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Original Article

Types of precompetition anxiety among junior athletes

IHOR POPOVYCH[1], ROKSOLANA SIRKO[2], ALLA DUSHKA[3], VOLODYMYR SLOBODIANYK[4], OKSANA STELMAKH[5], LILIIA PYLYPENKO[6], LARYSA ZAHRAI[7]
[1]Kherson State University, Kherson, UKRAINE
[1,6]Mykola Yarmachenko Institute of Special Pedagogy and Psychology, NAPS of Ukraine, Kyiv, UKRAINE
[2,4,5,6]Lviv State University of Life Safety, Lviv, UKRAINE
[7]Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, UKRAINE

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Abstract:
The aim of the research is to categorize the types of precompetition anxiety experienced by junior athletes immediately before official sports events. Methods: Valid and reliable psychodiagnostic tools, well-established in sports research, were utilized to accurately measure anxiety phenomena in junior athletes. Results: Descriptive frequency characteristics were analyzed to construct a comprehensive profile of pre-competition anxiety among the participants. K-means clustering identified four distinct types: "Destructive Anxiety Disorder" (DAD) (n = 42; 13.13%); "Personal Precompetition Anxiety" (PPA) (n = 120; 37.50%); "Situational Precompetition Anxiety" (SPA) (n = 102; 31.87%); and "Social Unprotected Anxiety" (SUA) (n = 56; 17.50%). Notably, DAD is the most concerning type, potentially impacting both performance and the athlete's overall health. Additionally, SUA was identified as posing significant risks. It was explained that this type can become a plateau of stagnation and be transformed into a psychological problem later. It was highlighted that anxiety performs an important function in an athlete's sporting activities and it is important how efficiently a junior athlete can utilize their resources. We performed comparison of the types of pre-competition anxiety of junior athletes representing team sports (Group 1) and individual sports (Group 2) by Fisher's criterion (φ). Two statistically significant advantages were established: Group 1 (n = 79; 49.37%) has an advantage by "SPA" (φ = 1.89; p ≤ .05); Group 2 (n = 42; 26.25%) has an advantage by "SUA" (φ = 2.12; p ≤ .05). **Discussion and conclusions.** It was substantiated that the types of junior athletes' pre-competition anxiety are considered to be psycho-physiological states related to awaiting a sports competition, which are accompanied by psycho-emotional stress, require the development of athletes' self-regulation, stress-resistance and resilience, and depend on their individual-psychological characteristics, experience and mastery. We recommend that coaching staffs should diagnose the types of pre-competition anxiety that will allow making timely corrections to an athlete's performance that can have a considerable impact on the result of a sports competition and also protect athletes against traumas.
Keywords: mental health, psychological health, personal anxiety, situational anxiety, anxiety disorder, expectations in sports, psycho-physiological state.

Introduction

The fast-paced life, high standards of sports mastery and a surge in the indicators for qualifying athletes to participate in European and World sports competitions, martial law and permanent conflict situations sweeping our planet affect mental and psychological health, have an effect on psycho-functional states, encourage junior athletes to search for health-saving technologies and technics for coping with anxiety and stress. Anxiety and stress are two phenomena which permanently accompany sporting activities. There is no clear classification of stimuli causing anxiety and stress, since we can observe absolutely different behavior of one athlete in the same competition situation. Anxiety is an emotion accompanying a psycho-physiological anxious state. Anxiety should not be associated only with negative characteristics and functions. A signal function of anxiety serves as a preventive measure ensuring the functioning of the human body. Psycho-physiological nature of anxiety signalizes and thereby protects the human body against harmful and damaging impacts from the inside and from the outside. Activating the human body, anxiety emerges as a response to the unknown. At the same time, stress is a mechanism preparing an athlete's body for a meeting with a tough or dangerous situation. President of the Spanish Society for the Study of Anxiety and Stress (SEAS), Doctor Antonio Vindel thinks that stress is something we feel when we have to solve a problem, and anxiety emerges when we expect a negative result (Ayuso-Moreno et al., 2020). Mental tension before a contest accompanied by anxiety and stress is a combination of athletes' psycho-physiological nature and mental state. It is partly accompanied by a decrease in concentration, a reduction in activeness and an increased heart rate. A high heart rate is a usual phenomenon for junior sports, and it is called tachycardia. Tachycardia is mainly caused by sudden worries and fears, imaginary scenarios of events, which did not happen and remained in an athlete's imagination. Anxiety is easily identified

Corresponding Author: IHOR POPOVYCH, E-mail: ihorpopovych999@gmail.com

by participants of a competition process in juniors' performances. We think that juniors should not struggle with anxiety, they should permanently examine this characteristic and learn how to manage it since it has distinct individual nature.

