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Study regarding the impact of trait anxiety on intersegmental coordination and topographical memory in junior football players

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Abstract

The purpose of our study consists of analyzing the existing impact of trait anxiety on limbs coordination and upon topographical memory of junior football players. The Endler Multidimensional Anxiety Scales allows greater precision in assessing anxiety across situations. The RCMV and MT tests are included into the PSISELTEVA battery, developed by RQ Plus. The subjects who took part in this study are 21 junior football players, from Dinamo Bucharest Sports Club. Using the Spearman correlation there have been important relations highlighted between trait anxiety in socially-evaluative and physically dangerous situations and the resistance to time pressure coefficient, the complex reaction time and the topographical memory.

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Keywords: trait anxiety; intersegmental coordination; topographical memory; complex reaction time; resistance to time pressure.

1. Introduction

Anxiety is a disorder of the affectivity, expressed by fear, unrest sensations, felt in absence of true causes able to cause them. It globally affects the human body, expressing at somatic, psychic and behavioral levels. The anxiety on short term and at moderate intensity level is not always noxious, being able to lead to the growth of the adapting potential and activity efficiency. But, on long term and at high intensity level, anxiety could become a very noxious phenomenon for the human being. A person suffering of generalized anxiety develops a special psychological functioning: his/her worries are excessive compared to the reality, he/she is afraid due to none objective reasons.

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With regard to the performance sport activity, the experts talk about an optimum anxiety area, which differs from a sportive person to another, within whose limits the athlete expresses his/her ability to obtain performance at a higher level and can register the best results (Krane, 1993). However, the specific manifestations of anxiety vary depending on a series of intrapersonal variables like the perception of the practice situation, athletic experience, ability of anticipation, personal expectations, whose result leads to the anxious behavior, specific in the case of a sport competition (Fisher & Zwart, 1982). Mullen, Lane & Hanton (2009) identified that low trait anxious athletes reported lower intensities of cognitive and somatic anxiety and higher self-confidence and interpreted these competitive state anxiety symptoms as more facilitative than high trait anxious athletes. Regarding the trait anxiety in dangerous situations, Kleinert (2002) highlights three dimensions of situations that cause injury anxiety: situations with low competency, situations with high importance and situations with loss of control. As a component part of the psychomotor domain, coordination is regarded (Hirtz, 2001) as one of the most challenging topics of investigation, relevant to sport psychologists and coaches, as well as a complex quality conditioning motor control capacity, motor learning capacity, adaptation and re-adaptation capacity, vigilance, all these conferring the athlete self-confidence, accuracy and efficiency when performing the specialized skills. Coordinated movements give to the subject the possibility to economize effort, motor action, in predictable situations (stereotypical) and unpredictable (of adjustment). Coordinated actions are movements carried out simultaneously with two or more limbs, characteristics of each movement serving successively to the adjustment of the others (Aniței, 2007). The coordination difficulties manifest through: temporal discrepancies between processing the information and executing the motor act, errors of non-synchronization of individual movements, order errors (inversions or substitutions of movements) or commutative errors (persevering with the anterior movement, interferences between movements). In football, a multiple experience of gestures is required, which shortens the learning and makes the training process more efficient (Cojocaru, 2002). Thus, becomes necessary to give a great importance to the development of a large repertory of gestures. Topographical memory requires retaining for a period of time a certain route and to use this information in a predetermined purpose. Such a task includes orientation in space, focusing, cognitive efficiency, risk taking, etc. The topographical memory represents a kind of knowledge stored in the form of spatial representations (Zlate, 1999), being essential for a better adaptation to the environment. Having a special importance in the psychomotor, mental organization, in organizing the external and internal space, along with the movement memory, is decisively influenced by the level and quality of the psychomotor stimulation in childhood, by systematically practicing physical exercises specific to various types of sports. Specialized literature (Epuran, Holdevici & Tonița, 2001) mentions the importance of spatial memory in team sports based on the understanding of the complex situation, reported to the athletes own action.

2. Objectives and Hypotheses

2.1. Objectives

The main purpose of our research was to investigate the impact of trait anxiety on intersegmental coordination, expressed through some psychomotor-related parameters (personal optimum rhythm, resistance to time pressure, perceptual-motor learning, mean of the latency time needed for a bi-segmental or multi-segmental response, resistance to disruptive factors) and upon topographical memory of the junior men football players.

3. Method

2.2. Subjects

The sample included 21 football players, aged between 14 and 15 years, from Dinamo Bucharest Sports Club. The football players represent the Junior Team II of Dinamo Bucharest.
2.3. Procedure

To solve the research issues, we used: questionnaire – EMAS-T (part of EMAS – Endler Multidimensional Anxiety Scales), belonging to the computerized platform Cognitrom Assessment System, designed by Cognitrom, test – RCMV and MT, within PSISELTEVA tests, elaborated by RQ Plus, statistical processing methods – SPSS and data interpreting.

