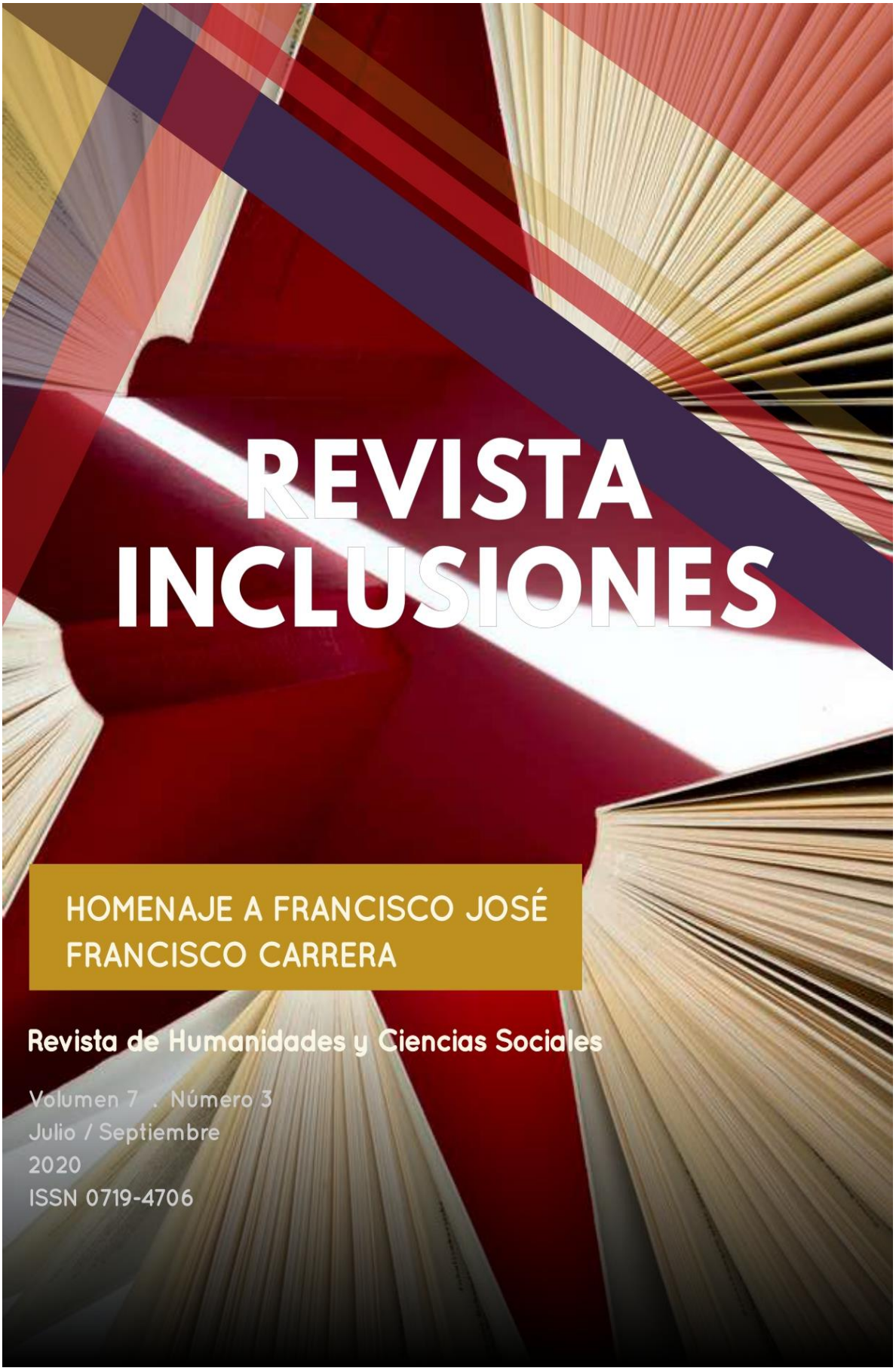
REVISTA
INCLUSIONES
HOMENAJE A FRANCISCO JOSÉ
FRANCISCO CARRERA
Revista de Humanidades y Ciencias Sociales
Volumen 7 . Número 3
Julio / Septiembre
2020
ISSN 0719-4706