Competitive activity is accompanied by a considerable number of stressors which can be divided into internal and external ones. The most widespread stressors include: tasks for a sports season assigned to a team or an individual athlete, team placing, qualification for tournaments, tactical and physical training, successful or unsuccessful experience of previous competitions, traumas and rehabilitation. All these are stressors, and factors and sources of anxiety at the same time. Sports competitions are a stressful event which changes a reaction of the cardiovascular system. It was examined immediately before competitions and shown on the sample of professional mini-football players U-20 (Paludo et al., 2022). A pre-competition attitude, the ability to achieve an optimal state of competitive activity are those successful technologies which are elucidated in the studies of many researchers, namely by I. Popovych et al. (2021e; 2021d), T. Shcherbak et al. (2023).

Researcher L. Wang (2023) found how self-reflection and stability affect pre-competition anxiety (PCA). It was established that interpersonal support and self-control can prevent pre-competition anxiety. The research of A. Kumar (2017) elucidated methods and techniques for coping with pre-competition anxiety by athletes, trainers and managers. The study showed the impact of anxiety on competitiveness and revealed emotional aspects. It was found that pre-competition anxiety is identified through fear, perplexity, excessive sweating, tremor, heavy breathing, giddiness and a high heart rate. Expanding knowledge about fear and anxiety, mastering techniques of self-regulation, meditations, visualizations, body relaxation, goal-setting, improving self-confidence, distraction and concentration will contribute to the formation of competence which is necessary for dealing with pre-competition anxiety. Researchers Díaz-Tendero et al. (2020), having performed relevant psychometric procedures, proposed the test "Test of psychological state" (ТПС), which should be used for measuring actual pre-competition parameters. Another empirical research involving handball players (Mesquita do Nascimento et al., 2023) established a correlation of the variables of competition duration, age and gender with competition anxiety. It was found that handball players' confidence increased as they grew older. No differences were identified by gender. It was registered that competition duration can affect content parameters of somatic anxiety and, consequently, self-confidence. Dominant mental states, as shown in a number of experimental studies, play an important role in competitive (Popovych et al., 2019a; Prokhorenko et al., 2023), training (Popovych et al., 2023b), educational-professional (Hrys et al., 2024; Kobets et al., 2021; Popovych et al., 2019a; 2022b; Popovych & Blynova, 2019; Zavatska et al., 2023), rehabilitative (Popovych et al., 2021c), leisure (Popovych et al., 2019c), extreme (Mamenko et al., 2022; Nosov et al., 2020a; 2020b; 2022; Solovey et al., 2020) and health-saving activities (Popovych et al., 2022c; 2022e). It was established that pre-competition profiles play an important role in athletes' attitude towards a sports competition (Popovych et al., 2022d; 2023a). As shown in a number of modern studies on human activities, in particular those related to sports (Zinchenko et al., 2020; 2021; 2022; 2023), implementation of automatic and half-automatic systems contributes to the development of this field and has an effect on athletes' professional growth. It was found that the correlation of cognitive, emotional and conative components of psychological safety with the parameters of expectations is the most important one. Obviously, psychological safety is a systemic factor related to a number of important parameters of competitive activity. There are studies whose results experimentally confirmed that educational space safety has a direct correlation with motivation, efficiency and corporate culture (Blynova et al., 2022b; Kalenchuk et al., 2023; Zhuravlova et al., 2023).

The research involving a women's handball team established expectations of a victory result I. Popovych et al. (2020a). It was found and substantiated that emotional states affect pre-competition expectations. In particular, "joy" affects awareness of expected events, and "interest" correlates with expected attitude towards participants of a competition process. Y. Hanin and C. Spielberger (1983) think that each athlete possesses "zone of optimal functioning" of the psyche. Efficacy of such an athlete will be optimal when the level of excitation is within this zone. We can assume that junior athletes who are excessively anxious before competitions, head for search and stabilization of their zone of optimal functioning of the psyche. We also considered a number of studies identifying the specificity of mental states of anxiety. The research team of L. Li et al. (2021) studied pre-competition anxiety with the methods of Chinese medicine. The researcher drew a conclusion that the quality of athletes' anxiety depends on the level of their mastery and ability to demonstrate this mastery in competitions. Appropriately formed mental states are a necessary condition for athletes' achieving better results. The results of comparative analysis of pre-competition anxiety of disabled wheelchair athletes (Peron & Elsner, 2020) are of special scientific interest. It was proven that pre-competition anxiety has a negative impact on the performance of teams and individual athletes. Comparison of anxiety indices by gender did not show statistically significant differences. However, it was found that safety and confidence indices by the final goal had an advantage in the male sample.

Pre-competition types of junior athletes' anxiety are psychophysiological states related to awaiting a competition which are accompanied by high psycho-emotional stress, require development of athletes' self-regulation, stress-resistance and resilience, and depend on their individual-typological qualities, experience and mastery.

Hypothesis. 1) Types of pre-competition anxiety will depend on the levels of the formedness of personal and situational anxiety; 2) High levels of the researched content parameters will have a dominant impact on the types of pre-competition anxiety; 3) The types of pre-competition anxiety of juniors representing team and individual sports will not have statistically significant differences.

Aim. To study the types of junior athletes' pre-competition anxiety diagnosed before official sports competitions.

