

# Mental skills in combat sports – review of methods anxiety evaluation

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## Abstract

According to the accurate recognition of John Harasymowicz “fighting reveals different features of human nature, such as anxiety, aggression, vanity, pride, abilities, physical disposition, and knowledge as well as interdependence between these features”. In this article particular attention was paid to the phenomenon of anxiety, which arises in different circumstances and almost always has an impact on physical, mental and behavioral health of people, especially athletes. The consequences of its influence are still unknown. Understanding the way how emotions influence the course of sports rivalry is a key element for controlling weaknesses, particularly during a fight. Therefore, the aim of this study was to review the scientific literature concerning the anxiety phenomenon in combat sports, with particular emphasis on the most commonly used research tools in the psychological analysis of anxiety among combat sports athletes, including the different varieties of this phenomenon.

For a detailed analysis were selected the current English and Polish-language original papers and reviews. They were retrieved mainly from electronic literature databases (Medline, PubMed, EBSCO) and from the available library resources. Analysis also taking into account comparisons between the intensity of anxiety according to different types of sports, gender, age, level of education, sports experience, number of injuries, as well as the difference between winners and losers. It also presents basic information about the impact of a coach, training methods and about selected relaxation techniques. On the other hand, it is shown that combat sports and martial arts can be regarded as a form of relaxation.

**Key words:** anxiety disorders • cognitive function • concentration • emotional intelligence • emotional reactivity • martial arts • psychological training • self-esteem • state of anxiety

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**Anxiety** – an emotion, subjectively unpleasant feeling of dread over anticipated events characterized by an unpleasant state of inner turmoil, often accompanied by nervous behavior [46].

**Combat sports** – competitive contact sports where two combatants fight against each other using certain rules of engagement [47].

**Combat sport** – *noun* a sport in which one person fights another, e.g. wrestling, boxing and the martial arts [48].

**Martial arts** – *plural noun* any of various systems of combat and self-defence, e.g. judo or karate, developed especially in Japan and Korea and now usually practised as a sport [48].

**Sports psychology** – *noun* the scientific study of the mental state of sportspeople, looking at issues such as motivation, concentration, stress and self-confidence [48].

## INTRODUCTION

Emotions are an essential component of sports activity, mainly due to the fact that they determine arousal during competition. Competition in sports requires maximum effort from an athlete, often accompanied by mental stress and great physical tiredness. This process is composed of a series of directed and organized activities, mainly dependent on cognitive functioning [1-3].

A particular importance of this aspect is revealed in combat sports, in which an effective attack on an opponent's body is the main assumption. It is connected with a direct physical contact with an opponent and implemented in accordance with strict rules (depending on the discipline). Fight against the opponent is often accompanied by the risk of pain and injury, which can cause psychological discomfort of competitors. That kind of sports competitions requires extensive mental strength, rapid and tactically correct reactions in changeable simulative situations, as well as precision and imagination [2].

According to the accurate recognition of John Harasymowicz "fighting reveals different traits of human nature, such as anxiety, aggression, vanity, pride, abilities, physical dispositions, knowledge and the interdependence between these factors" [4]. On the one hand, they are connected with a marked improvement in the performed activities; on the other hand, their occurrence can cause a significant deterioration in the level of performance and disorganization of undertaken actions [4-6].

Particular attention is paid to the phenomenon of anxiety. It arises in different circumstances and always has an impact on physical, mental and behavioral health of people, especially athletes. The consequences of its influence are an open secret [1, 3]. It is emphasized that such an emotional state is particularly important in combat sports due to the fact that a persistent fear of failure paralyzes a competitor and reduces his ability to correct and take intelligent action [4, 6].

The current state of knowledge causes problems related to pre-competitive stress, emotions and personality traits of athletes which are often undertaken and widely discussed in research projects regarding combat sports [1, 2, 5, 7]. The multifactor analysis primarily regards the phenomenon of anxiety in relation to the level of

sports achievements [1, 8-10]. Numerous research projects are conducted in this area. They include psychological analysis with standardized research questionnaires [2, 11-13] as well as evaluation of physiological indicators [14-19] – particularly in relation to hormonal balance [16, 18-21], which reflects the level of stress and anxiety in various situations.

Understanding how emotions influence the course of sports rivalry is a key element for controlling weaknesses, especially during the fight. Therefore, the aim of this study was to review the scientific literature concerning anxiety in combat sports, with particular emphasis on the most commonly used research tools in the psychological analysis of anxiety among combat sports athletes, including the different varieties of this phenomenon.

The articles selected for the study are the current English and Polish language original papers and reviews. They were retrieved mainly from electronic literature databases (Medline, PubMed, EBSCO) and from the available library resources.

## PSYCHOLOGICAL EVALUATION AND SIGNIFICANCE OF ANXIETY IN COMBAT SPORTS

Anxiety is understood as a disturbed and unpleasant state of mind, accompanied by nervousness, anxiety, emotional reactivity, agitation [3, 12] as well as increased skeletal muscle tone, heart rate, respiration rate and unpleasant vegetative reactions [1, 2, 9, 22]. It is an essential component of each rivalry, but its level must be adequate to produce best results. It affects both psychological and physiological determinants of sports performance [3, 9].