REVISTA
INCLUSIONES
REVISTA DE HUMANIDADES
Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA
EDITORIAL

REVISTA INCLUSIONES
REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL

REVISTA
INCLUSIONES
REVISTA DE HUMANIDADES
Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA
EDITORIAL

Editorial Cuadernos de Sofía
Santiago – Chile
Representante Legal
Juan Guillermo Estay Sepúlveda Editorial

Indización, Repositorios y Bases de Datos Académicas

Revista Inclusiones, se encuentra indizada en:

BIBLIOTECA UNIVERSIDAD DE CONCEPCIÓN

REVISTA INCLUSIONES
REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL

ISSN 0719-4706 - Volumen 7 / Número 3 / Julio – Septiembre 2020 pp. 298-305

A KINESIOLOGICAL AND PSYCHOLOGICAL STUDY OF THE RATIONAL MOVEMENTS OF ATHLETES IN TRAP SHOOTING DURING THE PREPARATION FOR COMPETITION ROUTINE

Dr. (C) Svetlana Sergeevna Stashkevich
Federal Science Center for Physical Culture and Sport, Russian Federation
ORCID ID: 0000-0002-3722-8557
seta_89@mail.ru
Ph. D. Tamara Fedorovna Abramova
Federal Science Center for Physical Culture and Sport, Russian Federation
ORCID ID: 0000-0002-5671-3806
atf52@bk.ru

Fecha de Recepción: 13 de enero de 2020 – **Fecha Revisión**: 12 de febrero de 2020

Fecha de Aceptación: 23 de mayo de 2020 – **Fecha de Publicación**: 01 de julio de 2020

Abstract

The paper describes and substantiates the main approaches to studying the dynamics of the functional and emotional state of competitive shooters. In the generally accepted practice of sports physiology and kinesiology, the definition of an athlete's functional state refers to the state of individual body systems (respiratory, cardiovascular, nervous, musculoskeletal systems, psychophysiological indicators, etc.), through which one judges the functional capabilities of the body. The purpose of this paper is to study the influence of objective and subjective factors on the formation of the functional characteristics of the musculoskeletal system and the quality of the exercises in trap shooting. This allows the authors to identify the weak spots in the condition of individual parts of the musculoskeletal system (namely, the upper limbs) and introduce additional exercises/adjustments to the training process that eliminate these imbalances. The use of the kinesiological method makes it possible to objectively assess the functional state of individual parts of the musculoskeletal system (the upper limbs) of athletes and correct it. The study of the emotional state of athletes is expressed in a change in indicators of reactive anxiety, mood, and well-being, indicating the optimization of the functional state of athletes. The results support the continued use of kinesiological and psychological techniques and the continuation of further research.

Keywords

Trap – Kinesiology research – Psychological diagnostics – Situational anxiety – Personal anxiety

Para Citar este Artículo:

Stachkevich, Svetlana Sergeevna y Abramova, Tamara Fedorovna. A kinesiological and psychological study of the rational movements of athletes in trap shooting during the preparation for competition routine. Revista Inclusiones num 3 (2020): 298-305.

Introduction

A dynamically developing discipline, such as trapshooting, is accompanied by a complex change in the structure of training competitive shooters in the preparatory and competitive periods.

The lack of a single algorithm for a comprehensive examination of the physiological and psychological foundations of the rational movements of competitive shooters is emphasized by Russian and foreign authors[1].

As a result of this, the reasons why competitive shooters often miss their target or cannot fire their shot have not yet been established. They could include failure to hit the target, the physical factor (such as dust impeding the flight of the bullet), weapon failure due to the athlete's fault (forgot to load, charge or remove the fuse, insert the second cartridge after a miss), as well as subjective reasons. Trapshooting exercises are conducted from five numbered spots, where shooting places are located in a straight line on a rectangular platform. The targets flying out of the hidden trench move along several trajectories, with a tolerance of deviation of up to 45°. The flight altitude can vary too, which requires the shooter to respond as quickly as possible.