Methods

Methodology. The methodological fundamentals of our research involve the concept of organic nature of anxiety and locomotor behavior of the individual by C. Spielberger (1972), the theory of anxiety as an important characteristic of the individual (Taylor, 1953), the concept of stress by H. Selye (1976), which prepares an athlete's body for competition trials, the study on "zone of optimal functioning" of an athlete's psyche as a factor of managing mental states by Y. Hanin (2001), anthropometric and psychophysiological characteristics and relationship with anxiety in sporting activities (Cretu et al., 2021; Ferraz et al., 2011; Kozina et al., 2019; Marques et al., 2011). The development of the research methodology for examining pre-competition types of anxiety was based on the applied studies elucidating medical (Avramchuk et al., 2023), psychophysiological and psychological nature (Aleksina et al., 2024; Kuzikova et al., 2023; Stelmashchuk et al., 2023) of the phenomenon of anxiety.

Organization of Research. A summative algorithm with elements of comparison and clustering was used in the research. Empirical data were collected from randomly selected junior athletes who systematically train and associate their future with professional sporting activities. We purposefully added teams of junior athletes representing fire-fighting sport to the sample of junior athletes representing team sports such as football and handball. We argue that anxiety in the representatives of this kind of sport is actualized by natural fear for their lives and the lives of those they rescue when performing educational and professional activities. The sample of representatives of individual sports involved junior athletes representing contact sports where anxiety before a contest can be actualized by natural danger posed by a future physical contact. Empirical data were collected by means of standard questionnaire forms through Google forms in September – November, 2023. The research was approved by administrations of sports teams, coaching staffs and administrations of schools for children and youth and the higher education institution Lviv State University of Life Safety (Lviv, Ukraine), where junior athletes take academic and training courses in fire-fighting sports. Participation in the research was voluntary and confidential. The research data concerned one of the work packages of the grant program BURN Erasmus+ Ukraine.

Participants. The research participants were junior athletes aged 15–18 years (M = 17.25; Me = 17.00; SD = 2.96) who systematically train and represent football and handball sports clubs and take academic and training courses in sports schools for children and youth or take professional courses in fire-fighting sport at the university. Team sports are represented by football, handball and fire-fighting sport. Individual sports are represented by freestyle wrestling, boxing, track and field, weightlifting and artistic gymnastics. The research involved an equal number of male juniors (n = 160; 50.00%) and female juniors (n = 160; 50.00%), numbering n = 320 juniors. There was parity in the number of representatives of team sports and individual sports.

Procedures and instruments. We applied valid and reliable psycho-diagnostic tools adapted on the Ukrainian sample and numerously tested on the sports sample. When selecting methods for diagnosing anxiety, we preferred those which relevantly reflect the nature of this complex phenomenon. The identical scales were used only for self-verification. Questionnaire "State-trait anxiety inventory" (STAI, version Y) (Spielberger, 1971), namely, its later adapted version by Y. (Hanin, 2001) was used to establish two important parameters: situational reactive anxiety (SRA) and personal anxiety (PA). This questionnaire is a commonly used tool by Y. Hanin (2001) for diagnosing anxiety in sporting activities. A unipolar semantic differentiated scale with the range of responses from 1 – "no, absolutely wrong" to 4 – "yes, absolutely right" was used. The next method is a continuation of the classical method (STAI, version Y) (Spielberger, 1971). This is the method "Integrated anxiety test" (IAT) (Bizyuk et al., 2014). According to this test method, each of the parameters of situational and personal anxiety obtained the following invariants of measurement: the indicator of general anxiety, emotional discomfort, an asthenic component, a phobic component, anxious evaluation of perspective and social protection. Correspondingly, six parameters were obtained by each type of anxiety. The next method "Generalized Anxiety Disorder" (GAD-7) (Spitzer et al., 2006) is a reliable and valid tool which is often used in clinical practice for screening anxious disorders, determining the degree of severity and monitoring the reaction to future treatment. The method allowed identifying four types of anxiety: minimal, mild, moderate and heavy. The method combines seven statements and uses a unipolar semantic differentiated four-point scale: 1 – "never"; 2 – "a few days"; 3 – "more than half the time"; 4 – "almost every day". For diagnosing actual mental states of depression and anxiety, the self-esteem scale "The Hospital Anxiety and Depression Scale" (HADS) (Zigmond & Snaith, 1983) was used. This method is also commonly used in clinical practice. It is an efficient method for measuring the degree of severity of psycho-emotional disorder. The method has two scales: anxiety (A) and depression (D). The self-esteem scale "HADS" (Zigmond & Snaith, 1983) positively proved itself in sports and rehabilitative

practice. Cronbach's coefficient of homogeneity (α) was .856 by the method "STAI, version Y" (Spielberger, 1971); it being at a satisfactory level (.726) by "IAT" (Bizyuk et al., 2014); at a high level (.923) – by "GAD-7" (Spitzer et al., 2006) and also at a high level (.905) – by "HADS" (Zigmond & Snaith, 1983).