2.4. Instruments

The Endler Multidimensional Anxiety Scales (EMAS) are three related self-report measures that allow greater precision in assessing and predicting anxiety across situations and in measuring treatment response. In our study, we have used the EMAS-T scales. EMAS-T scale measure the individuals predisposition to experience anxiety in four different types of situations: socially-evaluative, physically dangerous, new or ambiguous, and routine. EMAS-T can be computer scored, using the computerized platform Cognitrom Assessment System. The RCMV and MT tests are included into the PSISELTEVA battery, developed by RQ Plus. The RCMV test consists in displaying a soft made up of different images that present, at variable time intervals and in a randomized order, square-shaped centrally-left/-right, upward/downward positioned relevant stimuli, as well as a green-coloured upward-right positioned circle which becomes red at variable time intervals. The subject must respond through a motor reaction of his upper limbs (button pressing) and lower limbs (pedal pushing), by a homogeneous/ heterogeneous bi-segmental or multi-segmental combination, depending on the number and position of the displayed squares. The red circle in the upward-right corner claims the hand one-segmental movement. The test is individually applied and lasts about 10 minutes. The MT test is conceived as a labyrinth itinerary, which offers many possibilities to move through the space between 2 points placed in the extremities of the image. The test consists in giving, in a limited time, responses based on the memorized information. Image content: a labyrinth itinerary marked with yellow arrows, a starting point placed in the left upper side of the screen marked with a red circle, an arrival point situated in the bottom right part of the screen and marked with a green circle. As response devices one can notice a desk on which there are three central buttons and a side button. Concerning the dynamics of the test, for a determined duration of time, one of the ramifications of the labyrinth itinerary appears marked by green arrows. The task of the participant is to memorize the itinerary marked with green arrows and to issue a response for its retracing, forward - backwards, from memory. The responses are given by pushing the buttons of the desk according to the established program.

2.4.1. Results of the RCMV test (intersegmental coordination)

Among all the coefficients provided by the battery soft, we shall present the following parameters: perceptual-motor learning ability (rapid adaptation of movements at new perceptual conditions); the mean of the complex reaction time, measured in miliseconds; resistance to disruptive factors (faces a problem - unpredictable appearance of signal-stimuli, distraction - the subject gives correct answers); personal optimum rhythm (qualitative measure statistically calculated by correlating the number of errors to the total number of stimuli); resistance to time pressure (ability to perform motor tasks under stress conditions expressed by increasing the dynamic of the situations).

2.4.2. Results of the MT test (topographical memory)

The coefficients provided by the battery soft are: cmt (topographical memory coefficient) – it refers to the correctly issued answers and failed answers; performance coefficient – qualitative measure statistically calculated by reporting Cmt to the test time (measured in seconds, in which the participant has executed the test).

The results obtained by the football players at EMAS-T have been correlated to the results registered by the athletes at RCMV (intersegmental coordination) and MT (topographical memory).
3. Results

Preliminary data analysis (box-plot chart) has emphasized that in the case of the results obtained at RCMV (personal optimum rhythm, resistance to time pressure, perceptual-motor learning, mean of the complex reaction time, resistance to disruptive factors), at MT (topographical memory, performance coefficient) and for the scores obtained by the football players at EMAS-T, there were no excessive values – marginal or extreme.

Using the Spearman correlation, we have verified if there were any relations between trait anxiety and the results obtained by the football players at RCMV and MT.

Table 1. Results for trait anxiety and for the scores obtained by the football players at RCMV (intersegmental coordination) and MT (topographical memory)

<table>
<thead>
<tr>
<th></th>
<th>Correlation Coefficient</th>
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<tbody>
<tr>
<td></td>
<td>Spearman’s rho</td>
</tr>
<tr>
<td>perceptual</td>
<td>complex reaction time</td>
</tr>
<tr>
<td>motor learning</td>
<td>resistance to disruptive factor</td>
</tr>
<tr>
<td>resistance</td>
<td>personal optimum rhythm</td>
</tr>
<tr>
<td>to disruptive</td>
<td>resistance to time</td>
</tr>
<tr>
<td>factor</td>
<td>pressure</td>
</tr>
<tr>
<td>personal</td>
<td>topographical memory</td>
</tr>
<tr>
<td>optimum rhythm</td>
<td>coefficient</td>
</tr>
<tr>
<td>pressure</td>
<td>performance coefficient</td>
</tr>
<tr>
<td>socially</td>
<td>0.072</td>
</tr>
<tr>
<td>evaluative</td>
<td>-0.437*</td>
</tr>
<tr>
<td>physically</td>
<td>0.240</td>
</tr>
<tr>
<td>dangerous</td>
<td>-0.329</td>
</tr>
<tr>
<td>new or</td>
<td>0.041</td>
</tr>
<tr>
<td>ambiguous</td>
<td>-0.129</td>
</tr>
<tr>
<td>routine</td>
<td>0.160</td>
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<tr>
<td></td>
<td>0.006</td>
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<tr>
<td></td>
<td>0.039</td>
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<td>0.217</td>
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<td></td>
<td>0.088</td>
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<td>0.050</td>
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</table>

*Correlation is significant at the .05 level (2-tailed).