Fighting is usually accompanied by a significant increase in general excitation that continuously stimulates the nervous system and leads to increased tension and anxiety levels. During the competition dispersion of increasing emotions is difficult and sometimes impossible. It leads to a decrease in the player's ability to a suitable evaluation and situation monitoring. The consequences may be inadequate and they may sometimes slow down a response to emergent situations and in extreme cases can cause a loss of control over the body and mind [3, 23]. Frequently, it results from a fear of injury or shame of possible failure or loss of prestige [1].

The relationship between anxiety and performance in sports is differently perceived by researchers in the field of sport psychology. Opinions on this issue are varied and the phenomenon of anxiety is defined in different ways.

On the one hand, people experiencing chronic anxiety are often accompanied by the characteristic feeling of constant tiredness, irritability, worrying, loss of courage, compulsiveness of thoughts and reactions. The persistently high level of anxiety depreciates the experience of pleasant feelings, contributes to the weakening of the body defensive forces and decreases self-esteem. It results in underutilization of human potential, which is disadvantageous to proper functioning. This suggests that the level of anxiety of successful athletes should not be too high, because it is not conducive to efficient functioning of combat sports practitioners [2].

On the other hand, there is a widespread belief that anxiety is one of the determinants responsible for success in sport. Researchers argue that experienced athletes, who have a corresponding level of self-orientation and self-control, are able to turn it into so-called sports anger. Appropriate selection of athletes and psychological training allows them to transform negative emotions into positive ones and thus to maintain a high activity of the nervous system and to increase self-confidence, performance and the probability of success [1, 2].

A lack of clear explanation of the meaning of anxiety in sport is the cause of searching for ways to explore this mystery. For this purpose researchers use a variety of tools to assess the anxiety level in athletes of different sports, including combat sports [24]. The frequency of this type of research is causally related to the fact that sports environment can be described as highly stressful in nature as well as to the accessibility and openness of athletes. Moreover, sports competition is considered to be an ideal situation to study the antecedents, dynamics and consequences of anxiety [24].

The experiences of athletes practicing combat sports can be empirically examined using appropriately constructed questionnaires and research tools, which enable an analysis of various anxiety types [1, 5, 11, 25, 26]. A summary of the most widely used testing questionnaires and measured

variables is shown in Table 1. Multilevel analyzes often include comparisons between different types of both team and individual sports [27, 28]. Widely discussed is the impact of gender [1, 23, 28, 29], age [1, 12], the level of education [1], sports experience [2, 8, 12], number of injuries [12] as well as dependence on the competition result (winner/loser) [2, 8, 9, 27, 30]. A summary of the evaluated relationships with regard to the type of combat sport as well as selected results are shown in Table 2.

## GENERAL ANXIETY

General anxiety is defined as relatively constant readiness to experience unjustified negative emotional states. These kinds of experiences often disturb natural reactions of individuals and determine inadequate responses to stimuli [2]. A normal anxiety level occurs when people react adequately to the situation, but after adaptation anxiety disappears. However, in anxiety disorders a disproportionately high intensity compared to the situation is observed, which interferes with an individual's ability to perform usual activities [12].

General anxiety is relatively rarely measured in combat sport athletes, but some researchers emphasize its importance for sports competition [2, 12, 31, 32].

Marks et al. [2] assessed general anxiety in a group of experienced competitors professionally practicing kickboxing and presenting a high level of sports competence. The results showed that most of them have a low level of anxiety, and a small percentage (12%) have an average level. It confirms the classic theory on the negative role of anxiety in sports, because in successful athletes the level of this trait proved to be low in comparison to the representatives in the general population. The observed relationship probably results from competitors' experience and from the impact of adequate preparation, being a result of long-term self-control and self-awareness training [2].

The team of other scientists assessed the same characteristics on a group of athletes practicing kickboxing, karate and boxing. Averaged results showed that competitors have a mild anxiety level. A detailed analysis showed differentiation dependent on the type of practiced combat sport. The highest average level of anxiety was noticed in

**Table 1.** Questionnaires used (+) for the evaluation of anxiety and emotional states in athletes practicing combat sports and their application in selected original articles.

