South African Journal for Research in Sport, Physical Education and Recreation, 2019, 41(1): 121 - 131.
Suid-Afrikaanse Joernaal vir Navorsing in Sport, Liggaamlike Opvoedkunde en Ontspanning, 2019, 41(1): 121 - 131.
ISBN: 0379-9069

FACTORIAL VALIDITY OF EXTENDED SPORT COMPETITIVE ANXIETY TEST EVALUATED WITH YOUNG ATHLETES

Aleksandra A. SANADER[1], Ljubica BAČANAC[2], Ana ORLIĆ[3],
Olivera M. KNEZEVIC[4], Ivan IVKOVIC[5], Dusan UGARKOVIC[3]
[1] *Serbian Institute of Sport and Sports Medicine, Belgrade, Serbia*
[2] *University of Donja Gorica, Faculty of Sport Management, Podgorica, Montenegro*
[3] *University of Belgrade, Faculty of Sport and Physical Education, Belgrade, Serbia*
[4] *University of Belgrade, Institute for Medical Research, Belgrade, Serbia*
[5] *Ministry of Defence, Belgrade, Serbia*

ABSTRACT

The Sport Competitive Anxiety Test (SCAT) has been applied most widely to estimate anxiety in sport. Although the SCAT has been modified to make the instrument more appropriate for the assessment of the multidimensional competitive trait anxiety construct, the extended version (SCATe) has not been validated to date. The aim of this study was to investigate factorial validity of the SCATe, as well as the consistency of the three subscale measures within the global score. SCATe was evaluated with 1024 young competitors aged 12 to 21 years, involved in 21 sports. The Cronbach's coefficients, exploratory and confirmatory factorial analysis and the Spearman Correlation were applied. The three-factor model accounts for 34.23% of the total variance of competitive anxiety. All three dimensions revealed significant inherent eigenvalues (6.79, 1.98, and 1.49). The somatic component was 23%, while self-confidence and cognitive components were 7% and 5%, respectively. The results indicated acceptable internal consistency and factorial validity for successful evaluation of a global score for competitive trait anxiety and the three individual subscale scores: somatic, cognitive and self-confidence. The data suggest that SCATe could be applied as alternative test to SCAT, however, further improvement of the SCATe metric characteristics is recommended.

Keywords: Trait anxiety; Construct validity; Reliability; SCAT.

INTRODUCTION

Anxiety, in general, has been interpreted as a negative emotional state. When related to competition, anxiety can adversely affect sports performance (Carson & Collins, 2016), increase the likelihood of sport-related injuries (Van Niekerk & Lynch, 2012) and bring an athlete to a higher risk of burnout (Wiggins *et al.*, 2006). The competitive trait anxiety (CTA) and precompetitive state anxiety (CSA) are significantly associated, whereas the first one (CTA) could be the predictor of the second one (CSA) (Martinent *et al.*, 2010; Weinberg & Kerns, 2015).

In addition, the multidimensional nature of anxiety was determined (Martens *et al.*, 1990), suggesting the presence of somatic, cognitive and self-confidence components. Somatic anxiety has been manifested through physiological responses, such as rapid and shallow breathing, heart palpitations, palmar hyperhidrosis (sweaty palms), nausea, increased muscle tension, etc.

Cognitive anxiety reflects a mental component, which refers to negative thoughts (fear of failure, errors, bad comments, etc.). Finally, it has been recognised that self-confidence is highly related to anxiety since the lack of self-confidence contributes to the increase in competitive anxiety and vice versa (Vealey & Chase, 2008).

Among a number of different approaches to estimate the anxiety in sport, the Sport Competitive Anxiety Test (SCAT) (Martens, 1977) has been most widely applied (Weinberg & Kerns, 2015). Although the SCAT has been shown to have satisfactory metric characteristics, the clear limitation could be its presumed unidimensionality. To overcome the particular limitation of SCAT, new instruments were constructed (Martens *et al.*, 1990; Weinberg & Kerns, 2015). In addition, Bačanac has proposed the extended version of the SCAT (SCATe) (Bačanac & Juhas, 2004) that has been applied for psycho-diagnostics of more than 10,000 athletes (Sanader *et al.*, 2009).