Statistical Analysis. The empirical data by each respondent's scale in Google forms were processed automatically. Then, the application "MS Excel" was used and statistical processing was performed by the computer program "IBM SPSS Statistics" version 29.0.0.0 (241). The applied statistical parameters and procedures are as follows: Cronbach' coefficient of homogeneity (α); standard descriptive frequency characteristics; Student's t-test – for comparing our empirical data with the data of the identical methods from other studies; *k*-means clustering for distributing into clusters; Fisher's criterion (φ) – for identifying statistical differences of the types in the researched groups. Statistical significance was registered at the levels $p \leq .050$; $p \leq .010$; $p < .001$.

Results

Descriptive frequency characteristics were established by all the scales involved in our research. Tabl. 1 gives the mean (M), the mean squared deviation (SD) and the median (Me) by the methods: "STAI, version Y" (Spielberger, 1971), "IAT" (Bizyuk et al., 2014), "GAD-7" (Spitzer et al., 2006) and "HADS" (Zigmond & Snaith, 1983).

Table 1. Descriptive frequency characteristics of the parameters of pre-competition anxiety (n = 320)

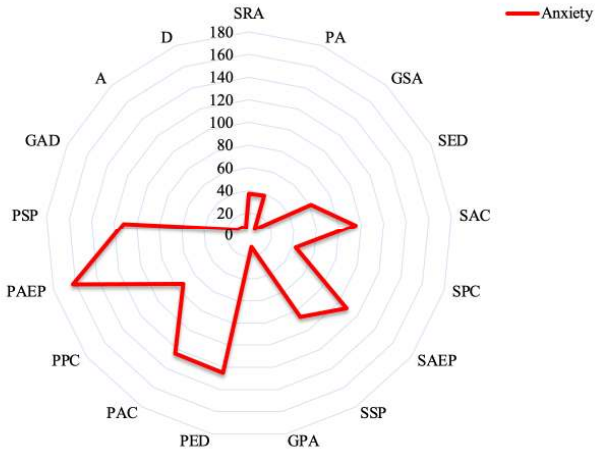
Scale	M	SD	Me
"State-trait anxiety inventory" (Spielberger, 1971)			
Situational Reactive Anxiety (SRA)	37.14	±2.51	37.00
Personal Anxiety (PA)	37.89	±2.78	38.00
"Integrated anxiety test" (Bizyuk et al., 2014)			
General Situational Anxiety (GSA)	7.19	±1.18	7.00
Situational Emotional Discomfort (SED)	61.23	±11.25	61.00
Situational Asthenic Component (SAC)	95.08	±17.37	95.00
Situational Phobic Component (SPC)	43.12	±7.03	43.00
Situational Anxious Evaluation of Perspective (SAEP)	108.67	±18.87	108.50
Situational Social Protection (SSP)	86.44	±16.04	86.50
General Personal Anxiety (GPA)	11.23	±2.02	11.00
Personal Emotional Discomfort (PED)	125.11	±19.78	125.00
Personal Asthenic Component (PAC)	124.56	±19.29	124.50
Personal Phobic Component (PPC)	72.88	±11.91	73.00
Personal Anxious Evaluation of Perspective (PAEP)	162.23	±27.23	162.00
Personal Social Protection (PSP)	111.56	±16.98	111.50
"Generalized Anxiety Disorder" (Spitzer et al., 2006)			
Generalized Anxiety Disorder (GAD)	11.05	±1.95	11.00
"The Hospital Anxiety and Depression Scale" (Zigmond & Snaith, 1983)			
Anxiety (A)	9.23	±1.92	9.00
Depression (D)	7.14	±1.17	7.00

Note: M – mean; SD – mean squared deviation; Me – median.

Then, we performed comparison of the descriptive frequency characteristics of the obtained parameters of anxiety by Student's t-test (*t*) with the average norms and the data of other researchers obtained on similar samples in terms of sports or age components. In scientific literature, there are numerous empirical studies using "STAI, version Y" (Spielberger, 1971). Comparison of the average data did not show statistically significant differences with the sample of athletes representing different kinds of sport (aged M = 21.50) numbering n = 180 athletes of different levels of mastery, whose level of competitive activeness considerably reduced during the ongoing COVID-19 (Popovych et al., 2021c). Comparison of the parameters of anxiety by the differentiated scales of the method "IAT" (Bizyuk et al., 2014) with the average norms proposed by the authors did not show significant differences. Comparison with the empirical data of the sports sample purposefully created for identifying the level of anxiety which numbered n = 123 athletes specializing in martial arts, game, dance sport and cyclic kinds of sport, with qualifications from the second category to international master of sports, also did not show statistically significant differences (Statsenko et al., 2018). Comparison of the parameter "Generalized Anxiety Disorder" with the recommended norms of the method "GAD-7" (Spitzer et al., 2006) showed the levels of mild and moderate pre-competition anxiety of junior athletes. No statistically significant deviations were registered. We also found no statistically significant deviations in the parameters "anxiety" and "depression" identified by the method "HADS" (Zigmond & Snaith, 1983) with the average recommended test norms. We acknowledge that psychometric measurements were taken earlier, therefore there could be fluctuations of anxiety under the current conditions. At the same time, we think that probable fluctuations cannot have a considerable impact on the researched indicators and regularities.