Instruments	Measured variables	Author(s) [references]																	
		Marks at al [2]	Tiric-Campara at al [12]	Aksutin at al [31]	Korobeynikov at al [32]	Lambu [13]	Cerin at al [34]	Han at al [27]	Obmiński at al [29]	Kolayis at al [1]	Chapman at al [9]	Arous at al [28]	Kabir at al [23]	Terry at al [8]	Boguszewski at al [35]	Smith at al [24]	Filaire at al [10]	Gutiérrez-García at al [30]	Parmigiani at al [21]
Taylor Manifest Anxiety Scale (TMAS)	general anxiety	+																	
Beck's Anxiety Inventory (BAI)	general anxiety		+																
Lucher's Color Personality Test	among others: anxiety, workability, tiredness			+	+														
Sport Anxiety Scale (SAS)	somatic anxiety, cognitive anxiety (two classes: worry and concentration disruption)														+				
Sport Competition Anxiety Test (SCAT)	competitive trait anxiety						+												
State-Trait Anxiety Inventory (STAI)	trait anxiety, state anxiety							+	+	+				+		+	+	+	+
Competitive State Anxiety Inventory - 2 (CSAI-2)	cognitive anxiety, somatic anxiety, self-confidence									+	+	+	+	+	+				
Endler Multidimensional Anxiety Scales (EMAS)	anxiety as a perception anxiety as a state					+													
Zuckerman-Kuhlman Personality Questionnaire (ZPKQ)	among others: neurocriticism-anxiety					+													
Cooper Smith Self-esteem Inventory	self-esteem									+									
Profile of Mood States	tension, depression, anger, vigor, fatigue, confusion												+						
Scale of Emotional Intelligence	emotional intelligence	+																	
Temperamental and Character Inventory (TCI)	among others: self-directedness, cooperativeness, self-transcendence																		+
16 Personality-Factors (16 PF-C)	among others: emotional arousal and stability, insecurity, self-confidence																		+
Visual Analog Scale (VAS)	perceived stress (PS)								+										

**Table 2.** Anxiety evaluation methods and anxiety types, results and findings in combat sports.

Author(s) [references]	Anxiety evaluation	Evaluated anxiety type	Sample size/ gender	Age (mean years $\pm$ or min $\div$ max)	Combat sport (n)	Results/Findings
Marks et al [2]	Taylor Manifest Anxiety Scale	general anxiety	male (n = 25)	25 (20-31)	kickboxing (n = 25)	significantly lower level of general anxiety than the average in the population
Tiric-Campara et al [12]	Beck's Anxiety Inventory (BAI)	general anxiety	male (n = 45) 10 female (n = 10)	20.2 $\pm$ 8	kickboxing (n = 18) karate (n = 22) boxing (n = 15)	no connection between the level of anxiety and age and duration of sports experience; positive correlation between levels of anxiety and the number of injuries
Aksutin et al [31]	8-color variant of Luchter's test in modification of L. Sobchuk	among others: anxiety, workability, tiredness	male (n = 22)	18 $\div$ 23	boxing (n = 22)	attacking style of boxing is accompanied by a higher level of workability, lower tiredness, anxiety and dependence on vegetative functions' state rather than on the defensive attacking style
Korobeynikov et al [32]			male (n = 28)		boxing (n = 28)	attacking combat style of strongmen is characterized by high workability, reduced tiredness, anxiety and presence of psychological comfort
Lambu [13]	Endler Multidimensional Anxiety Scales	anxiety as a perception anxiety as a state	teenagers boys (n = 5) girls (n = 5)		karate (n = 9)	athlete does not perceive himself as being in physical danger in his daily life, probably because he/she practices karate for more than 10 years, and this has led to its perception as a daily routine; state anxiety was slightly below general population
	Zuckerman-Kuhlman Personality Questionnaire (ZPKQ)	among others: neurocriticism-anxiety				subjects had scores within the population mean athletes obtained the score under the population mean
Cerin et al [34]	Sport Competition Anxiety Test (SCAT)	competitive trait anxiety	male (n = 44)	26.77 $\pm$ 2.99	tae kwondo (n = 22) karate (n = 22)	higher levels of trait anxiety in athletes were reported with higher levels of pre-competition fear, shyness, self-hostility and shame for competition-related than for competition-extraneous concerns
Han et al [27]	State-Trait Anxiety Inventory (STAI)	trait anxiety, state anxiety	athletes (n = 227) non athletes (n = 152)	17.36 $\pm$ 2.99	among others: tae kwondo (n = 28), Korean wrestling (n = 20), judo (n = 47)	trait and state anxieties of the 'winner' group were lower than those of the 'no winner group'; both had higher values in athletes than in non-athletes; taekwondo fighters had the highest level of state anxiety in a group of combat and non-combat sports;
Obmiński et al [29]	STAI	state anxiety	male (n = 33) female (n = 33)	19 $\div$ 28	judo	significant mean fluctuations of state anxiety in both sexes were shown during the anticipatory period; morning values of state anxiety were slightly higher in females;
	Visual Analog Scale (VAS)	perceived stress (PS)				female judokas demonstrated significantly higher overall PS than their male peers; VAS can be an alternative to time-consuming questionnaires
Kolayis et al [1]	STAI	state anxiety	male (n = 82) female (n = 44)	20.53 $\pm$ 2.93	judo	insignificant difference between males and females according to state anxiety, cognitive anxiety, somatic anxiety, self-confidence and self-esteem; self-esteem and anxiety points did not significantly differ according to gender; educational level significantly correlated with competition ranking and state-anxiety; there was a negative significant correlation between self-confidence and all types of measured anxiety; no significant difference was found between STAI and CSAI-2
	Competitive State Anxiety Inventory - 2 (CSAI-2)	cognitive anxiety, somatic anxiety, self confidence				
	Cooper Smith Self-esteem Inventory	self-esteem				