Furthermore, the SCATe has been used also for research purposes to assess CTA of athletes with different athletic backgrounds (soccer players, elite wrestlers, elite track and field competitors) (Janković, 2007; Kasum & Bačanac, 2007; Bačanac *et al.*, 2012; Bačanac *et al.*, 2014). Researchers also have found high concurrent validity of SCATe, as compared to the sport confidence (r=-58) (Bačanac *et al.*, 2014), as well as the athletic coping skills measures (ACSI-28) (r=-.52) (Kitanović, 2007). Surprisingly, although these findings have suggested that SCATe has sufficient reliability and high concurrent validity, there is a lack of data regarding its factorial validity proving its presumed components aimed to assess somatic, cognitive and self-confidence aspect of anxiety.

PURPOSE OF RESEARCH

This study aimed to investigate the factorial validity (multidimensionality) of the SCATe, as well as the consistency of the three subscale measures within the global CTA score. The applied principle analysis components allow for testing of the hypothesis that the SCATe could be applied to assess particular aspects (somatic, cognitive and self-confidence) of anxiety within the global score. The results were expected to provide important data regarding the evaluated test, improve the current methodology in psycho-diagnostics and to motivate the further development of SCATe as an alternative to SCAT when used to assess competitive anxiety in young athletes.

METHODOLOGY

Participants

The sample consisted of 1024 young male (57.6%) and female (42.4%) Serbian athletes (younger categories then senior ones in 21 sports) aged between 12 and 21 (mean=15±2) years with sport experience ranging from 2 to 14 years (7±3). The mother-tongue language of the participants was used in the testing procedure.

Measures

The SCATe (Bačanac & Juhas, 2004) measures the competitive anxiety in children and adults (aged 12 years and over). This evaluation scale is an extended version of the 10 scoring SCAT (Martens, 1977) by adding 20 new items. Namely, the psychologists' expert team constructed 20 new items related to somatic (fast heartbeat, sweaty palms) and cognitive (concern for

possible mistakes) anxiety, as well as self-confidence (success certainty) based on the theoretical knowledge of the multidimensional nature of anxiety and the long-standing experience in the psycho-diagnostics perspective and top athletes. In the construction process, the expert team specifically took into account that content and language must be adjusted for the age category that the scale is intended. An individual evaluates his/her own behaviour and characteristics by answering to 30 items that describe the CTA intensity and nature and show how an athlete usually feels and reacts just before and during the competition.

Each item has three possible answers: hardly ever, sometimes, and often. Most items are calculated as follows: 1=hardly ever, 2=sometimes, 3=often. Reverse scoring is used for items 6, 11, 19, 20, 28 and 30. The total result is the sum of all 30 items (30-90 points). The higher the score, the higher the anxiety. The items related to self-confidence are interpreted, as the higher the item score, the lower the self-confidence.

Analysis of data

Descriptive statistics were calculated. In addition, the Kaiser-Meyer-Olkin (KMO) measure for Sampling Adequacy and the Bartlett's Test of Sphericity (BTS) were calculated to examine the appropriateness for the factorial analysis. The first step in multidimensionality analysis was the Explorative Factor Analysis where the number of factors was determined applying Kaiser-Guttman's criteria (lambda≥1), the Cattel's criteria (Screen test), and parallel analysis of random pairs (Monte Carlo analysis).

Further analysis was conducted by performing a Maximum likelihood Confirmatory Factor Analysis (CFA) in SPSS Amos 21. Each item was loaded to its corresponding first-order factor, namely Somatic anxiety, Cognitive anxiety and Self-confidence. Each first-order factor was loaded to the second-order factor representing general CTA. Three item regression weights (one for each first-order factor) and second-order factor variance were fixed at 1. Model fit was assessed by several fit indices: χ^2, standardised root mean square residuals (SRMR), root means square error of approximation (RMSEA), Goodness-of-Fit index (GFI), comparative fit index (CFI). The next step in the analysis was to calculate internal consistency (Cronbach's α) of the three subscales and the correlations (Spearman coefficient) between subscales, as well as subscales and the global score. Additionally, the correlation between SCAT score and SCATe score was also calculated.

