrate children with SEN into the community, by providing them equal opportunities.
6. Implementing the decisions and recommendations of the international bodies to which Romania has adhered and which thus lead to the integration of our country into the European and worldwide structures.

General objectives of the project:
1. Ensuring the necessary conditions for children with SEN to practice physical exercise, movement, recreational activities and sports.
2. Providing the necessary means to enable children with SEN, professional athletes, to participate in national and international competitions.
3. Ensuring the legislative and organizational framework for correlating the activities of central and local administration, central and local institutions with concerns for children with SEN, for their social protection; allowing children with SEN to practice sport in an organized or independent setting, according to their needs, preferences, abilities, traditions, as well as performance sports in an organized and favourable environment for achieving results at international level.
4. Ensuring the human, material, and financial conditions for the development of sports activities for children with SEN at territorial level.
5. Achieving a fair and real attitude of the community members about and towards children with SEN and their needs for integration into the community, with equal opportunities.
6. Creating new jobs with the support of competent bodies through the training of qualified staff (trainers, animators, monitors).
7. Developing a database on sports classification for different sports branches.

Educational project “Unified 7-a-side Football”

The learning units proposed to be experimented require operationalised objectives (measurable and observable behaviour) for each of them, as well as completion by an evaluation test.

Our research is a solid argument for the usefulness and benefits of football adapted to the life of a child with SEN. The project includes general motor development programs to educate balance, spatial orientation, climbing and coordination, ideomotor skills etc. In addition to these, there are also special motor training programs for the football game adapted to children with SEN.

Results

Table 1. Evolution of the significance threshold (t-test) – Subtests of the general motor cycle

<table>
<thead>
<tr>
<th>Test</th>
<th>1-2</th>
<th>1-3</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-m Sprint</td>
<td>0.09</td>
<td>0.005</td>
<td>0.001</td>
</tr>
<tr>
<td>800-m Long-distance running</td>
<td>0.08</td>
<td>0.005</td>
<td>0.001</td>
</tr>
<tr>
<td>Squats</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Coxo-femoral mobility</td>
<td>0.231</td>
<td>0.08</td>
<td>0.005</td>
</tr>
<tr>
<td>Speed endurance</td>
<td>0.124</td>
<td>0.01</td>
<td>0.005</td>
</tr>
<tr>
<td>Trunk lift</td>
<td>0.005</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Standing long jump</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Vertical jump</td>
<td>0.07</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Endurance test in speed regime</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>
From the comparative analysis of the results recorded in the four tests (initial - intermediate - final), we can find that significance is recorded in the range of tests 1-3 and 1-4, in the case of the 25-meter sprint. This can be attributed to the content of the programs proposed in the experiment, which targeted counter-attack actions.

From the comparative analysis of the results in the four tests (initial - intermediate - final), we can see that significance fits into the range of tests 1-3 and 1-4, in the case of 800-m long-distance running and speed endurance tests. This can be attributed to the content of the programs proposed in the experiment, which aimed at taking over the ball - guiding between flagpoles and scoring between two goalposts, guiding the ball - pass - taking it back - scoring between two goalposts, release - taking over - guiding-one-two - finishing and passing in two - with a semi-active opponent - and scoring between two goalposts.

Table 2. Evolution of the significance threshold (t-test) – Motor skill tests specific to the football game, adapted for children with special needs

<table>
<thead>
<tr>
<th>Test 1-2</th>
<th>Test 1-3</th>
<th>Test 1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping the ball in the air with the head</td>
<td>0.08</td>
<td>0.001</td>
</tr>
<tr>
<td>Keeping the ball in the air with the head and foot</td>
<td>0.08</td>
<td>0.005</td>
</tr>
<tr>
<td>Keeping the ball while moving</td>
<td>0.08</td>
<td>0.005</td>
</tr>
<tr>
<td>Precision pass at a distance</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Passing the ball - 1 m estimated space</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>9-m shot</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

From the comparative analysis of the results from the four tests (initial - intermediate - final), we can see that significance is recorded in the range of tests 1-3 and 1-4, in the case of the subtests “Keeping the ball in the air with the head”, “Keeping the ball in the air with the head and foot” and “Keeping the ball while moving”. This can be attributed to the content of the programs proposed in the experiment, which targeted:

- Taking over the ball - guiding - one-two - pass;
- Pass - taking over - guiding - cross - finishing;
- Throwing the ball from the edge - taking over - opening - guiding - cross - finishing;
- Throwing the ball from the edge - taking back - driving - centring back - finishing;
- Throwing the ball from the edge - guiding - one-two - finishing.

From the comparative analysis of the results from the four tests (initial - intermediate - final), we can see that significance is recorded at all ranges, in the case of subtests “Precision pass at a distance” and “Passing the ball - 1 m estimated space”. This can be attributed to the content of the programs proposed in the experiment, which targeted:

- Pass - taking over - opening - guiding - cross - finishing;
- Double pass - guiding - cross - finishing;
- Release - taking over - pass - guiding - one-two - finishing;
- Simple combinations with finishing - in small groups.

Conclusions

All this evolution of the results in the general and specific motricity tests indicates that, by monitoring the training period under the Unified 7-a-side Football Project and applying periodic tests, there are improvements in the effective results of our subjects through the programs developed and implemented by us.

After applying the specialist questionnaire to children with special needs, as well as processing and analysing the responses received, the following conclusions have been obtained:

- the level of inclusion of children with special needs in our country is low and very low;
- limiting factors: the most reluctant to integrate children with disabilities into mass education is society (62% of the surveyed people have stated that, in their opinion, children with disabilities should be enrolled in special educational establishments);
- the number of favouring factors is low and refers to projects and laws that were put into practice over a limited period or remained only on the paper;
- practicing adapted football and 7-a-side football brings a significant contribution to increasing the success of social inclusion through: the development of the competitive function in the National 7-a-side Football Championship organized by the Romanian Football Federation in collaboration with Special Olympics and the Ministry of Health; the function of maximising performance by developing motor skills and
psychomotor abilities, creating the habit to exercise, enhancing socialisation within a group - with all its benefits (vocational, social, psychological and physical ones); the cultural function of knowing the history of football, its regulation, body aesthetics; the economic function, by keeping the body healthy and controlling its weight.