Author(s) [references]	Anxiety evaluation	Evaluated anxiety type	Sample size/ gender	Age (mean years ± or min ÷ max)	Combat sport (n)	Results/Findings
Chapman et al [9]	CSAI-2	cognitive anxiety, somatic anxiety, self confidence	male (n = 142)	18÷32 <b>21.23</b> ±2.72	tae kwon do	winners showed higher self-confidence scores and lower cognitive anxiety and somatic anxiety scores than losers
Arous et al [28]	CSAI-2	cognitive anxiety, somatic anxiety, self confidence	male (n = 160) female (n = 160)	<b>19.37</b> ±1.26	among others: karate	combat sports practitioners express more cognitive anxiety than individual sports other than fighting; karate practitioners had a lower level of anxiety than team sports practitioners (e.g. football, handball and basketball); cognitive anxiety is negatively correlated with global self-esteem and physical self-esteem; practitioners of individual sports are characterized by a high level of self-esteem and low anxiety; males express more somatic anxiety and self-esteem than females females exhibit more cognitive anxiety than males
Kabir et al [23]	CSAI-2	cognitive anxiety, somatic anxiety, self confidence	male (n = 12) female (n = 13)		wrestling (n = 25)	insignificant difference between elite male and female wrestlers
Terry et al [8]	CSAI-2  Profile of Mood States (PMS)	cognitive anxiety, somatic anxiety, self confidence  tension, depression, anger, vigor, fatigue, confusion	male (n = 208)	brown belt <b>22</b> ±12.9 black belt <b>28.7</b> ±14.3	shotokan karate: brown belt (n = 104) black belt (n = 104)	anxiety scores alone allowed for correct estimation of 79% winners and losers, while the PMS questionnaire demonstrated almost 92% accuracy; simultaneous use of both questionnaires enabled the estimation of 93.5% competition results; winning competitors scored significantly higher than losing competitors on the Anger Subscale of the PMS

kickboxers (moderate anxiety), followed by karate fighters (mild anxiety), with the lowest one in boxers (minimum anxiety). Also a positive correlation between levels of anxiety and the number of injuries suffered in the past was shown along with no association between the level of anxiety and the age and the duration of sports experience [12].

In this field a multilevel analysis of elite boxers' psycho-physiological status was conducted, including workability, tiredness, anxiety and the vegetative coefficient. The observed psychological characteristics of athletes were compared to their preferred fighting style. The results clearly suggest that an attacking style of fighting in elite boxers is connected with a high level of efficiency, which is associated with reduced anxiety and tiredness, as well as the presence of psychological comfort, which depends on the condition of vegetative functions. In turn, individuals who exhibit a higher level of anxiety preferred a defensive style of fighting, which is characterized by quickness and better processing of information. However, it is accompanied by worse efficiency and effectiveness [31, 32].

### STATE AND TRAIT ANXIETY

Anxiety as a state is understood as a temporary condition, which is a response to a specific situation generally perceived as a threat. The scheme of reacting follows in a similar manner regardless of the strength and the type of the causative stimulus. With the end of a stressful situation, the state of anxiety also disappears. Therefore, the state of anxiety occurs along with typical changes in physiological variables. It is suggested that it may be caused by the autonomic nervous system [1, 11, 23, 25, 26, 33].

Trait anxiety is also associated with a response to a potential threat and with inwardly experienced conflicts. It differs from state anxiety in the intensity, duration and type of generating situations. Among temperamental features associated with trait anxiety, among others, shyness and a tendency to make difficult tasks and high aspirations should be mentioned. A high level of trait anxiety will cause the situation to seem to be more difficult than it actually is, which in turn greatly reduces the possibility of full utilization of one's own capabilities [11, 25, 26, 33].

State and trait anxiety evaluation is very popular in research projects concerning combat sports [1, 9, 23, 27, 34]. Available results provide valuable information about the conditions and the course of competition. Among others, it was proven that experienced karate teenagers demonstrate state anxiety at a level slightly below the general population [13]. In turn, high school athletes practicing various sports, including martial arts (taekwondo, Korean wrestling and judo), demonstrate a higher level of trait and state anxiety than non-athletes and the greatest level in all compared groups showed by tae kwon do competitors. In the same experimental group it was also observed that trait and state anxieties measured in a group of successful athletes were lower than among athletes suffering defeat [27].

Additionally, some research projects take into account other relations that may affect the level of trait anxiety among fighters. Among others, the impacts of the educational level on anxiety disorders were analyzed. It turned out that judokas' level of education is significantly correlated with results of the competition and state anxiety, which might suggest that a larger number of well-educated athletes will probably increase competition rankings. The above may stem from the fact that a higher level of education might positively affect athletes' cognitive processes, which may result in achieving better results due to decision making, risk-taking, evaluating the situation and acting properly, evaluating the game, etc. [1].

