

CONNECTION OF SUPREME NERVOUS FUNCTIONING'S NEURO-DYNAMIC CHARACTERISTICS WITH SUCCESS OF JUNIOR SPORTSMEN IN SPORTS DANCES

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Abstract. *Purpose:* to find peculiar features of neuro-dynamic characteristics of 14-15 years' age sportsmen in sport dances and their influence on successfulness. *Material:* we tested 32 qualified dancers of 15-16 years' age. *Results:* it was found that high workability and reduced anxiety level of dancers with higher successfulness is accompanied by sympathetic adrenalin system's activation, resulted from mobilization of organism's adaptation resources. The presence of nervous processes' high mobility and increase of quickness of information perception and processing are the keys to success in sport dances. It was proved that success in sport dances is connected with nervous processes' balance and facilitates higher organization of psycho-motor skills. It is also conditioned by concentration on fulfillment of motor skills, accompanied by reduction of nervous processes' lability. *Conclusions:* we found connection between individual-typological characteristics of junior dancers' high nervous functioning. We also determined that high workability and reduced anxiety of sportsmen with high successfulness is accompanied by sympathetic adrenalin system's activation, resulted from mobilization of organism's adaptation resources. It follows from mobilization of organism's adaptation resources. Increase of accuracy and stability of motor skills' realization reduces the level of junior dancers' psycho-motor productivity.

Key words: neuro-dynamic, sport dances, dancers, psycho-motor, lability.

Introduction

A great number of factors influences on successfulness in sports. It especially concerns creative kinds – sport dances and other. The most influential are the factors, which are conditioned by individual typological features of supreme nervous system's functioning. Such factors are genetically determined and manifestation of these characteristics is connected with organism's functional status. Such factors are neuro-dynamic characteristics of supreme nervous system's functioning [1, 2, 3, 9].

The level of neuro-dynamic characteristics' manifestation reflects sportsmen's abilities to endure significant physical, psychological, intellectual, will and emotional loads. Such loads are conditioned by specificities of sports functioning without negative after-effects for health [4, 10, 14, 10].

In sport dances neuro-dynamic characteristics play important role. Sportsman-dancer shall be maximally concentrated and have optimal state of “combat readiness”, which maximally influences on result.

Sport activity is a kind of extreme functioning, which is realized on the border of human potentials for achievement maximal result. Many scientists think that neuro-dynamic characteristics of supreme nervous functioning are and integral component of its structure and determine effective functioning of all systems of organism and psych [5, 6, 7, 12, 13]. It is undoubted that exactly the state of dancers' neuro-dynamic characteristics conditions success of sport activity.

In our previous studies we researched psycho-physiological states, which appear in conditions of sports activity. We regarded psycho-physiological peculiarities of visual perception in sports and dynamic of sportsmen's psycho-physiological and vegetative functions on different training stages. Besides, we studied sex peculiarities of neuro-dynamic functions of elite athletes. It permitted to offer approaches to regulation and correction of psycho-physiological states, which appear in conditions of sportsmen's training and competition functioning [7, 8, 19].

However, in scientific literature we could not find the data about interconnection of neuro-dynamic characteristics with success in sport dances. Just for this purpose we conducted research of individual-typological characteristics' connection with successfulness in sport dances.

Hypothesis: we assumed that the level of neuro-dynamic characteristics of supreme nervous system in sport dances manifests in different ways and is connected with effectiveness of sports activity.

The purpose of the research: to find peculiar features of neuro-dynamic characteristics of 14-15 years' age sportsmen in sport dances and their influence on successfulness.

Material and methods

Participants: in the research 32 qualified junior sportsmen, specializing in sport dances, participated. Their age was 15-16 years. Their qualification was: from 1st sports degree to candidate master of sports of Ukraine.

Every dancer was assessed by five criteria of successfulness (10-points scale for every criterion) for further distribution into groups of more or less successful sportsmen.

The first group – dancers with the highest successfulness, determined by special tests – 12 persons (>71points), the second group – less successful sportsmen by special tests– 20 persons (< 70 points).

Organization of the research: for determination of successfulness level we carried out testing with five special exercises, which showed technical skillfulness and choreographic fitness:

1. Temp and main rhythm (“musicality” – assessment of fulfillment’s musicality in each tact). Dancing in tact means that step is completed (not before or after) but exactly at appropriate count. Following main rhythm means that step is made during proper time (for example, slowly or quickly) and correct correspondence between quick and slow steps is observed.

2. Lines of figure are correct, elegant lines of pair, which corresponds to character of stylized contest dance. Referee assesses correctness of the following: lines of arms, lines of backs, lines of shoulders and hips; (lines of legs, head and neck; left and right side lines. Marks for every line are equivalent.