The hypothesis of the research is confirmed by the comparative analysis of the results for the four tests: initial - intermediate (two tests) - final ones.

In the implementation of the general and specific training programs adapted to football, we have achieved: the adaptation of means used in preparation to the particularities of the football playing stations; the development and implementation of a complex verification and assessment system (tests) that highlights both the level of physical ability and other training components; the development of individual student records including indicators for each of the sports training factors, in order to track their evolution in preparation and competition; the development of a practical-methodical guide to support the data obtained from the present research and be useful in the professional activity of the physical education and sports teachers in the institutionalised centres, which constitutes a benchmark for conducting improved training in football adapted to children with special needs aged 16-18 years.

A concrete dissemination would be the organization of county and national competitions targeting the Unified Football in 7.

The use and recording of general and specific test batteries to assess the level of training for children with special needs between the ages of 16-18, which periodically test the development of motor skills and motor skills throughout the season, represent a concrete element of dissemination in practice.

References
THERAPEUTIC APPROACH TO SYSTEMIC LUPUS ERYTHEMATOSUS
– A CASE STUDY

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Abstract. This case study addresses multiple therapeutic aspects of a 45 years old male with delicate polyopathy and aggressive evolution from the diagnosis point until today, when the treatment is still in progress, with its benefits for the patient’s functional life quality. Systemic lupus erythematosus is an autoimmune disease with a genetic component, in which the immune system has a dysfunction in working correctly with good cells, viewing the tissues and organs as foreign to the body, so it generates autoantibodies that attack and destroy healthy cells. This disease is a challenge by its multitude of symptoms. No patient is identical to another. It is hard to diagnose and treat this disease, because of various symptoms, from minimal to severe ones. The medical therapy approach is customised so as to fit each patient and kind of disease. That is why the good collaboration between family, patient, doctor and physical therapist is important, as well as the constant and regular medical checks, which are essential for the patient’s quality of life.

Keywords: lupus erythematosus, therapy, physical exercise, quality of life, functionality.

Introduction

Systemic lupus erythematosus (SLE) is an autoimmune disease with a genetic component, in which the immune system has a dysfunction in working correctly with good cells, viewing the tissues and organs as foreign to the body, so it generates autoantibodies that attack and destroy healthy cells (Housman et al., 2003). As a consequence, it will develop diseases of one or many internal organs, and the most affected ones are the skin, osteoarticular system and lungs.

The scientific medical world is focusing on the question: “Is SLE one single or a multiple disease?” (Werth, 2001).

At the National Rheumatology Congress (October 25-27, 2010) held in Bucharest, there were debates about the patient’s lifestyle and how this disease might affect them physically, mentally and socially.

Statistical data: According to the statistics presented during this Congress, 93% of the Romanian SLE patients are women under the age of 45. Moreover, 5 out of 10 patients cannot continue their professional activities because of their illness. Meanwhile, although the survival rate has increased, 15 to 20% of SLE patients die within 15 years from the time of diagnosis.

According to official estimates, more than 500,000 people are suffering from SLE in Europe, while more than 5 million patients worldwide are suffering from different forms of this disease. The most common and severe form of the disease, affecting 70% of patients, is SLE. In Romania, according to available statistics, around 9,000 people are diagnosed with SLE, and 9 out of 10 are women. More than half of the diagnosed patients are forced to give up their current jobs because of the disease (Nistor, 2018).

Diagnosing SLE can be difficult: on average, 4 years and 3 medical doctors are needed for an accurate diagnosis. This is caused by the fact that the symptoms often imitate those of other diseases, vary significantly from one patient to another and may change over time. Different types of blood analyses are used to diagnose SLE, including the analysis for antinuclear antibodies, anti-dsDNA and complement serum values. Until today, there is no a unique test for diagnosis.

Having in mind this description of the disease, our research aims to assist people suffering from SLE, keeping the limits of competence and responsibility of the specialist in physical therapy.

The paper addresses the issue of increasing the quality and efficiency of motor function recovery in a SLE patient by means of physical therapy, tracking the specifics of various forms of pathology: functional disorders, unsystematised pain and symptoms and accumulation of risk factors (genetic-constitutional risk factors have been identified: hereditary diseases, metabolic risk factors, occupational risk factors, as will be seen below).

The evolution of values from medical analyses with relevance for a correct orientation of the approach, in terms of physical therapy, was carefully monitored (Calabrese & Resztak, 1998). Table data processing was used to compare quantitative data with normal reference values for the synoptic analysis in chronological evolution.
Topic addressed

This case study approached the multiple therapeutic aspects of a male patient aged 42, with delicate polyopathy and fluctuating progression of the disease. The study covers the patient’s life from the time of aggressive diagnosis (end of August 2017) until today, including stages of natural biological decline compatible with life, as well as treatment to date, when therapy is positively affecting the patient’s quality of life.

For 27 years, good response to poly-chemical treatment and radio treatment had been noted, in the absence of any specific medication since 2004.

The aggressive onset of SLE dates back to October 2017, on an unbalanced functional area of many harmful factors: unbalanced diet (processed meat products/ minced meat, semi-prepared products, carbonated beverages), smoking, stress, lack of sleep, no medication and sustained effort.

We mention that, in this delicate case study and treatment, we have always had the support of the family, priest and physicians.

Clinical picture of the subject is presented in Table 1, starting from the aggressive onset of the disease, in 2017, until today, with the mention that the multiple pathology and associated diagnosis are not in included.