Gender-sensitive analysis of state anxiety proved that this phenomenon was not significantly different between Turkish male and female judokas [1]. Similar correctness was also demonstrated in a group of Polish judokas, in which women were characterized by only slightly higher values of this phenomenon than men. However, differentiation considering sex came forward in the sphere of precompetitive stress, which was much stronger in women. Therefore, emotions associated with participation in the competition among them are more likely to have a negative and unpleasant undertone. The level of perceived stress was well correlated with state anxiety and was significantly higher for women than for men [29].

Analyzing the stress phenomenon in athletes, it is worth remembering that preparation is often more than just long hours of heavy trainings. It is also noted that the distribution of contestants

according to weight categories makes a significant number of them reduce their body mass before the competition. It is appraised that in the groups of kickboxers and judokas, nearly 48% of them reduce their body mass approximately 10 days before each competition. It concerns both women and men. The applied methods of the body mass reduction can negatively affect the competitors' psychological vulnerability. Most of them suffer as a result of aggressive weight loss. The main symptoms include malaise, loss of strength and endurance as well as headaches. Women additionally report menstrual cycle disorders, hair loss, decreased libido and aggressive behavior. The described symptoms among the competitors reducing their body mass are associated with a significantly increased level of state and trait anxiety before the start in competition. This should be taken into account while preparing athletes to rivalry [35].

Cerin et al. [34] also searched for predictors reflecting the pre- and post-competition affective states. They demonstrated that competitive trait anxiety in men practicing taekwondo and karate at the national or international level is a key element influencing the relationship between cognitive appraisal and affective states. The study clearly confirmed the theory that cognitive assessment, situational factors and personality have a major interactive effect on athletes, both before and after the competition [34].

Special attention was also paid to the phenomenon of neuroticism-anxiety, which describes annoyances, emotional tensions, worries, constant indecisions, lack of self-confidence and sensibility. The level of this factor was responsible for contestants' increased sadness before competition, which has been consistently related to impaired performance [13, 34]. It was suggested that the few individuals who obtained the score ranked under the population mean are characterized by mastery and are self-controlled people who do not worry about unimportant things [13].

Moreover, it was observed that competitive trait anxiety is associated with increased competition-related shame and shyness, which causes submissive and avoidance behavior as well as self-focused attention. Such a condition directly contributes to the negative impact on results, particularly in combat sports. In addition, it was indicated that high levels of competitive trait

anxiety can contribute to a dysfunctional adaptation to competition, especially if the results were weak [34].

#### **MULTIDIMENSIONAL THEORY OF PRE-COMPETITION ANXIETY**

Pre-competition anxiety is most often explained by Martens' *Multidimensional Anxiety Theory*, which argues that anxiety consists of a cognitive and somatic components [11, 25, 26].

Somatic anxiety increases until it reaches the optimal level at the beginning of the competition and then rapidly decreases. It also informs us about annoying physiological responses of the body (the heart rate, shortness of breath, clammy hands, butterflies in the stomach and tense muscles), resulting from the autonomic stimulation [1, 9, 11, 25, 26]. It is responsible for the tendency to lower productivity and concentration at the beginning of competition, as perceptions of bodily symptoms from the self-excitation process [8, 23, 28].

Cognitive anxiety can appear for several days before the competition as irritability and worrying. It demonstrates in the difficulties in concentration and attention as well as in anxiety which may affect the performance. Furthermore, concerns about failure [8, 26, 28] and negative self-evaluation may appear [1, 25, 26]. Cognitive anxiety displays a negative relationship with rivalry (the more, the worse), which means that the higher level it has, the more it will limit the progress [1, 11, 25, 26].

The third independent predictor of cognitive and somatic anxiety is self-confidence. It is explained as a sign of relative trust, confidence and ability to cope with competition [23, 28]. This factor shows a positive correlation with rivalry (the more, the better) and a negative correlation with all types of anxiety. This means that self-confidence increases when the level of anxiety decreases. Such accuracy exists both for somatic and cognitive anxiety [1].

Accordingly, the multidimensional anxiety theory conducts analyses of various relations. One of them is the psychological assessment of competitors involved in combat sports against athletes who practice other types of individual and team sports. It has been proved that athletes practicing team sports are characterized by low self-esteem

and a high level of anxiety. In turn, in the group of individual sports, including martial arts (karate), competitors are characterized by a high level of self-esteem and a low level of anxiety. The results confirmed that people with low self-esteem express high levels of anxiety and vice versa. However, authors note that combats sports practitioners express more cognitive anxiety than athletes involved in individual sports other than fighting. Three possibilities are given as an explanation. Firstly, it is suggested that anxiety is associated with an inhibition of aggression; secondly, it may be associated with direct contact with an opponent; thirdly, anxiety may be due to the possible occurrence of aggression in these disciplines [28].