Of the existing methods for studying the musculoskeletal system, such a method as kinesiology provides an integral picture of muscle movement in all its manifestations since this method considers the mechanical, physiological, and psychological aspects of movement: quality, correctness, sequence of movements, smoothness and accuracy of movements, degree of freedom and stability in holding a pose, performing movements at the first try or the second or third try; confidently or with tension, swaying, the simultaneity of the execution of specified movements, accuracy, smoothness of execution, accuracy, and speed of transition from one movement to another. This ultimately allows one to find the most rational movements for competitive shooters.

Methods

General scheme

The analysis of scientific, methodological, and specialized literature, observation, kinesiology studies, psychological diagnostics, and methods of mathematical statistics allowed us to us generalize and systematize the research results to increase the efficiency of training athletes, as well as for forecasting and professional selection of trapshooters for a team.

Algorithm

The study was conducted at the All-Russian Scientific Research Institute of Physical Culture and Sports (FSBI FNT VNIIIFK). The study involved competitive trap shooters during their preparation for competitions.

[1] K. C. Atwood, “Naturopathy, pseudoscience, and medicine: myths and fallacies vs truth”, Medscape General Medicine Vol: 6 Issue 1 (2004) y M. Haas; R. Cooperstein y D. Peterso, “Disentangling manual muscle testing and Applied Kinesiology: critique and reinterpretation of a literature review”, Chiropractic & Osteopathy Vol: 15 (2007).

All athletes signed informed consents to the publication of data obtained as a result of research without identification.

The following parameters were determined for all shooters during epy kinesiology study: switchability of movements, spatial organization, volume and quality of movements, self-control when performing tests, feelings of pace and rhythm.

A kinesiographic study of the upper limbs (right and left arms) was carried out as follows: the arm of the subject was fixed on a special platform with surface electric sensors (the passive sensor was the magnetic sensor), which recorded the movement of the magnet (the active sensor). It was attached to the bottom of the platform. During the movement of the upper limb, signals from the magnet were captured by the magnetic sensors of the platform frame and transmitted to a personal computer.

As a result of kinesiographic research on a computer screen, a three-dimensional graphic image of the usual path of movement of the upper limb was obtained. The subject with open eyes moved alternately the right and left arm at an angle of 50 degrees to the right and left side. The arm, which was actively involved in the movement, was bent at a right angle in the elbow joint. At a signal, the subject began to move their arm to a place (angle) of 50 degrees indicated in advance. Speed was not taken into account. During the task, the subject could deviate from the specified angle of 50 degrees (make a smaller or larger swing with their arm). Assignments were repeated 2 times for each arm (5 times to each side).

As part of a psychological study, we determined the situational and personal anxiety for all athletes and performed a subjective assessment of the athletes' emotional state before the competition.

The psychological methodology called "Integrative Anxiety Test" includes two main scales, which allow one to identify the level of personal and situational (reactive) anxiety. The results of psychological diagnostics allowed us to assess the impact of anxiety on the achievement of successful and productive activities in sports. The maximum severity of anxiety is 10 points, the minimum is 10 points, the average level of anxiety (norm) is 0-3 points, 4-6 points are a moderate level of anxiety, and 7-10 points means a high level of anxiety, indicating a steady tendency to perceive a wide range of situations as threatening[2].

An express assessment of the emotional state of athletes before the competition included a personal assessment of the athlete’s well-being, mood, desire to train, satisfaction with the training process, relationships with their teammates and the coach, sports prospects, and preparedness for the competition. The emotional state indicator scales were interpreted as follows: 1-3 — low, 4-7 — average, 8-10 — high. Interpretation of the emotional state: <20 — low, 21-40 — below average; 41-60 — average; 61-69 — above average; > 70 — high.

[2] A. P. Bizyuk; L. I. Wasserman y B. V. Iovlev, The use of integrative anxiety test: Methodological recommendations (St. Petersburg: SPbNIPI them. V.M. Bechterew, 2005).

Block diagram

We carried out the statistical processing of the experimental material using SPSS 22 software, using correlation analysis and Student's t-test.