Table 1. Clinical picture of the subject

<table>
<thead>
<tr>
<th>Date of admission</th>
<th>Main diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/09/2017</td>
<td>Follicular (nodular) lymphoma, non-Hodgkin’s small follicular cells, folds</td>
</tr>
<tr>
<td>28/09/2017</td>
<td>Another chronic kidney failure</td>
</tr>
<tr>
<td>9/10/2017</td>
<td>Anatomic pathology – Diabetic nephropathy associated with active lesions (endocapillary hypercellularity and cellular semolina)</td>
</tr>
<tr>
<td>29/10/2017</td>
<td>Pleurisy</td>
</tr>
<tr>
<td>14/11/2017</td>
<td>Another chronic kidney failure</td>
</tr>
<tr>
<td>12/12/2017</td>
<td>Diffuse non-Hodgkin’s large lymphoma</td>
</tr>
<tr>
<td>22/01/2018</td>
<td>Diffuse non-Hodgkin’s large lymphoma</td>
</tr>
<tr>
<td>12/02/2018</td>
<td>Another chronic kidney failure</td>
</tr>
<tr>
<td>22/02/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>23/03/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>5/4/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>19/04/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>18/05/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>15/06/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>13/07/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
<tr>
<td>13/08/2018</td>
<td>Systemic lupus erythematosus with organ or system damage</td>
</tr>
</tbody>
</table>

It is worth mentioning that, during hospitalisation, multiple associated diagnosis were made, such as: Type 2 diabetes mellitus with established diabetic nephropathy, Hypertensive nephropathy with renal impairment, Hyperuricaemia without signs of inflammatory arthritis or to face disease, Vulgar ichthyosis, Glomerular disorders in the systemic connective tissue, Other water and electrolyte disturbances not elsewhere classified, Anaemia in other chronic diseases classified elsewhere, Pericardial (non-inflammatory) infusion, Specific polynuropathy (medically provoked), Secondary hypertension of other kidney disorders, Ascites, Hypo-osmolality and hyponatraemia, Chronic nephritis syndrome and other.

In October 2017, the patient’s functional condition was that of functional inability to self-service and personal inability to maintain the orthostatic and seated positions, as well as to move around. The clinical admission file showed the following: “Generalised oedema, neohioid follicular lymphoma, fluid overload, weight gain - 10 kg, positional inspiratory dyspnoea, general mediocre status, bilateral pleurisy, small pleuro-pericarditis, type 2 diabetes mellitus, anaemia, vulgar lichenia, acute nephritis syndrome, thrombocytopenia, EKG RS 100/min; TA = 170/90mm Hg, AV = 108 beats/min, Weight = 84 kg”.

A few images of the foot oedema during that period are listed in Figure 1.
The patient was under complex treatment including medication: Nebilet 5mg 2pcs/day, Milurit 100mg 1 pcs/day, Furosemide 40mg 8pcs/day, Prednisone 10mg 7pcs/day, Diaprel 30mg 2pcs/day, Claritin 1pcs/day, dermatological treatment of ichthyosis.

The dietary regimen consisted of vegetarian hygroscopic and hydroglycaemic food, water management with 500ml more than the urinary removal and herbal teas with gemotherapeutic indication.

Also, sustained psychological and spiritual support through faith was managed with the patient. The psychological support that the patient received from the medical staff and family was largely based on his trust in them, this being all the more necessary as the treatment with corticosteroids may cause behavioural changes (periods of extreme energy and activity, insomnia and irritability). We identified at least three main reasons for the patient’s desire to recover: confidence in the successful completion of the treatment, desire to return to normal life and sacred therapy.

The physical therapy programme followed the objectives set for each period of change in the patient’s condition.

The initial objectives of the treatment were those of preserving life, following the developments in functionality and the prevention of complications. For this purpose, the methods used were:

- breathing exercises from decubitus and sitting positions;
- easy mobilisation exercises for the upper limbs with the stick;
- slow exercises for the lower limbs at the bedside level;
- lymphatic drainage;
- progressive passive mobilisations.

The recovery protocol consisted in tracking the functionality of each step, according to the patient’s evolution following the food and drug indications and the degree of muscle and joint recovery, also taking into account the balance function that had been greatly affected.

During those months of complex treatment, the patient had positive or stagnant recovery moments, being affected by atmospheric pressure and temperature and climate change.

In February 2018, the patient’s functional condition was that of integrity of functionality and personal care, ability to adopt the standing posture and walk with moderate balance. The clinical admission file showed: “Type 2 diabetes under treatment with ADO, cutaneous ichthyosis under treatment, bilateral pleurisy in the past, grade 1 steatosis, secondary parenchyma hypertension; chronic nephritis syndrome, diabetic nephropathy. EKG RS 70/min; TA = 130/70mm Hg, AV = 72 beats/min, Weight = 93 kg”.

The medication is: Nebilet 5mg 2pcs/day, Milurit 100mg 1 pcs/day, Furosemide 40mg 2pcs/day, Omez 20mg 1pcs/day, Vigantolleten 1000 ui 1pcs/day, Lactic calcium 500mg 4pcs/day, Prednisone 5mg 7pcs/day.

A few images of the foot oedema during that period are presented in Figure 2.

From this moment on, the physical therapy consists in:

- breathing exercises from sitting and standing positions;
- mobilisation and toning exercises for the upper limbs with the stick and 1-kg weight;
- exercises for the lower limbs at the bedside level and from the standing position with terra band;
- abdominal and diaphragmatic exercises;
- balance exercises with lateral support;
- progressive active mobilisations;
- prehension exercises;
- lymphatic drainage and manual therapy.

Images of the feet in September 2018 are shown in Figure 3.

Figure 3. Foot oedema and neuropathy on 03.09.2018

We mention that the complex treatment of the patient is ongoing with positive results. SLE is in remission and most symptoms are relieved. The therapeutic programme is ambulatory at the patient’s home.

Results

Here are some observations from the laboratory analyses, with an impact on the physical therapy approach:

- Analysis of the medical records highlights a point of juncture preceding the initiation of treatment for SLE, between 19 and 24 February 2018. The clinical picture began to improve with mid-April 2018. Antinuclear antibody (ANA) test began to be negative on March 23, and Anti-dsDNA test, after February 27. Complement serum values C3 and C4 followed the same trend (Figure 4).