Ethical clearance

Data were collected during the Summer Sports Training Camps for young athletes by qualified psychologists according to the standard procedures prescribed by the Institute of Sport and Sports Medicine. The procedures are included in health, functional, motor and psychological evaluations of athletes that are regularly performed at the camps. Prior to the testing, the subjects were informed of the objectives of the study and procedures. Informed written consent for participation in the study was obtained for all subjects. The study was approved by the Local Ethics Committee (Institute of Sport and Sports Medicine, No 03-686).

RESULTS

In addition to descriptive statistics, results of correlation coefficients are presented in Table 2a and 2b. The mean value for the global score was 47.47±9.04, while the individual items varied from 1.19 to 1.95. Most of the items (80%) correlated with a global score within the range from

0.30 to 0.60. Only three items have shown correlation coefficients below 0.20. Excluding the item 19 with a zero item-total correlation, all correlation coefficients, were statistically significant ($p<0.001$).

Appropriateness of the data for the factorial analysis was confirmed. The BTS was high ($\chi^2=6845$) with a significant risk of less than 1% ($p<0.001$). The KMO index of sampling adequacy was 0.91.

Table 1. **FACTORIAL ANALYSES OF COMPONENTS OF SCATe WITH VALUES OF VARIANCE**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.79	22.64	22.64	6.79	22.64	22.64	5.73
2	1.98	6.61	29.25	1.98	6.61	29.25	2.62
3	1.50	4.99	34.23	1.50	4.99	34.23	4.04
4	1.32	4.41	38.64	1.32	4.41	38.64	4.68
5	1.11	3.70	42.33	1.11	3.70	42.33	2.67
6	1.07	3.56	45.89	1.07	3.56	45.89	1.36
7	0.97	3.23	49.12				
30	0.38	1.27	100.00				

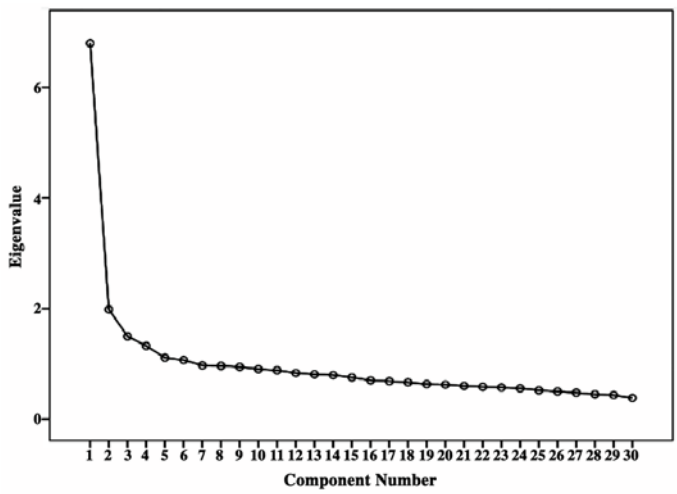

Figure 1. **FACTORIAL ANALYSIS OF COMPONENTS OF SCATe: SCREEN PLOT DIAGRAM**

In the first step of the SCATe internal structure testing, the six major components (lambda≥1) were identified (Table 1). The screen-plot diagram shows the main saddle point of fracture after the third factor (Figure 1). Parallel analysis of random pairs points to four components with characteristic values higher than the corresponding values that were obtained from the current sample. The equally large matrix of random numbers (30 variables x 1024 respondents) was used.