The selected complex of the parameters of anxiety consisting of seventeen parameters combined by four valid and reliable methods relevantly reflected the research subject. Application of each tool was

methodologically substantiated which allowed performing an important function in identifying pre-competition types of anxiety. It seems logical to create a general profile of junior athletes' pre-competition anxiety using the results of the obtained descriptive frequency characteristics (Fig. I) by the mean (M).



Note: SRA – situational reactive anxiety; PA – personal anxiety; GSA – general situational anxiety; SED – situational emotional discomfort; SAC – situational asthenic component; SPC – situational phobic component; SAEP – situational anxious evaluation of perspective; SSP – situational social protection; GPA – general personal anxiety; PED – personal emotional discomfort; PAC – personal asthenic component; PPC – personal phobic component; PAEP – personal anxious evaluation of perspective; PSP – personal social protection; GAD – generalized anxiety disorder; A – anxiety; D – depression.

Figure I. General profile of junior athletes' pre-competition anxiety

The diagram allows visually evaluating the perimeter and area created by seventeen parameters of anxiety. The area testifies to the depth of anxiety, and the contour length indicates the amplitude of fluctuations between anxiety and "zone of optimal functioning" of the psyche by Y. Hanin and C. Spielberger (1983) or "optimal competitive state" by A. Alekseev (2006).

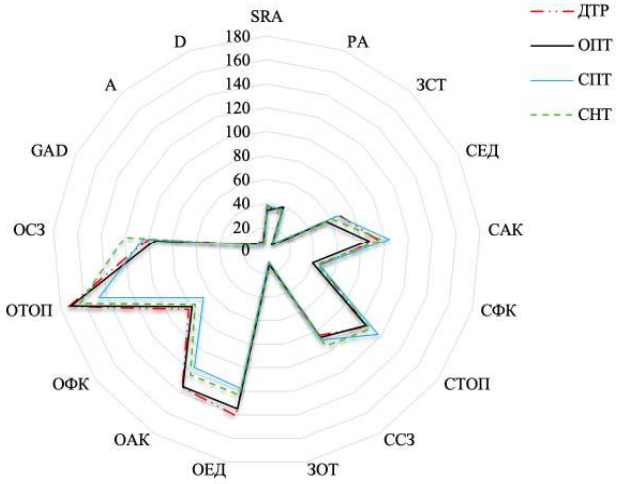
Then, we identified pre-competition types of junior athletes' anxiety by means of *k*-means clustering. We selected in advance an odd number of the researched parameters – seventeen (see Tabl. 1), since, according to *k*-means clustering, one scale is regarded as a main characteristic, and the rest of the scales should make an even number. It is determined by the condition that *k*-means clustering requires an odd number of parameters. The scale "Generalized Anxiety Disorder" of the method "GAD-7" (Spitzer et al., 2006) is regarded as a main characteristic. The rest of the scales are placed analogously to Tabl. 1. Thus, $n = 17$ scales were used in clustering which were distributed into an optimal number of clusters $k = 4$. It was empirically established that four clusters ($k = 4$) are an optimal choice. The least possible number of respondents in a cluster is $n \geq 28$. Statistical criteria of Kaiser–Meyer-Olkin (KMO = .745) and Bartlett ($p < .001$) were found. The obtained statistical parameters testify to validity of applying *k*-means clustering on the selected sample. Tabl. 2 gives the results of clustering the types of junior athletes' pre-competition anxiety.

Table 2. Results of clustering the types of junior athletes' pre-competition anxiety (n = 320)