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Right arm				
Kinesiography of the right arm to the right at 50º. Average (X)	10	53.6900	5.19903	1.64408
Kinesiography of the right arm to the right at 50º. Standard deviation (σ)	10	4.1960	3.52349	1.11423
Kinesiography of the right arm to the right at 50º. Coefficient of variation (V)	10	7.7300	6.47028	2.04608
Kinesiography of the right arm to the left at 50º. Average (X)	10	52.8800	10.14690	3.20873
Kinesiography of the right arm to the left at 50º. Standard deviation (σ)	10	7.6660	16.60088	5.24966
Kinesiography of the right arm to the left at 50º. Coefficient of variation (V)	10	10.8000	20.75155	6.56222
Left arm				
Kinesiography of the left arm to the right at 50º. Average (X)	10	55.5500	10.78355	3.41006
Kinesiography of the left arm to the right at 50º. Standard deviation (σ)	10	8.2010	14.33318	4.53255
Kinesiography of the left arm to the right at 50º. Coefficient of variation (V)	10	11.8100	17.02230	5.38292
Kinesiography of the left arm to the left at 50º. Average (X)	10	52.0880	4.92437	1.55722
Kinesiography of the left arm to the left at 50º. Standard deviation (σ)	10	10.0580	22.32128	7.05861
Kinesiography of the left arm to the left at 50º. Coefficient of variation (V)	10	16.8700	35.62016	11.26408

Table 1
Statistical data of the main kinesiological characteristics on the trap

One-Sample Test (Comparison of two dependent samples)						
	Test Value = 0					
	Student's t-test	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Right arm						
Kinesiography of the right arm to the right at 50º. Average (X)	32.657	9	.000	53.69000	49.9708	57.4092
Kinesiography of the right arm to the right at 50º. Standard deviation (σ)	3.766	9	.004	4.19600	1.6754	6.7166
Kinesiography of the right arm to the right at 50º. Coefficient of variation (V)	3.778	9	.004	7.73000	3.1014	12.3586
Kinesiography of the right arm to the left at 50º. Average (X)	16.480	9	.000	52.88000	45.6213	60.1387
Kinesiography of the right arm to the left at 50º. Standard deviation (σ)	1.460	9	.178	7.66600	-4.2096	19.5416
Kinesiography of the right arm to the left at 50º. Coefficient of variation (V)	1.646	9	.134	10.80000	-4.0448	25.6448
Left arm						
Kinesiography of the left arm to the right at 50º. Average (X)	16.290	9	.000	55.55000	47.8359	63.2641
Kinesiography of the left arm to	1.460	9	.178	7.66600	-4.2096	19.5416

the right at 50º. Standard deviation (σ)						
Kinesiography of the left arm to the right at 50º. Coefficient of variation (V)	1.646	9	.134	10.80000	-4.0448	25.6448
Kinesiography of the left arm to the left at 50º. Average (X)	33.449	9	.000	52.08800	48.5653	55.6107
Kinesiography of the left arm to the left at 50º. Standard deviation (σ)	1.425	9	.188	10.05800	-5.9097	26.0257
Kinesiography of the left arm to the left at 50º. Coefficient of variation (V)	1.498	9	.168	16.87000	-8.6111	42.3511

Table 2
Statistical data of the main psychological characteristics on the trap

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Rapid assessment of the athletes' emotional state before the competition				
Well-being	10	8.3000	.94868	.30000
Mood	10	8.2000	1.03280	.32660
Desire to train	10	8.4000	1.34990	.42687
Satisfaction with the training process	10	8.3000	1.25167	.39581
Relationship with teammates	10	8.0000	1.33333	.42164
Relationship with the coach	10	8.4000	1.17379	.37118
Sports prospects	10	9.2000	.78881	.24944
Readiness for the competition	10	8.6000	1.07497	.33993
Emotional state	10	67.4000	7.05849	2.23209
Integrative anxiety test				
Situational anxiety (SA)	10	1.3000	.67495	.21344
Emotional discomfort (SA)	10	1.8000	1.75119	.55377
Asthenic component of anxiety (SA)	10	2.3000	1.88856	.59722
Phobic component (SA)	10	2.6000	2.22111	.70238
Negative anticipatory thinking (SA)	10	1.9000	.99443	.31447
Social protection (SA)	10	3.6000	2.50333	.79162
Personal anxiety (PA)	10	4.2000	1.93218	.61101
Emotional discomfort (PA)	10	5.1000	1.96921	.62272
Asthenic component of anxiety (PA)	10	3.1000	2.33095	.73711
Phobic component (PA)	10	4.1000	2.23358	.70632
Negative anticipatory thinking (PA)	10	4.1000	1.96921	.62272
Social protection (PA)	10	4.2000	2.34758	.74237