Figure 4. Complement serum values C3 and C4

- Soft muscle damage and loss of motor function, including due to:
  - almost three months of bed rest (Figure 5);
• decreased number of erythrocytes (responsible for carrying oxygen in the body) and decreased haemoglobin resulted in anaemia, declining the amount of oxygen to tissues and organs, and thus the degradation of motor function (Figure 6);

• electrolyte imbalance (chlorine, calcium, potassium, sodium, magnesium), accompanied by a change in blood pressure and nervous system reactions, confusion, weakness, muscle spasms, paraesthesia, fatigue etc. (Figure 7);
• decrease in albumin value (mainly due to renal failure), with the usual symptoms: confusion and dizziness; fluid retention (therefore, swelling of the hands and feet); increased amount of urea; excessive fatigue (Figure 8).

Figure 8. Decrease in albumin value

We mention that the complex treatment of the patient is ongoing with positive results, SLE is in remission and most symptoms are relieved.

Conclusions

The recommended strategy for the recovery of motor function in such a complex SLE case requires monitoring at least three lines of observation:

1. Always be aware of both the disease progression (more in the context of the risk of disease relapse) and the medication administered:
   • see the physician’s recommendations, the results of medical tests, imaging investigations etc.;
   • check the treatment schedule, especially in the case of a disease involving a long-term treatment scheme, and adjust the substances and doses used (the side effects of drugs may often have an impact on the patient’s condition);

2. Use effectively the advantages of a positive mental state (a calm and orderly mind with clear targets) and cultivate the patient’s will;

3. Permanently assess the patient’s evolution at points where difficulties were found: posture, coordination and motricity.

Following the lines of this strategy, the physical therapist will be able:

• to work together with the patient, in a flexible system, the recovery exercises – maximum 10-30 minutes;

• to recommend the patient a set of exercises to be performed at home (immunosuppressive regimens do not recommend the presence of the SLE patient in the community over long periods of time, even more in the presence of other patients with transmissible diseases);

• additionally, to apply manual therapy techniques and drainage sessions, where appropriate.

We mention that, in the research area, there is a lack of references on SLE (Ilicea, Ilicea, & Silion, 1997).

References


MODEL ANALYSIS OF THE BASKETBALL PLAYER EFFICIENCY ACCORDING TO THE NEW CLASSIFICATION PROPOSED BY MUTHU ALAGAPPAN (2013), ADAPTED TO EUROPEAN BASKETBALL RESOURCES

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Abstract. For as long as basketball has been played, it’s been played with five positions. Today they are point guard, shooting guard, small forward, power forward and centre. A California data geek sees 13 more hidden among them, with the power to help even the Charlotte Bobcats improve their line-up and win more games. Muthu Alagappan is a Stanford University senior, a basketball fan and an intern at Ayasdi, a data visualization company. Ayasdi takes huge amounts of info and displays it in interactive shapes that highlight patterns - it's called topological data analysis, and it can be applied to sports, too. The structure of the new positions was made for the North American Basketball Championship (NBA), based on an impressive number of statistical information. Adaptation of such a system to basketball on the European continent also implies adapting it to the analytical and statistical resources available in domestic and international competitions in Europe. Thus, of the 12 positions for analysis, we propose the use of 10 of them, which can be identified using the resources that any senior team has at their disposal, namely the FIBA statistical box and the video analysis by the technical staff.

Keywords: analysis, positioning, statistic, profile.

Introduction

Basketball analysis involves comparing players considering their technical and tactical actions during the game, which determine the final score (Almar, 2013); comparison of player statistics has to be done according to the role that they have in the team and to their profile (determined by somatic and motor peculiarities and technical, tactical, theoretical and psychological training). From Figure 1, we can notice the differences between three athletes playing in the same position, but with different profiles.

![Figure 1. Player profiles, position 1 (Game leaders) – Muthu Alagappan (2013)](image)

Topic addressed

Player classification according to their position on the court (from 1 to 5) is the unanimously accepted version of the world basketball, first of all because the team has 5 players on the court (Ghițescu & Moanță, 2008). This type of classification assume that the player on position 1 is responsible for bringing the ball in the offense, while the player on position 5 has to play close to the rim; coaches use positions 1 to 5 to accurately determine the role of each of them in the different game systems used:

1. Point Guard – (the coach on the court) is most often the shortest player, the best passer and dribbler. He is the player who has to make the best decisions to put his teammates in good situations; he must be able to create a spatial and temporal advantage for his team, being the main ball handling player who initiates pick-and-roll collective tactical actions; he is responsible for ensuring the defensive balance.
2. Shooting Guard – he is the best shooter of the team. The player on this position needs to: have the ability to execute middle range and outside shots and achieve good percentages even in situations where the defender is...
positioned near him at the time of execution; be able to use the advantages created by collective tactical actions by teammates to create the space needed to shoot.

3. Small Forward – the motor skills and technical procedures specific to the position must be well appropriated, with respect to the perimeter play specific to players in positions 1 and 2, but also to the inside game (with the back to the basket and facing the basket) specific to the 4th and 5th positions. This position claims a strong and aggressive player, but, at the same time, agile enough to be able to initiate effective tactical actions from the perimeter. Position 3 player is usually the second most effective shooter and the second most effective player to drive towards the basket; one of his main responsibilities, in both the offensive and defensive phases, is his active involvement in tactical rebound actions.

4. Power Forward – is the second player in terms of somatic development and strength development. He must be able to: execute the “3-point-catch-and-shoot” technical process; use the 1-to-1 game in the post and execute shots with good percentages of success near the paint. On offense, he has to effectively execute the tactical screening actions of the ball-handler, but especially those of screening the man without the ball; defensively, it is necessary for the player position 4 to master the technical defensive elements in the low-post, but also the perimeter players, and to participate in tactical defensive rebound actions.

5. Post/Centre – he is the tallest and strongest player of the team. Post player must be prepared technically and tactically to set effective screens for teammates, usually at the man with the ball, and has to master the technical defence within the paint.

Alagappan (2013) addresses this issue by proposing to modify these positions as regards the setting up of a comparative group for analysis in order to have a realistic and detailed classification (Figure 2).