Table 2a. **ITEM ANALYSIS OF SCATe**

No	Item	Mean±SD	r_{it}	SOM	SEC	COG
15.	Before I compete I usually get uptight.	1.82±0.70	0.59	**0.72**	0.08	0.01
2.	Before I compete I feel uneasy.	1.89±0.67	0.55	**0.72**	0.18	-0.09
6.	Before I compete I am calm.	1.70±0.75	0.47	**0.62**	0.39	-0.19
11.	Before I compete I feel relaxed.	1.79±0.74	0.57	**0.61**	0.38	-0.05
12.	Before I compete I am nervous.	1.80±0.71	0.57	**0.60**	0.18	0.08
9.	Just before competing I notice my heart beats faster than usual.	1.70±0.71	0.45	**0.59**	-0.09	0.05
8.	Before I compete I get a queasy feeling in my stomach.	1.54±0.68	0.47	**0.57**	0.04	0.02
13.	Before a competition my hands sweat more than usual.	1.49±0.70	0.43	**0.49**	-0.01	0.08
18.	I notice that my breath-taking becomes accelerated and shallow before the very performance.	1.26±0.54	0.45	**0.46**	-0.17	0.22
1.	I sleep badly before an important game.	1.46±0.60	0.40	**0.45**	-0.06	0.10
16.	Before the very competition my mouth and throat become soar.	1.31±0.61	0.45	**0.42**	-0.09	0.24
14.	I get nervous waiting to start the game.	1.91±0.74	0.31	**0.37**	-0.33	0.20
19.	The tension I feel before the performance disappears at the beginning of the competition.	1.43±0.70	0.07	**-0.37**	0.28	0.21
26.	Before a performance I have a frequent need to go to the toilet.	1.60±0.73	0.31	**0.35**	-0.03	0.08
17.	Although there are no objective reasons, I get scared of my rivals before the very competition.	1.34±0.58	0.48	**0.30**	0.27	0.27
22.	I have a need to move before the beginning of a competition.	1.95±0.79	0.26	**0.29**	-0.28	0.21

Highest factor loadings for each factor are in the bold script.
SD=Standard Deviation r_{it}=item-total correlation and factor loadings
Pattern Matrix: SOM=Somatic component SEC=self-confidence component COG=Cognitive component)

The next step tested the predefined number of SCATe factors. The first major component included 16 items identified as the somatic component (Table 2a). The second component is related to self-confidence. The third principal component consisted of 11 items and corresponds

to the cognitive component (Table 2b). There was no significant overlap of items, except for items 17 and 22, in which a similar low saturation occurs. Due to the fact that item 19 separates from the rest of the test and from the measurement objective, all three items (17, 19 and 22) are identified as problematic ones. With this in mind, CFA was conducted without these items.

Table 2b. **ITEM ANALYSIS OF SCAT*e***

No	Item	Mean±SD	r_{it}	SOM	SEC	COG
30.	Before the start I am sure that I will suppress the competition pressure.	1.44±0.63	0.27	0.00	**0.60**	0.14
20.	I feel secure and self-confident before the competition.	1.47±0.62	0.43	0.24	**0.64**	0.08
28.	I am sure that my performance will be good.	1.51±0.62	0.31	0.10	**0.66**	0.06
24.	Before the performance I think more about my failure than my success.	1.51±0.62	0.31	0.03	0.24	**0.57**
4.	Before the game I think about how the others (the coach, friends, selector) will estimate my performance.	1.79±0.76	0.32	0.06	-0.13	**0.51**
29.	Before the performance I am worried about whether I will achieve my competitive cause.	1.90±0.68	0.51	0.15	0.21	**0.51**
25.	The tension I feel before the start keeps to be present during the whole competition.	1.19±0.47	0.27	-0.06	0.05	**0.48**
21.	The delay of the beginning of the competition influences my performance in a bad manner.	1.56±0.74	0.30	0.10	-0.14	**0.44**
5.	When I compete I worry about making mistakes.	1.81±0.74	0.48	0.23	0.11	**0.43**
27.	The mistakes did badly affect my further performance at the competition.	1.53±0.65	0.36	0.07	0.15	**0.42**
3.	Before I compete I worry about not performing well.	1.52±0.66	0.55	0.26	0.29	**0.40**
23.	Before the beginning of a competition I feel unconcerned (indifferent, passive).	1.22±0.49	0.18	-0.05	0.02	**0.37**
10.	Before a competition I worry whether my team players (members of the team, crew, members of the relay-race) will do their best.	1.75±0.77	0.15	0.00	-0.23	**0.36**
7.	Before the very beginning of a competition, my concentration decreases (I cannot get my thoughts together).	1.7±50.77	0.15	0.22	0.26	**0.32**