3. Motion (“dynamic” is continuous fulfillment of figures; movements, which correspond to character of the dance; assessment of ascends and descends, swing, and equilibrium of the pair). Referee shall determine is movements are fulfilled in compliance with dance character, swing and balance of pair. Excessive swing justifies rising of mark only if movements are controlled and balance is kept. In dances of Latin America it is necessary to assess plasticity of torso, which is characteristic for every dance.

4. Work of feet (“technique” is exact fulfillment of figures: direction of movement in respect to body in different positions, work of feet). Referee shall assess correctness of feet work, including toe and heel, postures and movements, closeness of feet position, expressiveness of legs’ movements and control over them.

5. Presentation; it is artistry, preproduction of every dance character, behavior on parquet.

For assessment of psycho-physiological state and general workability we used eight colors’ Luscher test. Conception about associative connection between colors and human state, reflecting human different adaptation methods to environment, is in the base of this methodic [8].

For studying of neuro-dynamic characteristics we applied the following methods: functional mobility and balance of nervous processes; time of simple visual reaction and psycho-motor characteristics (tapping test). The tests were components of computer psycho-diagnostic system “Multi-psycho-meter -05”.

Statistical analysis: processing of the received results was fulfilled with the help of MS Excel and “Statistica 6.0” applied computer programs. As far as indicators were out of law of normal distribution, for determination of significant difference between samples we used landmark criterion rank sum of Wilkinson. For demonstration of the data distribution we used inter-quartile range, which pointed at first (25% percentile) and third quartile (75%) [7, 10].

Results of the research

Determination of dancers’ psychological state was fulfilled with Luscher color test, results of which are presented in table 1.

Results of the research (see table 1) show confidently lower workability values in group of less successful dancers, comparing with group of more successful./ It points at connection with psychological state and successfulness in sport dances.

More confident anxiety indicator in group of less successful dancers points at increase of stress, resulted from weakening of general workability level (see table 1).

By indicator of vegetative coefficient we see higher values in more successful dancers (see table 1). The received fact reflects higher activation of sympathetic adrenalin system in more successful group.

Thus, high workability and reduced anxiety level in more successful dancers is accompanied by activation of sympathetic adrenalin system, resulted from mobilization of organism’s adaptation resources.

Table 1. Indicators of psychic state by Luscher test of dancers with different successfulness level (median of upper and lower quartiles)

Indicators	More successful dancers (n=12)	Less successful dancers (n=20)
Workability, conv. un.	12. 00 11. 00;14. 00	7. 50* 6. 50; 10. 00
Fatigue, conv. un.	1. 50 1. 00; 2. 00	3. 00 2. 00; 4. 00
Anxiety, conv. un.	0. 5 0;1. 00	2. 00* 1. 00; 4. 00
Vegetative coefficient, conv. un. .	16.00 9. 00; 17. 00	10. 50* 5. 00; 15. 00

Note: * - $p < 0.05$, comparing with group of more successful dancers.

In table 2 we supply mean values of indicators by test of functional mobility of dancers with different successfulness.

Table 2. Indicators of nervous processes' functional mobility of dancers with different successfulness (median, upper and lower quartiles)

Indicators	More successful dancers (n=12)	Less successful dancers (n=20)
Dynamism, conv. un.	73. 70 66. 50;79. 25	78. 30 69. 65; 83. 40
Bandwidth of visual analyzer, conv. un.	1. 75 1. 45; 1. 85	1. 80 1. 50; 1. 90
Maximal time of information processing, msec.	320. 00 290. 00; 420. 00	360. 00* 340. 00; 450. 00

Note: * - $p < 0.05$, comparing with group of more successful dancers.

Analysis of results (see table 2) shows absence of confident differences between dynamism and bandwidth of visual analyzer in test for quickness of complex visual motor reaction's processing. By indicator of information processing maximal time there are certain distinctions. The presence of maximal time lower values in more successful dancers points at better functional mobility of nervous processes. Thus, higher mobility of nervous processes is a key to success in sport dances.

In table 3 we present indicators of latent time of simple visual-motor reaction of dancers with different successfulness.

Table 3. Indicators of latent time of simple visual-motor reaction of dancers with different successfulness (median, upper and lower quartiles)

Indicators	More successful dancers (n=12)	Less successful dancers (n=20)
Latent time of simple visual-motor reaction, msec.	245. 80 230. 50; 340. 40	290. 60* 250. 50; 303. 00
Stability, secV	18. 15 13. 62; 18. 33	15. 45* 12. 00; 17. 00

Note: * - $p < 0.05$, comparing with group of more successful dancers.