Parameters of anxiety	**Cluster 1 (n = 42)**		**Cluster 2 (n = 120)**		**Cluster 3 (n = 102)**		**Cluster 4 (n = 56)**	
	a	***b***	**a**	***b***	**a**	***b***	**a**	***b***
GAD	**11.00**	*13.00*	**12.00**	*10.00*	**8.00**	*10.00*	**9.00**	*11.00*
SRA	**38.00**	*39.00*	**33.00**	*35.00*	**37.00**	*40.00*	**40.00**	*35.00*
PA	**30.00**	*35.00*	**38.00**	*41.00*	**36.00**	*38.00*	**35.00**	*37.00*
GSA	**6.00**	*8.00*	**5.00**	*7.00*	**9.00**	*7.00*	**6.00**	*8.00*
SED	**66.00**	*70.00*	**51.00**	*60.00*	**72.00**	*61.00*	**58.00**	*64.00*
SAC	**90.00**	*99.00*	**80.00**	*93.00*	**112.00**	*95.00*	**93.00**	*103.00*
SPC	**44.00**	*49.00*	**38.00**	*42.00*	**50.00**	*43.00*	**41.00**	*47.00*
SAEP	**104.00**	*108.00*	**100.00**	*109.00*	**125.00**	*110.00*	**107.00**	*115.00*
SSP	**82.00**	*86.00*	**76.00**	*96.00*	**85.00**	*92.00*	**102.00**	*87.00*
GPA	**10.00**	*12.00*	**11.00**	*13.00*	**9.00**	*11.00*	**12.00**	*10.00*
PED	**140.00**	*142.00*	**125.00**	*145.00*	**110.00**	*125.00*	**127.00**	*120.00*
PAC	**130.00**	*140.00*	**124.00**	*144.00*	**109.00**	*124.00*	**126.00**	*119.00*
PPC	**81.00**	*84.00*	**73.00**	*85.00*	**60.00**	*73.00*	**78.00**	*73.00*
PAEP	**170.00**	*176.00*	**163.00**	*180.00*	**130.00**	*163.00*	**169.00**	*158.00*
PSP	**95.00**	*105.00*	**90.00**	*98.00*	**99.00**	*109.00*	**110.00**	*130.00*
A	**9.00**	*11.00*	**10.00**	*8.00*	**6.00**	*8.00*	**7.00**	*9.00*
D	**9.00**	*7.00*	**7.00**	*6.00*	**4.00**	*6.00*	**5.00**	*8.00*

Note: *a* – cluster beginning (given **in bold**); b – cluster end (given *in italics*); GAD – generalized anxiety disorder; SRA – situational reactive anxiety; PA – personal anxiety; GSA – general situational anxiety; SED – situational emotional discomfort; SAC – situational asthenic component; SPC – situational phobic component; SAEP – situational anxious evaluation of perspective; SSP – situational social protection; GPA – general personal anxiety; PED – personal emotional discomfort; PAC – personal asthenic component; PPC – personal phobic component; PAEP – personal anxious evaluation of perspective; PSP – personal social protection; A – anxiety; D – depression.

Fig. II presents profiles of the types of junior athletes' pre-competition anxiety created by the mean values of each cluster. The mean values of the measurements are the average of the beginning and the end of the cluster.



Note: SRA – situational reactive anxiety; PA – personal anxiety; GSA – general situational anxiety; SED – situational emotional discomfort; SAC – situational asthenic component; SPC – situational phobic component; SAEP – situational anxious evaluation of perspective; SSP – situational social protection; GPA – general personal anxiety; PED – personal emotional discomfort; PAC – personal asthenic component; PPC – personal phobic component; PAEP – personal anxious evaluation of perspective; PSP – personal social protection; GAD – generalized anxiety disorder; A – anxiety; D – depression.

Figure II. Profiles of the types of pre-competition anxiety created by the mean values of the cluster

It is noteworthy that, since the scale "Generalized Anxiety Disorder" (GAD) is regarded as a main characteristic, one of the clusters will be defined by it and it will have a dominant impact on the entire distribution.

Cluster 1 is the smallest cluster in size (n = 42; 13.13%) which united junior athletes by a number of high values by "destructive" scales. The respondents of this cluster have higher levels by the scales "generalized anxiety disorder" (a = 11.00; *b = 13.00*), "depression" (a = 9.00; *b = 7.00*) and "anxiety" (a = 9.00; *b = 11.00*). Medium and above medium values are also registered by other scales of anxiety. This type of pre-competition anxiety was named "Destructive anxiety disorder" (DAD).

Cluster 2 is the largest cluster in size (n = 120; 37.50%). High levels of the parameters of personal anxiety by the main and differentiated scales are dominant. The following scales have high values: "personal anxiety" (a = 38.00; *b = 41.00*), "general personal anxiety" (a = 11.00; *b = 13.00*), "personal emotional discomfort" (a = 125.00; *b = 145.00*), "personal asthenic component" (a = 124.00; *b = 144.00*), "personal phobic component" (a = 73.00; *b = 85.00*) and "personal anxious evaluation of perspective" (a = 163.00; *b = 180.00*. The list of the scales with high levels with evident personal anxiety allows naming the next type of pre-competition anxiety "Personal pre-competition anxiety" (PPA).

Cluster 3 is the second cluster in size (n = 102; 31.87%) which is logically located after "PPA". The following scales have high values: "situational reactive anxiety" (a = 37.00; *b = 40.00*), "general situational anxiety" (a = 9.00; *b = 7.00*), "situational emotional discomfort" (a = 72.00; *b = 61.00*), "situational asthenic component" (a = 112.00; *b = 95.00*), "situational phobic component" (a = 50.00; *b = 43.00*) and "situational anxious evaluation of perspective" (a = 125.00; *b = 110.00)*. The list of the scales with high levels with evident situational anxiety allows naming this type of pre-competition anxiety "Situational pre-competition anxiety" (SPA).