Highest factor loadings for each factor are in the bold script.
SD=Standard Deviation r_{it}=item-total correlation and factor loadings
Pattern Matrix: SOM=Somatic component SEC=self-confidence component COG=Cognitive component)

As shown in Table 3, all fit indices indicate acceptable to good fit, except for CFI, which is somewhat below the commonly accepted threshold. In the lower part of the model, the standardised regression weight of each item was significant ($p<0.01$) and positive. Regarding

the upper part of the model, all first-order factors were positively loaded on the general CTA, being the somatic component 0.83, the cognitive component 0.91 and self-confidence 0.60.

Table 3. **FIT INDICES FOR SCAT*e***

Model	χ^2	*df*	χ^2/df	SRMR	RMSEA (90% CI)	GFI	CFI
Hierarchical	1135.59***	8321	3.538	0.048	0.050 (0.047-0.053)	0.914	0.863

SRMR=Standardized Root Mean Square Residuals RMSEA=Root Mean Square Error of Approximation
GFI=Goodness of Fit Index CFI=Comparative Fit Index ***p<0.001.

Table 4. **SUBSCALE ANALYSIS OF SCATe**

Subscale /Global	Mean±SD	α	r_{it}	r_{is}	SOM	COG	SEC
SOM	21.25±5.06	0.83	0.47	0.48	–	–	–
COG	16.95±3.59	0.71	0.36	0.36	0.56**	–	–
SEC	4.42±1.42	0.66	0.33	0.47	0.33**	0.32**	–
Global	42.63±8.37	0.87	–	–	0.91**	0.82**	0.50**

Real self-confidence correlation is negative: Items are scored reversely **p<0.01
SOM=somatic COG=cognitive SEC=self-confidence SD=Standard Deviations
Cronbach´s α and Correlations Mean: r_{it}= Item-total r_{is}=Item-subscale

The three defined components of SCATe were analysed as separate subscales: somatic (with exception of items 17, 19 and 22), cognitive and self-confidence. The results of the central descriptive measures, reliability and correlations of global and subscale scores are presented in Table 4. The correlation coefficients (Spearman) ranged from 0.32 to 0.91 and were all significant (p<0.01).

DISCUSSION

The current study aimed to investigate factorial validity of the previously proposed SCATe, as well as the consistency of the three subscale measures within the global CTA score. The obtained findings support the suggested multidimensional structure, which clearly differentiates between somatic anxiety, cognitive anxiety and self-confidence.

The obtained results of the SCATe suggest a meaningful interpretation of global CTA. Firstly, these results are supported by the logical content analysis of items. Additionally, the results of other investigations established its correlations with related constructs: competitive anxiety, sport-confidence and athletic coping skills within the eligibility limits and expected direction (Kitanović, 2007; Bačanac *et al.*, 2012; Bačanac *et al.*, 2014).

Analysis of factorial validity presumes good reliability and appropriate correlations, which is supported by the results obtained in the current study. These findings are in line with those previously reported (Kitanović, 2007; Bačanac *et al.*, 2012; Bačanac *et al.*, 2014) thus, the SCATe could be recommended as an accurate and reliable CTA instrument.

The most important finding is related to the SCATe's multidimensionality. The results obtained from factorial analysis suggest that the three-factor model of SCATe is an acceptable solution with regard to the nature of CTA construct - somatic, cognitive and self-confidence component. CFA confirmed the hierarchical structure of the scale that is SCATe measuring general CTA through somatic, cognitive and self-confidence dimensions. In particular, all three subscales revealed adequate reliability, as well as a positive correlation with the global score of moderate to high intensity. The highest intensity is shown by the somatic subscale.