According to the received results, more successful dancers have less absolute values of visual motor reaction's latent time and confidently higher values of reaction's stability (see table 3). The received fact says about higher quickness of perception and processing of visual information by successful dancers, comparing with less successful sportsmen.

Stability indicator is actually the criterion of response "compactness" in sportsman's reacting to visual irritators. Psycho-physiologically interpreted, stability of visual-motor reaction reflects degree of psycho-emotional tension [15, 16, and 17]. Thus, in successful dancers we observe reduction of psycho-emotional tension and conclude

that success in sport dances is conditioned by increase of quickness of information perception and processing as well as by reduction of psycho-emotional tension.

In table 4 we give indicators of nervous processes balance of dancers with different successfulness.

Table 4. Indicators of nervous processes balance of dancers with different successfulness (median, upper and lower quartiles)

Indicators	More successful dancers (n=12)	Less successful dancers (n=20)
Accuracy, conv. un.	2. 90 2. 50; 3. 15	2. 50 2. 00; 3. 40
Stability, conv. un.	3. 80 3. 25; 3. 90	3. 30* 2. 80; 3. 75
Excitation, msec.	0. 02 -0. 25; 0. 65	-0. 15* -0. 90; -0. 03

Note: * - $p < 0.05$, comparing with group of more successful dancers.

Analysis of table 4 data witnesses about presence of confidently higher values of stability among more successful dancers, when they reproduce psycho-motor act. This result points at more organized system of psycho-motor functions' realization by more successful dancers, comparing other sportsmen's group [18].

Indicator of more successful dancers' excitation has positive value, while less successful – negative (see table 4). This fact points at presence of nervous processes' balance in successful dancers. At the same time less successful dancers have prevalence of excitation processes in central nervous system. Thus, success in sport dances is connected with balance in nervous processes that facilitate higher organization of psycho-motor skills' realization.

Tapping test indicators of dancers with different successfulness are presented in table 5.

Table 5. Tapping test indicators of dancers with different successfulness (median, upper and lower quartiles)

Indicators	More successful dancers (n=12)	Less successful dancers (n=20)
Frequency of touches, quantity	6. 15 6. 00; 6. 60	6. 10 5. 60; 6. 30
Lability, conv. un.	60. 00 48. 00; 68. 60	64. 00* 56. 30; 70. 50
Signal ratio, conv. un.	2. 70 2. 45; 3. 10	2. 60 2. 40; 3. 00
Stability, sec.V	10. 50 10. 00; 14. 00	14. 00* 12. 00; 19. 50

Note: * - $p < 0.05$, comparing with group of more successful dancers.

The found reduced stability of successful dancers points at concentration in conditions of psycho-motor realization that is in compliance with reduction of nervous processes' lability. Thus, success in sport dances is conditioned by concentration in motor skills' fulfillment with simultaneous reduction of nervous processes' lability [19, 20].

Discussion

It was found that neuro-dynamic functions of junior dancers influence on success of special technical skills' realization. It is known that fulfillment of complex technical elements in sport dances requires training of coordination [1, 12]. However, quality of motor skills' formation depends on individual-typological properties of supreme nervous functioning [4, 17]. At the same time high successfulness of special technical elements' realization by junior dancers is connected with mobilization of adaptation resources, resulted from activation of sympathetic adrenalin system of organism. One more important characteristic of supreme nervous system's individual-typological properties is functional mobility of nervous processes [10, 11].

We found that exactly high mobility of nervous processes and quickness of processes of information perception and processing by junior dancers are the keys to high successfulness. Thus, for optimization of junior dancers' training process it is necessary to consider individual-typological properties of supreme nervous functioning.

Further researches shall be concentrated on differentiation of training programs, considering neuro-dynamic characteristics in sport dances.

Conclusions

1. We found connection between junior dancers' individual-typological characteristics of supreme nervous functioning. We also determined that successful junior sportsmen's high workability and weakened anxiety is accompanied by activation of sympathetic adrenal system, resulted from mobilization of organism's adaptation resources.
2. High mobility of nervous processes is the key to success in sport dances. It is reflected in increase of quickness of information perception and processing as well as in weakening of psycho-emotional tension in sport dancers with higher successfulness.
3. Success in sport dances is connected with balance of nervous processes, concentration and reduction of nervous processes' lability. All these facilitate higher organization of psycho-motor skills' realization; reduces junior dancers' psycho-motor productivity.

Conflict of interests

The authors declare that there is no conflict of interests.

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