The meaning of psychological and personality traits of athletes in the context of the course and the outcome of competition has an important place in the analyzed research articles. Chapman et al. examined a group of competitors participating in British University Student Tae Kwon Do Championships. Pre-competition anxiety scores were compared with the results of rivalry. It turned out that winners showed higher self-confidence values and lower cognitive and somatic anxiety values than losers. This confirms the theory that pre-competition level of anxiety can be considered as an important prognostic factor that may be helpful in predicting the results of events in combat sports. Based on these results, it was possible to accurately classify 63% winners and losers [9]. A similar relationship between winners and losers was also analyzed among karate athletes with the brown or the black belt status. Application of multidimensional anxiety analysis allowed effective estimation of 79% winners and losers. Simultaneously, researchers evaluated the *Mood States Profile*, which enabled correct estimation for nearly 92% of the results. The highest predictive efficiency was achieved by a combination of mood scores and anxiety evaluation, because it allowed successful discrimination of 93.5% participants as winners and losers [8]. These results suggest that low scores on cognitive anxiety and high scores on self-confidence are closely related to the winning performances [8, 9].

The most unexpected results were obtained in the Senior Men Turkish Judo Championship. Amongst the competitors, there was no correlation between the competition ranking and self-esteem, self-confidence or between the levels of observed anxiety. It means that more



successful athletes were not those characterized by higher levels of self-confidence and self-esteem or lower level of anxiety. Furthermore, researchers showed that cognitive, somatic and state anxiety are reduced or increased depending on each other, which means that an increase in a particular type of anxiety might cause changes in others [1].

Numerous analyses also include the effect of gender on anxiety and self-confidence. Observations conducted among competitors practicing various sports disciplines have shown that males express more somatic anxiety and self-confidence than females, while females exhibit more cognitive anxiety than males [28]. In combat sports the impact of gender was evaluated both in judokas [1] and wrestlers [23]. The results showed that there was no significant difference in somatic and cognitive anxiety or self-confidence among male and female competitors [1, 23].

#### **SIGNIFICANCE OF ANXIETY IN COMBAT SPORTS**

Analysis of the anxiety phenomenon, ubiquitous in combat sports, clearly shows that the fear of failure paralyzes a competitor in most situations and reduces his/her ability to perform a correct and intelligent action [4].

The role of anxiety in the functioning of high-performance athletes creates a lot of controversies. On the one hand, a low level of anxiety is associated with mental health, low tension and low depression levels, and it is also understood as a manifestation of mental health, which should characterize athletes compared to the “average” population [2, 13]. On the other hand, coping effectively with anxiety can be an expression of self-control and self-awareness, which are features of experienced athletes [13]. During a fight, the competitor’s ability to maintain an optimal level of anxiety is very important, which is appropriate for their individual predispositions. Considerable deviations of this level (both increases and decreases) will lead to lower efficiency and a reduced probability of success [3]. Analysis of anxiety in combat sports often gives a controversial and surprising result, mainly because these sports are associated with a high risk of injury, high stimulation and health risk [2].

It is suggested that preliminary determination of the anxiety level should be carried out, and the

obtained results should play a decisive role in the selection, continuation, abandonment or change of the practiced discipline [12].

In the case of athletes already involved in combat sports, the continuation should be dependent on personality traits and emotions associated with competition. It should not be forgotten that increased anxiety may reflect some psychological, somatic and endocrine disorders and their measurement should be an integral part of the assessment of each competitor [12].

Sports psychologists ought to identify such competitors because they may need help in developing a positive attitude towards the discipline and competition. It should alleviate the negative impact of these emotions on sport performance and athletes’ mental well-being [5, 13, 28, 34]. Interference of sport authorities, particularly coaches may be a necessity. Equally important is also proper psychological preparation with the help of a qualified psychologist or psychotherapist. The values of anxiety exceeding a competitor’s individual norm can have a negative impact on sporting achievements. In that situation it is necessary to implement further action in order to achieve better results and prevent injury or excessive situations during the fight [5, 12].

#### **COACHING AND TRAINING AND ANXIETY**

Proper training has a great influence on competitors’ mental well-being, which takes into account the psychological conditions and necessities. An appropriate approach to psychological problems shaping the attitude of a vigilant observer and ability to act in accordance to the laws of nature highlight the weaknesses and the necessity to cooperate with others in overcoming the difficulties [4].

Therefore, individualization of sports training by coaches and sports psychologists is one of the key elements that eliminates the problem of anxiety in combat sports athletes [5, 13]. Increasingly, optimized training programs and techniques to reduce the level of anxiety and increase self-confidence are introduced [28]. That approach should enable maintaining an optimal level of anxiety, which in turn should affect the competitive results [13, 28]. Properly conducted training develops human disposition and allows overcoming anxiety and

complexes that can disadvantage the course of competition [4].

Coaches' behavior has a pivotal influence on contestant's emotions. It is suggested that excessive pressure, high expectations, criticism from the coach and negative interpersonal relationships can be major stress factors and can cause higher precompetitive anxiety levels. In turn, support from the coach and moderate expectations, allowing for failure and acceptance of that state, can reduce anxiety and lead to better competition results [29, 36].