The 12 positions (Figure 3) are established according to the players’ morphological characteristics, their tactical, technical, theoretical and psychological training: offensive ball-handler; defensive ball-handler; combo ball-handler; role-playing ball-handler; 3-point rebounder; scoring rebounder; paint protector; scoring paint protector; role player; NBA 1st-team; NBA 2nd-team; One-of-a-kind.
The structure of the new positions is achieved for the North American Basketball Championship (NBA), based on an impressive number of statistical information. Adaptation of such a system to basketball on the European continent also implies adapting it to the analytical and statistical resources available in domestic (Ștefănescu, 2016) and international competitions in Europe.

Thus, of the 12 positions for analysis, we propose the use of 10 of them, which can be identified using the resources that any performance team has at their disposal, namely the FIBA statistical box and the video analysis by the technical staff.

The profile of each athlete is identified by analysing the somatic and motor peculiarities and the technical, tactical, theoretical training of the athletes who constitute the group of the adverse team, each of whom identifies one of the following 10 positions:

1) Offensive ball-handler: he is the perimeter player, usually position 1 or 2, who plays an important role in the organization of the attack: assures the translation of the ball in the offensive court as soon as the team takes possession of the ball, interprets the defensive system of the adverse team, communicates to all teammates the offensive set play that the team will use in the offensive phase that follows; technically, excels in handling the ball; in many situations, is directly involved in the pick-and-roll collective tactical action as a ball-handler player; in most cases, is the one who reaches the completion position; is effective in the individual tactical 1-to-1 action; has the technical ability to execute middle range and 3-point shooting procedures both off the dribble and on the spot; is one of the team’s main scorers (according to long-term statistics).

2) Defensive ball-handler: he is the perimeter player, usually position 1 or 2, who has an important role in the organization of the offense: assures the translation of the ball in the offensive court as soon as the team takes possession of the ball, interprets the defensive system of the adverse team, decides and communicates to all teammates the offensive set play that the team will use in the offensive phase that follows; technically, excels in handling the ball; in many situations, is directly involved in the pick-and-roll collective tactical action as a ball-handler, in most cases, is the one who interprets the defensive system rotation, highlighting the other colleagues; is one of the players with the highest average assists of the first and second rank of the team (according to the recorded long-term statistics); in terms of the amount of scored points, is not discernible, his offensive tasks being limited to creating spaces and completing situations for one of the teammates; one of the main tactical tasks in the game system is to defend the most efficient opponent’s perimeter player, being one of the team’s best defenders.

3) Combo ball-handler: he is the perimeter player, usually position 1 or 2, who has an important role in the organization of the offense: ensures the translation of the ball in the offensive court as soon as the team takes possession of the ball, interprets the defensive system of the adverse team, decides and communicates to all teammates the offensive game system that the team will use in the offensive phase that follows; technically, excels in handling the ball; in many situations, is directly involved in the pick-and-roll collective tactical action as a ball-handler; in most cases, is the one who reaches the completion position, the main completion process being middle range and outside shot off the dribble; is one of the players with high offensive responsibilities in terms of number of attempted shots during a game, but also one of the players who have the best percentage of shots made through this process.

4) Role-playing ball-handler: he is the perimeter player, usually position 1 or 2, who has an important role in the organization of the offense: ensures the translation of the ball in the offensive court as soon as the team takes possession of the ball, interprets the defensive system of the adverse team, communicates to all teammates the offensive set play that the team will use in the offensive phase that follows; technically, excels in handling the ball; in the attack systems used, does not usually have major responsibilities, is not the first option among the players of the perimeter in the pick-and-roll tactical action, is not the player receiving off-ball screens; his specific role may be of several kinds (e.g.: player with special defensive tasks – to defend an inside player, defensive rebounds, good defender of certain collective defence situations such as blocking the ball-handler or the player without the ball etc./ player with special offensive tasks – good screener, especially at the player without the ball, player with a good speed and an important role in the fast-break development, offensive rebounding etc.).

5) 3-Point rebounder: he is the player who, according to the classic classification, performs in position 3 or 4; is one of the most effective 3-point shooter, his team’s offensive game systems putting him in the spotlight by the collective tactical screening action on the player without the ball or by positioning him on the opposite side of the ball, where the defence usually helps to make it possible for him to execute an open shot; as a rule, the main technique used for completion is shooting 3 points from the spot; is a player of great height, has good preparation for both defensive and offensive rebounds; has special explosive power, his vertical jump recording indices above the team average.
6) Scoring rebounder: he is usually the inside player (position 4 or 5) or position 3 player; is one of the team’s best scorers (according to long-term statistics), with special technical training for shooting procedures in different game situations (1 to 1 in the perimeter and the paint/face and back to the basket/very good positioning to receive the ball, followed by a shot); is a player of great height; has good preparation for both defensive and offensive rebounds; has special explosive power, his vertical jump recording indices above the team average.

7) Paint protector: he is the player who, in most cases, plays on position 5 (there are also exceptional situations where he can be a position 4 player); has exceptional somatic and motor qualities (tall, massive, strong); in most situations, is the one in the defensive system to provide help, especially in the proximity of the paint; is a very effective 1-to-1 defender in the paint, both in the situation where the opponent directly initiates an individual 1-to-1 game action with his back and when he plays face forward; is a very good communicator: from the position he usually occupies (in the paint 3), has the opportunity to best observe and interpret the opponent’s offensive game system and has a very important role in the coordination of the defensive system; statistically, is the team leader of blocked shots and a good defensive rebounder.

8) Scoring paint protector: he is an inside player, usually position 5 (there are also exceptional situations where he can be a position 4 player); is one of the team’s best scorers (according to long-term statistics), with special technical training for shots in different game situations (1 to 1 in the perimeter and the paint/face and back to the basket/very good positioning to receive the ball, followed by a shot); is a player with exceptional somatic and motor qualities (tall, massive, strong); in most situations, is the one in the defensive system to provide help, especially in the proximity of the paint; is a very effective 1-to-1 defender in the paint, both in the situation where the opponent directly initiates an individual 1-to-1 game action with his back and when he plays face forward; needs to be a very good communicator: from the position he usually occupies (in the paint), has the opportunity to best observe and interpret the opponent’s offensive game system and has a very important role in the coordination of the defensive system; is the team leader of blocked shots and a good defensive rebounder.