Table 3
Statistical data of the main psychological characteristics on the trap

One-Sample Test (Comparison of two dependent samples)						
	Test Value = 0					
	Student's t-test	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Rapid assessment of the athletes' emotional state before the competition						
Well-being	27.667	9	.000	8.30000	7.6214	8.9786
Mood	25.107	9	.000	8.20000	7.4612	8.9388
Desire to train	19.678	9	.000	8.40000	7.4343	9.3657
Satisfaction with the training process	20.970	9	.000	8.30000	7.4046	9.1954
Relationship with teammates	18.974	9	.000	8.00000	7.0462	8.9538

Relationship with the coach	22.630	9	.000	8.40000	7.5603	9.2397
Sports prospects	36.882	9	.000	9.20000	8.6357	9.7643
Readiness for the competition	25.299	9	.000	8.60000	7.8310	9.3690
Emotional state	30.196	9	.000	67.40000	62.3507	72.4493
Integrative anxiety test						
Situational anxiety (SA)	5.657	9	.000	1.33333	.7898	1.8769
Emotional discomfort (SA)	3.250	9	.010	1.80000	.5473	3.0527
Asthenic component of anxiety (SA)	3.851	9	.004	2.30000	.9490	3.6510
Phobic component (SA)	3.702	9	.005	2.60000	1.0111	4.1889
Negative anticipatory thinking (SA)	6.042	9	.000	1.90000	1.1886	2.6114
Social protection (SA)	4.719	8	.002	3.88889	1.9887	5.7891
Personal anxiety (PA)	6.874	9	.000	4.20000	2.8178	5.5822
Emotional discomfort (PA)	8.190	9	.000	5.10000	3.6913	6.5087
Asthenic component of anxiety (PA)	4.206	9	.002	3.10000	1.4325	4.7675
Phobic component (PA)	5.805	9	.000	4.10000	2.5022	5.6978
Negative anticipatory thinking (PA)	6.584	9	.000	4.10000	2.6913	5.5087
Social protection (PA)	5.658	9	.000	4.20000	2.5206	5.8794

Table 4
Statistical data of the main psychological characteristics on the trap

Results

According to the results of correlation analysis, in the process of preparing the shooter for targets that will fly out strongly to the left, strongly to the right, to the center, or at any other angle, the use of the technique of "quick eyeliner" is effective. In the process of lifting a gun before giving a command to release the target, the starting aiming point is very important. For right-handed shooters, the turn to the left will have a larger radius than to the right, for left-handed people this will be the other way around. Therefore, in the case of a miss to the left, the shooter experiences emotional discomfort (r = 0.632 *) against which the feeling of an incomprehensible threat, self-doubt, and their futility (r = 0.680 *) begins to grow. Their well-being worsens (r = -0.657 *), as well as their mood (r = -0.683 *), while their anxiety for their career in sports arises (r = -0.860 **), but the shooter receives support from the team (r = -0.606 *). In the case of a miss to the right, the shooter experiences emotional discomfort (r = 0.693 *), their well-being worsens (r = -0.670 *), they become anxious for their sports career (r = -0.860 **), but they receive support from the team (r = -0.606 *) (Tables 3-5).

	Well-being	Mood	Relationship with teammates	Sports prospects	Emotional discomfort (SA)	Phobic component (SA)
Right arm						
Kinesiography of the right arm to the right at 50º. Average (X)	-.461	-.378	.014	-.390	.108	-.062
Kinesiography of the right arm to the right at 50º. Standard deviation (σ)	-.560	-.464	-.676*	-.559	.855**	.730*
Kinesiography of the right arm to the right at 50º. Coefficient of variation (V)	-.525	-.435	-.683*	-.526	.854**	.749*
Kinesiography of the right arm to the left at 50º. Average (X)	-.357	-.336	-.749*	-.345	.732*	.680*
Kinesiography of the right arm to the left at 50º. Standard deviation (σ)	-.493	-.435	-.785**	-.545	.850**	.685*
Kinesiography of the right arm to the left at 50º. Coefficient of variation (V)	-.495	-.412	-.771**	-.550	.859**	.689*
Left arm						
Kinesiography of the left arm to the right at 50º. Average (X)	-.670*	-.584	-.768**	-.758*	.693*	.505
Kinesiography of the left arm to the right at 50º. Standard deviation (σ)	-.599	-.517	-.761*	-.674*	.773**	.576
Kinesiography of the left arm to the right at 50º. Coefficient of variation (V)	-.608	-.530	-.731*	-.689*	.740*	.524
Kinesiography of the left arm to the left at 50º. Average (X)	-.757*	-.683*	-.706*	-.860**	.559	.383
Kinesiography of the left arm to the left at 50º. Standard deviation (σ)	-.542	-.468	-.802**	-.609	.825**	.663*
Kinesiography of the left arm to the left at 50º. Coefficient of variation (V)	-.540	-.468	-.803**	-.609	.824**	.661*