It should also be mentioned that coaches should be aware that individual combat sports athletes may require different interventions to improve their results. This requires the development of appropriate techniques and strategies to deal with stress and anxiety that will help athletes to cope with the phenomenon of choking under pressure. Further investigations should help to increase psychological preparation and thus improve the performance of athletes during competition [37].

Also athletes' precompetitive emotions, their intensity and directions are often analyzed [17, 29, 32, 33]. On the other hand, the problem of psychological disorders in trainers and their impact on competitors' performance is rarely taken under investigation. However, it is possible to find some information about this relationship [36]. Unfortunately, usually they do not refer to combat sports. Nevertheless, it was demonstrated that there is an important relationship between the coach's anxiety level and the athlete's anxiety level. The appropriate role requires certain personality traits from a coach, resistance to stress and low levels of anxiety. It is highly probable that the coach's sincerity and principled relationship with the athletes may create a friendly, safe and conducive environment for their development, which does not cause additional pressure and mental problems. Anxiety behaviors in coaches may in turn disturb athletes' mental balance and disrupt the competition. It should not be forgotten that both competitors and coaches have an individual preferred level of anxiety, which should be kept to optimize undertaken activities [36]. Accordingly, it appears that the evaluation of emotional states should include both sides.

Particular attention should also be paid to the problem of overtraining, which can occur in

trainees under great pressure to improve their performance. Under such conditions, some athletes may exceed their physical and mental ability to cope with the training process, which requires many sacrifices. In such a situation, the intensified training instead of leading to strengthening the athlete's performance will also contribute to increased fatigue and reduced performance, which are basic symptoms of overtraining. Pre- and post-competition psychological indicators of overtraining may be variables depending on the athletes age. The junior group (up to 18 years) of judo competitors showed significantly higher values of pre-competition emotional stress (including evaluation of irritation, aggression, anxiety, and inhibition) than the group of seniors (over 18 years). The older athletes showed a more positive approach to competition than the younger ones [38]. This is a clear indication that training programs should also be adapted to different age groups.

#### MASTERING EMOTIONS AND RELAXATION TECHNIQUES

To manage or control anxiety, tension and stress are applied to a wide range of interventional strategies and techniques designed to combine physical and psychological training [3, 5, 7]. Psychological and tactical preparations are correlated with each other, which is particularly reflected in the development and implementation of the fight plan as well as in responses to unforeseen situations [7]. In experts' opinion, competitors should have certain mental skills that can be helpful in achieving success in combat sports. Among others, they include: effective use of self-talk, heightened concentration, self-regulation of arousal, goal setting, coping with being hit and mental imagery [5], behavioral modification, positive reinforcement, visualization, focused breathing, muscular and mental relaxation, behavioral modification, visualization, meditation, goal-setting, inner mental training [3]. According to the competitors achieving successes, the most important are three of them: high self-efficacy, high motivation and mental toughness [5].

It was suggested that cognitive anxiety would be sensitive to cognitive therapy strategies and manipulations of expectations, whereas the level of somatic anxiety might be reduced by relaxation techniques [8, 9, 28]. However, the effective use of those methods requires further studies,

and their skillful exploitation can contribute to a better understanding between emotions and performance [28].

It was also observed that there is a relationship between sports massage procedures and athletes' mental disposition. In the group of competitors who reduce their body mass in the course of preparations for the competition, it was shown that massage may be beneficial for their mental state by lowering the level of anxiety before the competition. This is particularly important due to the fact that weight reduction involves a number of consequences including psychological disturbances which worsen the competition results. Limiting them effectively with massage techniques meant that competitors significantly more often obtained the expected results. Therefore, application of physiotherapy approaches in such circumstances should be investigated on a larger scale [35].

Some analyses of the anxiety phenomenon in combat sports athletes emphasize the importance of emotional intelligence, which is understood as the ability to recognize and cope with one's own and other people's emotional states [2]. Development of these abilities can be potentially helpful in reducing the emotional states unfavorable to competition, such as anxiety [2, 5, 39].

In numerous scientific studies suggestions can be found that practicing combat sports has a positive impact on the development of emotional intelligence. However, it is debatable due to variable results of previous studies. Research carried out on groups consisting of boxers and judokas has shown that they have a higher level of emotional intelligence than non-athletes. The results suggest that boxing and others combat sports in general may foster its development. Researchers turned their attention to the fact that emotional intelligence is related to the education level and household incomes. This suggests that in the case of competitors with low education levels and from the lower social class, sport can bring more beneficial effects in comparison to other athletes or non-athletes [39]. On the other hand, observations carried out with the participation of kickboxers presenting a high level of sports competences (the national team) have shown that they express a low level of emotional intelligence, which may be associated with the specificity of the discipline. The description of the study does

not contain any information about the athletes' education level [2, 40], which according to other suggestions shows a significant correlation with the results of competition and state anxiety [1], regardless of the emotional intelligence level. The research teams are in agreement that the aspect of emotional intelligence requires further insightful analysis, particularly due to the fact that control of one's own excitement as well as a proper assessment of opponent's emotions in combination with appropriate training techniques may be crucial to curbing negative mental states and success in combat sports [2, 5, 39].