9) Role player: he can perform on any of the 5 positions; is assigned a single role specific to the level of physical, technical, tactical and theoretical training, but also to his somatic and motor skills; this role can be both defensive and offensive; has much responsibility for completion in the offensive system.

10) One-of-a-kind: he is a player who can perform efficiently on at least 3 positions; is the player with high performance ability, having the most offensive responsibilities; his team’s tactical offensive plan is generally designed to create favourable game situations for this player (isolation in certain areas of the court); technically, is a perfect athlete who has the ability to initiate effective individual and collective tactical actions, the ability to complete the actions with shots (penetration/shot from the spot, off the dribble/from long range, from midrange etc.), as well as the ability to interpret tactics and execute assists of rank 1 or rank 2; has the greatest impact on implementing his team’s tactical plan, the outcome largely depending on his presence on the court and his shape.

Conclusions

A factor of variability is the tactical conception of the coach and the role of each player according to it. Statistical data are the product of athletes’ performance capability, described as an internal feature with a high degree of stability (Dragnea & Teodorescu-Mate, 2002). The role of the team player is an external factor, but the degree of stability, from this point of view, is much lower.

Authors’ Contributions

Authors contributed equally to this study and should be considered as main authors.

References

WING PLAYERS’ PERFORMANCE AT EHF EURO 2018

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Abstract. The purpose of the present research is to investigate the performance of the wing players at the 13th edition of EHF Euro 2018, a competition hosted by France. 65 players specialised on the wing position, with a mean age of 26.6 years, 169 cm in height and weighing 63.7 kg on average took part in this competition. The players scored 703 goals at EHF Euro 2018, meaning 28% of all goals scored in the competition. Of these, 387 goals were scored from the wing’s angle (55%), and 180 goals (26%) were scored after a fast break, the rest of the goals being scored almost equally from the 6m line, after a penalty, a breakthrough or a long-distance throw. The scoring efficiency of the wing players was 67%. Right wings had an efficiency of 69%, while left wings, 65%. A total number of 124 assists and 86 steals complemented the performance of the analysed players.

Keywords: handball, women, wing player.

Introduction

Due to the continuous processes of change in team handball over the last years, the understanding of every small detail matters and can be the thing that makes the difference in the end. In order to bring physical, technical or tactical improvement, the analysis process reaches higher boundaries from one competition to another.

Major international handball events are strong indicators for both the level of handball development and the trends in the playing systems, for both offence and defence. The evaluation of these indicators is done not only by video analysis of the played matches, but also by performing statistical analyses.

“The Olympics, World Championships and European Championships are tournaments where top level performances occur for a certain branch of sport. Comparison of the tournament analysis and longitudinal analysis of matches during these tournaments are of primary importance to determine current developments in world handball” (Taborsky, 2007).

The topic of the present research has aroused our interest over time, the involvement of players specialised on the wing position being tracked by us also during some other important tournaments for seniors (Vărzaru, Alexandrescu, & Hantău, 2014; Vărzaru & Igorov, 2014).

Monitoring and analysis of the team play and the fundamental characteristic of the team are key factors in the progress of the team. The analysis and its conclusions should result in the coach’s interventions during both the training process and the game (Savic, 2016).

The main purpose of this research is to investigate the performance of players specialised on the wing position at the latest European Championship held in France, in the first part of December 2018.

The research will reveal details about the number of goals scored by wing players, their scoring efficiency, their preferred throwing positions and actions, but also the rate of goals scored by them out of the total number of goals of each national team. Assists, steals and technical faults are also observed.

Materials and methods

15 teams qualified for the EHF Euro 2018. Together with France, the organizing country, the teams were distributed in 4 preliminary groups. From 29 November to 16 December, great and spectacular handball was seen in the hosting cities from France. The final phase of the tournament, when the semi-finals and finals were played, was hosted by Paris, where over 10,000 people watched live the games between the best four teams of the tournament, France, Holland, Russia and Romania.

The subjects of this research are the handball players specialised on the wing position from the 16 participating nations. Almost each team participated in the tournament with 2 wings for each side. A total number of 65 wing players were counted, of whom 30 right wings and 35 left wings. Information about the players that occupied these two positions at EHF Euro 2018 is presented in Table 1.

In order to collect data about the 65 wing players participating in the tournament, the official website of EHF Euro 2018 was visited. The collected data were further interpreted using mathematical indicators, such as the sum and average, but also graphical representations were used for a better understanding of the results.
Table 1. Somatic profile of the wing players participating in the EHF Euro 2018

<table>
<thead>
<tr>
<th>Position</th>
<th>Total no.</th>
<th>Age</th>
<th>Min age</th>
<th>Max age</th>
<th>Height</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW</td>
<td>35</td>
<td>27.3</td>
<td>22</td>
<td>36</td>
<td>170.4</td>
<td>63.6</td>
</tr>
<tr>
<td>RW</td>
<td>30</td>
<td>25.6</td>
<td>19</td>
<td>32</td>
<td>168.4</td>
<td>63.8</td>
</tr>
</tbody>
</table>

The mean age for the left winger was 27.3 years, while the right wingers participating in the competition were almost 2 years younger (25.6 years old). The youngest winger in the tournament was 19 years old, while the oldest one was 36 years old.

When talking about height, the 35 left wings had an average of 170.4 cm, while the right wing’s average was 2 cm lower than the wings from the other side of the field.

The most experienced wing players having the highest number of games and goals scored for their national teams before the competition in France are the left wingers Ardean Elisei Alice (Rou), with 247 games – 898 goals and Siraba Dembele, with 260 games – 798 goals, and the right wingers Martin Carmen, with 207 games – 707 goals, followed by Radicevic Jovanka, with 142 games – 767 goals, while Berger Amelie was at her first experience with the national team of Germany.