A number of studies have confirmed the role of physiological systems (cardiovascular, muscular, and neuro-hormonal) on the state anxiety and their impact on behaviour (Loupos *et al*., 2008; Mathersul *et al.*, 2008; Obmiński *et al.*, 2016). In addition, it has been shown that there is a genetic disposition towards anxiety (Petito *et al.*, 2016), as it is already well-known for some somatic features. However, it must be noted that although the somatic component of anxiety is associated with physiological activation, it may not be identified with it (Bačanac *et al.*, 2014).

The inter-scale correlations of the SCATe provide important information regarding the factorial validity. The highest positive relationship appeared between the somatic and cognitive subscales. This finding is in line with findings, which reveal that the complex relationship between brain structures (hippocampus, amygdala) is reflected in the complex relationship among basic personality traits (Smoller *et al.*, 2009). The self-confidence subscale is negatively related to the somatic and cognitive ones. These findings are consistent with both the theoretical knowledge and research evidence (Kjørmo & Halvari, 2002; Bačanac *et al.*, 2010). The negative correlation of CTA with the self-confidence has been established even for a sample of elite athletes (Bačanac *et al.*, 2014). In fact, self-confidence acts as a protective factor of anxiety by reducing cognitive anxiety and physiological arousal during the performance and allows withstanding higher levels of excitement before any performance interruption (Vealey & Chase, 2008).

Unlike the results of this study in which self-confidence is equally correlated with the other two subscales, their relationship could be a complex one (Craft *et al.*, 2003; Hardy *et al.*, 2007; Goette *et al.*, 2015). It must be noted that a high level of self-confidence does not inevitably mean that the anxiety is low, and vice versa (Bačanac *et al*., 2010).

Finally, note that a high correlation between subscales would rule out the need for their individual existence. This fact, as well as satisfactory homogeneity of items within the subscales, indicate that each subscale could have an adequate level of discriminative and convergent validity. The results of this study indicate that, in addition to the total SCATe score, it is reasonable to take into account three individual subscale dimensions: somatic (with exception of items 17, 19 and 22), cognitive and self-confidence.

Further research should be done to address several limitations. Firstly, research should be performed with a sample that is homogenous regarding the age, gender and athletic experience. Secondly, examination of the scale with previously excluded 3 problematic items defined by EFA (17, 19 and 22) on a new sample is highly recommended.

CONCLUSIONS

The obtained findings of the factorial validity of the competitive anxiety test showed the SCATe in a favourable light. In general, the data suggest that SCATe could replace standard SCAT that has a unidimensional structure. Moreover, a part of the observed findings suggests that the SCATe could be considered as an alternative test to the often employed SCAT. Of particular

importance could be the fact that the SCATe can fit largely into the multidimensional construct of competitive anxiety, including three latent dimensions: somatic, cognitive and self-confidence. Taking into account the potential advantages of SCATe over SCAT, the findings suggest that SCATe could be a particularly promising method for routine testing of competitive trait anxiety in young athletes.

Acknowledgements

We wish to thank Dr D. Mirkov and Dr S. Jaric for useful comments and suggestions.

REFERENCES

BAČANAC, L. & JUHAS, I. (2004). Level of sport competitive anxiety trait as a function of sex, age and sport experience. *Third International Scientific Congress "Sport, Stress, Adaptation"* (pp. 85-94). Proceedings of the Third International Scientific Congress "Sport, Stress, Adaptation", 19-21 Novembre 2004. Sofia, Bulgaria: National Sports Academy "V.Levski".

BAČANAC, L.; NIKOLIĆ, M. & ILIĆ, J. (2010). Self-confidence relationship with demographic situation and psychological characteristics of athletes. In R. Stankovic (Eds.), *The 14th International Scientific Conference "Fis communication 2010"* (pp. 359–378). Proceedings of the The 14th International Scientific Conference "Fis communication 2010", 22 October 2010. Niš, Serbia: Faculty of Sport and Physical Education, University of Niš.