Table 5

Statistical data of the main kinesiological and psychological characteristics on the trap Correlation analysis

Conclusion

Experienced shooters often lift their gun high, about 1.2 meters above the trench and pick up the target at the moment when it appears from under the muzzle. For beginners, it is more convenient to lift their gun lower, at the trench level, because in this way they can see the target faster and its speed makes the shooter turn faster. Based on kinesiographic data, we identified and studied the "weak points" affecting the formation of the functional characteristics of the musculoskeletal system (namely, the upper limbs) in the process of preparing for competitions.

Based on the data of kinesiography and considering that the targets fly out of the trench and move along several trajectories with an allowable deflection angle of 45°, for experienced right-handed shooters, the “drift” of the gun strongly to the left should be at least 45°/60° and the "drift" of the gun strongly to the right no more than 50°/57°. For beginning right-handed shooters, the "drift" of the gun made by the shooter strongly to the left should be at least 52° and the "drift" of the gun strongly to the right no more than 54°. This scheme of rational movements will allow the shooter to react as quickly as possible to different heights of the target’s flight (Tables 1, 2). The 1964 Tokyo Olympics confirm our empirical study. The events of the 18th Tokyo Olympics were dramatic for P. Senichev, who showed the same result as the American athlete W. Morris, scoring 194 out of 200 possible targets. During the shootout, Senichev unexpectedly missed the target in the first shot. However, being confident that he had hit it, he lowered his gun and saw that it was still flying. Senichev reacted on time and shot the target with a second shot, hitting it when it had almost fallen, and finished the series without a miss, which allowed him to win a silver medal. Senichev was awarded the title of Honored Master of Sports, Honored Trainer of the USSR for successful performances at international competitions and received the Order of the Badge of Honor. Thus, to fire a shot and not miss the target, the shooter must go beyond the permissible deviation of the target at 45°. To avoid making mistakes for subjective reasons, one needs not to think about the target and its trajectory, but rather to use the gun quickly, skillfully, and freely. The total obtained data on personal and situational anxiety among shooters that affect the choice of behavioral strategies in the competitive and preparatory periods can serve as the basis for the development of psychological and pedagogical programs for optimizing behavioral strategies in both the preparatory and competitive periods.

References

Atwood, K. C. “Naturopathy, pseudoscience, and medicine: myths and fallacies vs truth”. Medscape General Medicine Vol: 6 Issue 1 (2004): 33.

Bizyuk, A. P., Wasserman, L. I., Iovlev, B. V. The use of integrative anxiety test: Methodological recommendations. St. Petersburg: SPbNIPI them. V.M. Bechterew. 2005.

Bobkov, G. A., Permyakov, I. A., Morozov, O. Yu., Nadinskii, O. Yu., Matov, V. V., Nazarov, S. E. y Bobkov, I. G. “Innovatsionnyi metod kolichestvennogo opredeleniya i korrektsii funktsionalnogo sostoyaniya miofastsialnykh meridianov sportsmenov: Vestnik sportivnoi nauki”. Vestnik sportivnoi nauki Vol: 4 (2014): 48-53.

Haas, M., Cooperstein, R. y Peterson, D. “Disentangling manual muscle testing and Applied Kinesiology: critique and reinterpretation of a literature review. Chiropractic & Osteopathy Vol: 15 (2007): 11.

Okhota i rybalka XXI vek: zhurnal. January 2006.

CUADERNOS DE SOFÍA
EDITORIAL