Cluster 4 numbers (n = 56; 17.50%) and is similar to the first type in size, but it is entirely different from it by content characteristics. This type has high levels of the parameters by two scales: "situational social protection" (a = 73.00; *b = 85.00*) and "personal social protection" (a = 163.00; *b = 180.00*). Since the dominant parameters are related to social protection, correspondingly, this type of pre-competition anxiety was named "Social unprotected anxiety" (SUA).

The profiles created by the mean values of each cluster reflected the average indices by the parameters. We realize that it is not entirely correct, since the amplitude of values of each measurement (the space between the cluster beginning and its end) can considerably vary. Therefore, it is reasonable to create personal profiles of pre-competition anxiety for each athlete and compare them in the course of a training-competition cycle. It is necessary to take at least three measurements per cycle: at the beginning, in the middle and at the end.

Comparison of the identified types of pre-competition anxiety in the representatives of team and individual sports seems to be logical. Tabl. 3 gives empirical results of comparison of the types of pre-competition anxiety in the representatives of team sports (Group 1) and individual sports (Group 2) by means of Fisher's criterion (φ).

Table 3. Empirical results of comparison of the types of pre-competition anxiety in the researched groups (n = 320)

Type	Group 1 (n_1=160)	Group 2 (n_2=160)	Fisher's criterion (φ)	Level of significance
DAD	8.13%	9.38%	0.49	$p \geq .05$
PPA	23.75%	25.62%	0.76	$p \geq .05$
СПТ	49.37%	38.75%	1.89	$p \leq .05$
СНТ	18.75%	26.25%	2.12	$p \leq .05$

Note: DAD – destructive anxiety disorder; PPA – personal pre-competition anxiety; SPA – situational pre-competition anxiety; SUA – social unprotected anxiety.

The results of comparison showed two statistically significant differences. Group 1 (team sports) has an advantage (n = 79; 49.37%) by the type "Situational pre-competition anxiety" (SPA) ($\varphi = 1.89$; $p \leq .05$). In other words, this type is dominant in nearly half of the junior athletes representing team sports. Obviously, unpredictability of a competitive situation is the strongest stressor for these athletes. Group 2 (individual sports) has an advantage (n = 42; 26.25%) by the type "Social unprotected anxiety" (SUA) ($\varphi = 2.12$; $p \leq .05$). A lack of social support and approval which is inherent in individual sports and less characteristic of team sports affects representative of individual sports. As a result, junior athletes permanently seek approval and support that determines the dominance of social defensive behavioral constructs.

Discussion

The obtained empirical results allow stating that anxiety has complex organic nature. An athlete's anxiety has regular relationships with a considerable number of characteristics. It is determined by cognitive, emotional-value and motivational-regulation spheres. Since important processes of personal and psychophysiological development occur in adolescence, as shown in a number of studies (Blynova et al., 2022a; Tsiuniak et al., 2024; Los et al., 2023; Popovych et al., 2021b; 2022a), identification of the types of pre-competition anxiety on junior sports sample can reveal typological taxonomies and establish important scientific combinations. It is noteworthy that typology depends on a list of criteria involved in research and their placement – from the main characteristic to a sequential list of the others. The proposed complex of psycho-diagnostic parameters (see Tabl. 1) consisting of seventeen measurements efficiently combined the main scales (the method STAI, version Y" (Spielberger, 1971) and the scale of deep differentiation of the phenomenon of anxiety (the method "IAT" (Bizyuk et al., 2014)). Such an approach to selecting parameters allowed for deep differentiation of the researched phenomenon, thorough examination of the problem of sports anxiety and determination of a social function in a junior athlete's sporting activities (see Tabl. 3). A social function through social pressure, social defensive reactions, social expectations, social support, social desirability and social comparison is an important mental resource in professional development of an adolescent (Kozmenko et al., 2023; Plokhikh et al., 2023; Popovych et al., 2021a; 2023d; Shevchenko et al., 2024). The effect of a social function is observed in socially directed motivational orientation and its impact on the parameters of athletes' emotional intelligence (Popovych et al., 2023c). The obtained statistical advantage of Group 2 (individual sports) over Group 1 (team sports) by the type "Social unprotected anxiety" ($\varphi = 2.12$; $p \leq .05$) is rather a dangerous formation. Since a junior athlete's personality carries substantial physical and psycho-emotional loads, this type can become a plateau of stagnation which can be further transformed into a psychological problem which requires time to solve it. Therefore, protective measures of a training staff in combination with a scientific-analytical department and the work of a team's psychologist have to prevent such regressive occasions. The proposed profiles (see Fig. I and Fig. II) presented as diagrams have a number of significant parameters, one of them being the area created by the connecting points and the contour length. These parameters should be measured by statistical programs and presented together with a diagram. The diagram area is a work resource which outlines functional and self-regulation ability of an athlete, and the contour indicates the amplitude of fluctuations of the parameters of anxiety. Systematical creation and examination of individual profiles of athletes' pre-competition anxiety allow for a better understanding of the nature of an athlete's pre-competition anxiety. We recommend creation of individual profiles rather than team profiles of the general sample profile which were presented for visualization (see Fig. I and Fig. II). Comparison of individual profiles of the types of pre-competition anxiety allows efficiently studying the specificity of athletes' anxiety and making timely corrections. It is noteworthy that it is more convenient to substitute raw scores for T-scores – the data entered into the empirical matrix of a profile

when making a diagram. Correspondingly, only the same-type profiles created either by raw scores or T-scores should be compared.