### SPORT AS A FORM OF RELAXATION

Various sports activities are frequently considered a form of active recreation as well as an effective method to cope with stress. They are considered as a good way to prevent many psychological problems, such as depression or anxiety disorders [41, 42].

A growing number of studies suggest that physical activity is a protective factor in relation to anxiety and depression. It is often determined as a non-pharmaceutical agent for the treatment of anxiety and depression in adults [41]. The literature contains reports suggesting that practicing tai chi as a form of physical activity can affect psychosocial well-being [22, 43, 44]. This technique involves traditional Chinese exercises that are commonly practiced for their health benefits and as martial arts. They consist of sequences of flowing movements combined with changes in mental focus, breathing, coordination and relaxation [43]. Available reports mainly refer to changes in the level of anxiety [22, 43, 44], depression, mood, general mental health and others [43, 44]. Available results concerning anxiety are varied and should be approached warily [43, 44].

Among children, the importance of physical activity in the treatment and prevention of anxiety and depression has not been sufficiently studied, and it is difficult to conclude on its effectiveness. It seems that activity has a positive effect on psychological disturbances without causing negative side effects. However, due to the limited knowledge about the subject and the ambiguity of the available information, physical activity can be used as a preventive agent and as support for the pharmacological therapy in the treatment among individuals suffering from mental health problems [41].

There is a widespread conviction that practicing martial arts by children supports the development of psychological traits such as self-esteem, self-confidence, concentration, and self-discipline. A lot of parents enroll their children in martial arts in hopes to achieve such a result. Research conducted on a group of children in the USA assessed changes in the behavior of children training martial arts during the school day. It has not confirmed the authenticity of those assumptions. Other benefits are related to children's participation in this kind of courses, such as improved physical fitness, motor coordination and self-defense skills, which shows the advantages of this form of activity [45]. In addition, various activities cause a number of health benefits, such as weight loss and maintenance and stimulation of brain development [41].

Also Jagiello et al. [6] present and explain the benefits of fun forms of martial arts. They suggest that this form of activity has two basic aspects: the health one and the utilitarian one. The health aspect involves somatic, mental and social features. Fun forms of martial arts may therefore constitute a universal path to improve both health and intellectual development, build ethical attitudes and break barriers of inability or ability to survive [6].

In an analysis of the anxiety phenomenon among combat sport practitioners, it should not be forgotten that the high level of involvement is characterized by different properties than among the general population. Sports competitions are often difficult for athletes and cause great psychological burden, because they abound in many stressful circumstances. Tournaments induce higher levels of stress and negative emotions than training. Emotions can be further aggravated by factors, such as the audience presence, rivalry with a stronger opponent, a fear of failure [7], high pressure, an exaggeration of one's own limitations or fear of career-ending injuries [42]. This may result in a negative impact on the progress and technical or tactical effectiveness during the competition, which leads to a decrease in the quality of results [7].

Most of the research projects encompass the estimation of the psychological status in athletes representing a high level of competence and their results are not necessarily transferable to people who practice sport as amateurs or as a form

of recreation. Professional competitors are often characterized by genetic predispositions, personality and environmental circumstances. In addition, extensive experience and long hard training have developed mental toughness in most of them. However, it should be remembered that mental strength of high level athletes supports succeeding but does not exclude a possibility of psychopathology [42]. It was estimated that in the French athletes of different disciplines (also including combat sports) the most common disorders are generalized anxiety disorder (GAD) and non-specific eating disorders, which affect women more often than men [42].

It is assumed that mentally well-prepared fighter will be able to win the fight even if he is less prepared physically. This is consistent with the statement that it is not possible to achieve maximum performance without the athlete's personality maximization [13]. Understandably, this aspect of the analysis of anxiety is particularly important due to the fact that it plays a significant role, not only in sports activities, but in all aspects of life [12].

## CONCLUSIONS

Analysis of the anxiety phenomenon in combat sport athletes results in a conclusion that, similarly to non-fighting athletes, combat rivalry is very difficult for athletes and causes great psychological burden (many stressful circumstances). Tournament rivalry induces a higher level of stress and negative emotions than training. Emotions can be further aggravated by factors such as the audience presence, rivalry with a stronger opponent, a fear of failure, high pressure, an exaggeration of one's own limitations or a fear of career-ending injuries. This may result in a negative impact on the progress and technical or tactical effectiveness during the competition, which leads to a decrease in the results.

On the other hand, training combat sports can have a positive impact on anxiety control and on the development of emotional intelligence.

To sum up, results point to suggest that an ability to control particular types of anxiety seems to be one of the most important psychological skills highly affecting the combat sports competition results.

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