Results

The wing players participating in the EHF Euro 2018 competition scored 703 goals.

As shown in Table 2, Russia was the national team that scored most with the wings. 83 goals were scored by Managarova, Sudakova, Kuznetsova and Samokhina in the 8 games played at this tournament, meaning an average of 10 goals per game. Another country that scored 10 goals per game due to a wing player was Serbia, Katarina Krpez being the top scorer of the competition, with 50 goals. Only Montenegro surpassed Russia and Serbia, with an average of 11 goals per game, scored by a wing player.

Slovenia was the only team that did not score any goal from the right wing position. Poland and Czech Republic are the teams with the lowest number of goals scored by a right wing, namely 8 goals each. On the other side of the field, Croatia, with 6 goals, and Holland, with 10 goals, are the teams with the lowest number of goals scored by a right wing.

Table 2. Wing players’ scoring efficiency and rate of goals scored per game

<table>
<thead>
<tr>
<th>Games</th>
<th>Total goals</th>
<th>Wing Goals</th>
<th>%</th>
<th>Wing goals/game</th>
<th>LW</th>
<th>%</th>
<th>RW</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRO</td>
<td>3</td>
<td>16/27</td>
<td>59%</td>
<td>5</td>
<td>6/11</td>
<td>55%</td>
<td>10/16</td>
<td>63%</td>
</tr>
<tr>
<td>CZE</td>
<td>3</td>
<td>19/32</td>
<td>59%</td>
<td>6</td>
<td>11/18</td>
<td>61%</td>
<td>8/14</td>
<td>57%</td>
</tr>
<tr>
<td>DK</td>
<td>6</td>
<td>41/63</td>
<td>65%</td>
<td>7</td>
<td>22/38</td>
<td>58%</td>
<td>19/25</td>
<td>76%</td>
</tr>
<tr>
<td>FRA</td>
<td>8</td>
<td>68/99</td>
<td>69%</td>
<td>9</td>
<td>34/56</td>
<td>61%</td>
<td>34/43</td>
<td>79%</td>
</tr>
<tr>
<td>GER</td>
<td>6</td>
<td>38/61</td>
<td>63%</td>
<td>6</td>
<td>28/42</td>
<td>66%</td>
<td>10/19</td>
<td>53%</td>
</tr>
<tr>
<td>HUN</td>
<td>6</td>
<td>46/56</td>
<td>82%</td>
<td>8</td>
<td>23/28</td>
<td>82%</td>
<td>23/28</td>
<td>82%</td>
</tr>
<tr>
<td>HOL</td>
<td>8</td>
<td>44/67</td>
<td>66%</td>
<td>5</td>
<td>10/12</td>
<td>83%</td>
<td>34/55</td>
<td>62%</td>
</tr>
<tr>
<td>MNE</td>
<td>6</td>
<td>65/99</td>
<td>66%</td>
<td>11</td>
<td>30/48</td>
<td>63%</td>
<td>35/51</td>
<td>69%</td>
</tr>
<tr>
<td>NOR</td>
<td>7</td>
<td>66/89</td>
<td>74%</td>
<td>9</td>
<td>28/39</td>
<td>72%</td>
<td>38/50</td>
<td>76%</td>
</tr>
<tr>
<td>POL</td>
<td>3</td>
<td>24/37</td>
<td>65%</td>
<td>8</td>
<td>16/23</td>
<td>64%</td>
<td>8/14</td>
<td>57%</td>
</tr>
<tr>
<td>RUS</td>
<td>8</td>
<td>83/117</td>
<td>71%</td>
<td>10</td>
<td>47/79</td>
<td>59%</td>
<td>36/38</td>
<td>95%</td>
</tr>
<tr>
<td>ROU</td>
<td>8</td>
<td>46/72</td>
<td>64%</td>
<td>6</td>
<td>23/34</td>
<td>67%</td>
<td>23/38</td>
<td>61%</td>
</tr>
<tr>
<td>SRB</td>
<td>6</td>
<td>63/98</td>
<td>64%</td>
<td>10</td>
<td>13/27</td>
<td>48%</td>
<td>50/71</td>
<td>70%</td>
</tr>
<tr>
<td>SLO</td>
<td>3</td>
<td>16/27</td>
<td>59%</td>
<td>5</td>
<td>16/27</td>
<td>59%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SPA</td>
<td>6</td>
<td>56/84</td>
<td>67%</td>
<td>9</td>
<td>26/35</td>
<td>74%</td>
<td>30/49</td>
<td>61%</td>
</tr>
<tr>
<td>SWE</td>
<td>7</td>
<td>49/74</td>
<td>66%</td>
<td>7</td>
<td>24/38</td>
<td>63%</td>
<td>25/36</td>
<td>69%</td>
</tr>
</tbody>
</table>

Legend: LW: left wing; RW: right wing

Table 2 also highlights the wing players’ efficiency. A high scoring percentage was recorded by the Hungarian wings, who managed to reach 82%. Norway and Russia had also safe hand for throw, with 74%, respectively 71% efficiency. By contrast, both Croatia and Czech Republic recorded a 59% scoring percentage for their wing players.

The left wings with the most secure hand were from Holland (83%), while for the right wings, the Hungarian Lucakz Viktoria finished the competition with 82% efficiency.
Figure 1 shows (in percentage) the number of goals scored by wing players out of the total number of goals scored by their national teams. Montenegro is in top of the list, mostly Radicevic and Mehmedovic, who have succeeded to score together 41% of all Montenegrin goals. Serbia and Spain are complementing the top, their wing players scoring 38%, respectively 37% of the total number of goals scored by these teams in the competition. At the lower limit, teams like Slovenia or Holland are those whose wing players scored only 19%, respectively 21% of the total number of goals. The middle block is made up of 7 teams (Sweden, Czech Republic, Denmark, Croatia, Hungary and Norway), whose wing players scored between 26% and 29% goals out of the teams’ total number of goals.