The comparison showed that the obtained values of the parameters (see Tabl. 1) which are not inferior to the empirical results of other sports samples do not allow revealing the specificity of anxiety and the danger of combining different parameters. Therefore, using clusterization (see Tabl. 2), we aimed to demonstrate the most akin combinations of parameters in the junior sample. When applying cluster analysis, we purposefully regarded the scale "Generalized Anxiety Disorder" as a main characteristic in the research (see Tabl. 2). The reason for this decision was the fact that this scale is actively used in clinical practice and allows identifying anxiety disorders. As shown in studies (Chaikovska et al., 2023; Chebykin et al., 2023; Karpenko et al., 2024; Plokhikh et al., 2024), psycho-emotional states of adolescents are too changeable and continuously develop. In some cases, the data border on normotypical development. Such parameters are kind of accentuations. They should not be considered pathological, since they are determined by age peculiarities, the dynamics and trajectory of the formation of a junior athlete's psycho-emotional sphere. *k*-means clustering allowed grouping a number of measurements related to anxiety disorder around the main characteristic, that resulted in four types of pre-competition anxiety. The first type determined by the main characteristic is "Destructive anxiety disorder". We are convinced that it is the most dangerous type of a respondent's pre-competition anxiety. Such an athlete can be "pulled out of a competition" and fail a team. Moreover, they can harm themselves, damage their physical and mental health. The other two types (see Tabl. 2) – "Personal pre-competition anxiety" and "Situational pre-competition anxiety" have a dual nature. Personal anxiety is dominant in "PPA", whereas situational anxiety is dominant in "SPA". Both types of anxiety should not be considered either positive or negative. They perform important functions in an athlete's sporting activities. It is important how efficiently a junior athlete can utilize their resources. It is quite normal for "PPA" (n = 120; 37.50%) to be possessed by more than a third of respondents. We predict that "SPA" may dominate in athletes if they improve their mastery. Discrete components will be studied in terms of age and professional development, whereas situational factors such as changed conditions of competitive activity, new rules and other innovations will remain permanent external stressors. A rival who is the main source of anxiety for subjects of sporting activities should also be taken into consideration.

Conclusions

It was substantiated that the types of junior athletes' pre-competition anxiety are considered to be psychophysiological states related to awaiting a sports competition, accompanied by high psycho-emotional stress, requiring the development of athletes' self-regulation, stress-resistance and resilience, and depending on their individual-typological characteristics, experience and mastery. The selected complex of valid and reliable methods allowed determining seventeen parameters which relevantly reflected junior athletes' pre-competition anxiety. The obtained descriptive frequency characteristics were used to create a general profile of junior athletes' pre-competition anxiety. *k*-means clustering allowed identifying four types of the respondents' pre-competition anxiety: "Destructive anxiety disorder" (DAD) (n = 42; 13.13%); "Personal pre-competition anxiety" (PPA) (n = 120; 37.50%); "Situational pre-competition anxiety" (SPA) (n = 102; 31.87%); "Social unprotected anxiety" (SUA) (n = 56; 17.50%). It was established that "Destructive anxiety disorder" is the most dangerous type of pre-competition anxiety. It was explained that an athlete with this type of anxiety can be pulled out of a competition and even damage their physical and mental health. It was found that the type "Social unprotected anxiety" is also rather dangerous, since a junior athlete carries considerable physical and psycho-emotional loads. It was explained that this type can become a plateau of stagnation and be transformed into a psychological problem later. It was elucidated that dominant anxiety underlies the other two types – "Personal pre-competition anxiety" and "Situational pre-competition anxiety": personal anxiety underlies "PPA" and situational anxiety underlies "SPAT". It was stated that both types of anxiety perform important functions in an athlete's sporting activities. It is important how efficiently a junior athlete can utilize their resources. The first and the second hypotheses were confirmed, since the types of pre-competition anxiety depend on the levels of the formedness of personal and situational anxiety, and high levels of the researched content parameters have a dominant impact on the types of pre-competition anxiety. The types of pre-competition anxiety of the junior athletes representing team sports (Group 1) and individual sports (Group 2) were compared by means of Fisher's criterion (φ). Two statistically significant advantages were established: Group 1 (n = 79; 49.37%) has an advantage by "SPA" (φ = 1.89; $p \leq .05$); Group 2 (n = 42; 26.25%) has an advantage by "SUA" (φ = 2.12; $p \leq .05$). The third hypothesis was disproven. We recommend that the obtained results should be implemented in sports theory and practice. We emphasize that creation of individual profiles will allow thoroughly examining the specificity of athletes' anxiety and making timely corrections to educational-training process.

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