The analysis of the results indicated in table number 1 emphasizes:

- There is no correlation between the perceptual-motor learning ability, the resistance to disruptive factors, the personal optimum rhythm and the scores obtained by the football players at EMAS-T (p > 0.05);
- There is a negatively significant correlation (-0.437) between trait anxiety in socially-evaluative situations and the complex reaction time - the mean of the latency time needed for a bi-segmental or multi-segmental response;

  As for correlation, a proper indicator for the effect size index is the determination coefficient (r^2) whose value is 0.19. We can say 19% of the variation of the two variables is common, the rest being due to other influences. Thus, the relation between trait anxiety in socially-evaluative situations and the complex reaction time is moderate.

- There is a positively significant correlation (0.438) between trait anxiety in physically dangerous situations and the results obtained by the football players for the resistance to time pressure (p < 0.05);

  The determination coefficient (r^2) has a 0.19 value, meaning that the relation between trait anxiety in physically dangerous situations and the resistance to time pressure is moderate.

- Also, there is a positively significant correlation (0.499) between trait anxiety in physically dangerous situations and the results obtained by the football players for the topographical memory coefficient (p < 0.05);

  The determination coefficient has a 0.25 value, which means that the relation between the anxiety in physically dangerous situation and the results for the topographical memory coefficient is strong.

4. Conclusions

This study demonstrates the existence of several significant statistic correlations between trait anxiety and the results obtained by the football players at RCMV - evaluates the intersegmental coordination and MT - evaluates the topographical memory. There is a negatively significant correlation between trait anxiety in socially-evaluative situations and the complex reaction time - the mean of the latency time needed for a bi-segmental or multi-segmental response. Thus, a medium level of trait anxiety in socially-evaluative situations is correlated to a fast reaction of the athletes at different perceptual conditions, reaction that involve a bi-segmental or multi-segmental...
response. Instead, if trait anxiety in socially-evaluative situations it’s below the average level, it can be related to a less efficient reaction time in situations that require intersegmental coordination. The results underline that maintaining the anxiety in socially-evaluative situations at a medium level by performing an adequate mental training in which the athletes are aware of the significance and the importance of this aspect combined with modelling the competition in training, is associated with a better reaction of the football players in situations that require intersegmental coordination. There is a positively significant correlation between trait anxiety in physically dangerous situations and the results obtained by the football players for the resistance to time pressure coefficient. This means that a highly below the average level of trait anxiety in physically dangerous situations, is correlated to a weak performance of the athletes in the case of the resistance to time pressure. Instead, if trait anxiety in physically dangerous situations it’s at a medium level or slightly below the average level, it can be related to a better performance. Under pressure conditions (increasing the dynamic of the situations which require intersegmental coordination) the athletes manifest a better synchronization of one’s own limb movements. This aspect could be explained by the fact that football is a sport characterized by a direct contact with the opponent. Feeling anxiety in potentially dangerous circumstances, the athletes are required to develop both technically and physically skills, in order to avoid any injuries and to achieve the desired performance. Also, there is a positively significant correlation between trait anxiety in physically dangerous situations and the results obtained by the football players for the topographical memory coefficient. The results obtained show that the football players who had a trait anxiety in potentially harmful situations at a medium level or slightly below the average level registered better results for the topographical memory. They registered a smaller number of errors and a greater number of correctly issued answers than the athletes whose level of anxiety in physically dangerous situations was highly below the average level. The results underline that maintaining the anxiety in potentially harmful situations (situations with low competency, situations with high importance and situations with loss of control) at a medium level or slightly below the average level, is associated with a better synchronization of one’s own limb movements (under stress conditions) and with a smaller number of errors (in the case of topographical memory). Performing an adequate mental preparation in which the athletes are aware of the significance and the importance of this aspects combined with modelling the competition in training, the football players will acquire a multiple experience of gestures and will develop the ability to perform motor tasks under stress conditions expressed by increasing the dynamic of the situations. Also, the athletes will register a smaller number of errors in situations that require topographical memory, knowing that spatial memory is very important in football. Consequently, this may positively influence the performance of the football players on the field. Our research has been limited by the physical and mental state of the participants during testing (fatigue, affective-motivational factors) which may cause variations of the motor answers. Observation and conversation as research methods support the value of our research, which is based on the study of trait anxiety, intersegmental coordination and topographical memory. This study results provide information useful to coaches in their training strategy, for scientifically conducting the sports training. The RCMV and MT tests may be used as a complementary means of psychological preparation, may offer data with respect to the intersegmental coordination and topographical memory. The Endler Multidimensional Anxiety Scales (EMAS) may be used by the sports psychologist, providing data with respect to the trait anxiety which may become objective points in specific training and may also represent an element of selection of the football players for the representative team.

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