Figure 1. Percentage of goals scored by wing players out of the total number of goals scored by each team

Table 3 shows, besides the number of goals scored by the wing players for each country, how these goals were scored. There is no surprise that the wing’s angle is the position from where most of the throws were coming. As a second favourite action, the first phase of attack had also the best scoring efficiency. For penalties, many coaches preferred a technical wing player to try to score, despite a strong shot coming from a 9m line player. Spain, Serbia or Germany had, as the first choice for this kind of throws, a wing player, while countries like Russia and Montenegro used, as a second choice, a wing player for the 7m throws.

Table 3. Global statistics for wing players

<table>
<thead>
<tr>
<th></th>
<th>Total goals</th>
<th>Wing goals</th>
<th>FB goals</th>
<th>7m goals</th>
<th>6m goals</th>
<th>BT goals</th>
<th>9m goals</th>
<th>2 min</th>
<th>AS</th>
<th>TF</th>
<th>ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRO</td>
<td>16</td>
<td>9/17</td>
<td>6/8</td>
<td>1/1</td>
<td>1/2</td>
<td>0/1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CZE</td>
<td>19</td>
<td>10/21</td>
<td>5/6</td>
<td>3/3</td>
<td>4/5</td>
<td>4/5</td>
<td>1/3</td>
<td>2</td>
<td>17</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>DK</td>
<td>4</td>
<td>22/37</td>
<td>13/15</td>
<td>4/8</td>
<td>2/2</td>
<td>0/1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>FRA</td>
<td>68</td>
<td>36/55</td>
<td>23/31</td>
<td>4/5</td>
<td>4/5</td>
<td>1/3</td>
<td>2</td>
<td>17</td>
<td>6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>GER</td>
<td>38</td>
<td>7/15</td>
<td>8/12</td>
<td>16/19</td>
<td>0/2</td>
<td>1/1</td>
<td>6/12</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>HUN</td>
<td>46</td>
<td>38/49</td>
<td>8/8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>HOL</td>
<td>44</td>
<td>27/43</td>
<td>7/9</td>
<td>2/3</td>
<td>4/4</td>
<td>1/2</td>
<td>3/6</td>
<td>1</td>
<td>9</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>MNE</td>
<td>65</td>
<td>36/63</td>
<td>12/14</td>
<td>6/7</td>
<td>7/11</td>
<td>1/1</td>
<td>1/1</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>NOR</td>
<td>66</td>
<td>29/43</td>
<td>33/40</td>
<td>¾</td>
<td>1/2</td>
<td>3/6</td>
<td>1</td>
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<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>POL</td>
<td>24</td>
<td>13/23</td>
<td>6/8</td>
<td>2/2</td>
<td>1/1</td>
<td>1/2</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>RUS</td>
<td>83</td>
<td>41/61</td>
<td>17/23</td>
<td>14/23</td>
<td>4/6</td>
<td>0/1</td>
<td>3/3</td>
<td>10</td>
<td>14</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>ROU</td>
<td>46</td>
<td>30/52</td>
<td>11/12</td>
<td>1/2</td>
<td>1/2</td>
<td>2/2</td>
<td></td>
<td></td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>SRB</td>
<td>63</td>
<td>27/47</td>
<td>6/10</td>
<td>23/25</td>
<td>5/9</td>
<td>1/1</td>
<td>1/4</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>SLO</td>
<td>16</td>
<td>6/14</td>
<td>2/4</td>
<td>7/7</td>
<td>1/2</td>
<td>0/1</td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SPA</td>
<td>56</td>
<td>24/41</td>
<td>7/10</td>
<td>20/25</td>
<td>1/3</td>
<td>1/1</td>
<td>1/2</td>
<td>3</td>
<td>12</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>SWE</td>
<td>49</td>
<td>30/47</td>
<td>16/19</td>
<td>2/2</td>
<td>1/1</td>
<td>1/1</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Legend: AS: assists; TF: technical faults; ST: steals
Of the 16 teams participating in the EHF Euro 2018, 6 involved their wing players, so they could be seen in all shooting situations: from the wing’s angle, penalty shoots, 6m goals, as the second line player, long-distance shots or breakthrough shots. These teams are Germany, Holland, Montenegro, Russia, Serbia and Spain.

The table above also highlights that a wing player can score fast or spectacular goals, but can also serve a colleague who is better positioned for scoring. The number of assists (AS) is quite high when talking about the wing players of France, Montenegro and Serbia (17, 15 and 15 assists).

An active and offensive defence will always involve some ball stealing, and wingers play an important role in this matter. At EHF Euro 2018, France, Russia and Norway had the biggest number of steals (ST) by wing players.

![Figure 2. Goal distribution by throwing position and action](image)

As seen in Figure 2, most of the goals scored by wing players at the EHF Euro 2018 tournament were from a wing’s angle, left or right side of the field. 40% of all goals were scored like this. The second most preferred action of a wing player was the fast break (FB). 19% of the goals were scored after running the first phase of the offense. The rest of the goals scored by wingers are almost equally split: after a long-distance shot (10%), a penalty (11%), a breakthrough (BT) (10%) or a shot from the 6m line, as the second line player (10%).

**Conclusions**

Players specialised on the wing position, who participated in the EHF EURO 2018 held in France, scored 703 goals, meaning 28% of all goals scored in the competition.

Of these, 387 goals were scored from the wing’s angle (55%), and 180 goals were scored after a fast break (26%), the rest of the goals being scored almost equally from the 6m line, after a penalty, a breakthrough or a long-distance throw.

The wing players’ scoring efficiency was 67%. Right wings had an efficiency of 69%, while for the left wings, a lower value was recorded, 65%.

A total number of 124 assists and 86 steals complemented the performance of the analysed players.

Besides the statistical indicators, the teams involved in the competition proved a great physical condition and an elaborated technical-tactical preparation, details that led to a spectacular tournament where wing players were an important part of the show, with their unique technique, fast runs, creativity and anticipation.

Majda Mehmedovic, the left wing from Montenegro, and Carmen Martin, the right wing from Spain, were selected by specialists to be a part in The All Star Team of the tournament.

**Authors’ contributions**

All authors contributed equally to this study and should be considered as main authors.
References


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