BAČANAC, L.; KITANOVIĆ, V.; NIKOLIĆ, M. & ĆIRKOVIĆ, T. (2012). Psychological profile characteristics of Serbian elite athletics. In M. Dopsaj, I. Juhas & G. Kasum (Eds.), *Effects of physical activity application to anthropological status with children, youth and adults* (pp. 667–676). Proceedings of the Effects of Physical Activity Application to Anthropological Status with Children, Youth and Adults, 10-11 December 2012. Belgrade, Serbia: University of Belgrade, Faculty of Sport and Physical Education.

BAČANAC, L.; MILIĆEVIĆ-MARINKOVIĆ, B.; KASUM, G. & MARINKOVIĆ, M. (2014). Competitive anxiety, self-confidence and psychological skills in top athletes with and without disabilities. *Facta Universitatis, Series: Physical Education and Sport*, 12(2): 59-70.

CARSON, H.J. & COLLINS, D. (2016). The fourth dimension: A motoric perspective on the anxiety–performance relationship. *International Review of Sport and Exercise Psychology*, 9(1): 1-21.

CRAFT, L.L.; MAGYAR, T.M.; BECKER, B.J. & FELTZ, D.L. (2003). The relationship between the Competitive State Anxiety Inventory-2 and sport performance: A meta-analysis. *Journal of Sport and Exercise Psychology*, 25(1): 44-65.

GOETTE, L.; BENDAHAN, S.; THORESEN, J.; HOLLIS, F. & SANDI, C. (2015). Stress pulls us apart: Anxiety leads to differences in competitive confidence under stress. *Psychoneuroendocrinology*, 54(April): 115-123.

HARDY, L.; BEATTIE, S. & WOODMAN, T. (2007). Anxiety-induced performance catastrophes: Investigating effort required as an asymmetry factor. *British Journal of Psychology*, 98(1): 15-31.

JANKOVIĆ, A. (2007). *Socio-psiholoske karateristike fudbalera* (trans: *Socio-psyhological characteristics of football players* [In Serbian.]. Beograd, Serbia: Zadužbina Andrejević.

KASUM, G. & BAČANAC, L. (2007). Interconnection between some psychological characteristics of elite wrestlers and their main scoring techniques. *Fizička kultura*, 61(1-2): 1-24.

KITANOVIĆ, V. (2007). Metrijske karakteristike inventara psiholoških veština prevladavanja stresa u sportu ACSI-28 (*trans.*: Psychometric Properties of the Athletic Coping Skills Inventory ACSI-28). [In Serbian.] Unpublished thesis. Belgrade, Serbia: University of Belgrade, Faculty of Philosophy.

KJØRMO, O. & HALVARI, H. (2002). Two ways related to performance in elite sport: The path of self-confidence and competitive anxiety and the path of group cohesion and group goal-clarity. *Perceptual and Motor Skills*, 94(3): 950-966.

LOUPOS, D.; FOTINI, M.; BARKOUKIS, V.; TSORBATZOUDIS, H.; GROUIOS, G. & TAITZOGLOU, I. (2008). Psychological and physiological changes of anxiety prior to a swimming competition. *Open Sports Medicine Journal*, 2(1): 41-46.

MARTENS, R. (1977). *Sport competition anxiety test*. Champaign, IL: Human Kinetics.

MARTENS, R.; BURTON, D.; VEALEY, R.S.; BUMP, L.A. & SMITH, D.E. (1990). Development and validation of the Competitive State Anxiety Inventory-2. In R. Martens, R.S. Vealey, D. Burton (Eds.), *Competitive anxiety in sport* (pp. 117-190). Champaign, IL: Human Kinetics.

MARTINENT, G.; FERRAND, C.; GUILLET, E. & GAUTHEUR, S. (2010). Validation of the French version of the Competitive State Anxiety Inventory-2 Revised (CSAI-2R) including frequency and direction scales. *Psychology of Sport and Exercise*, 11(1): 51-57.

MATHERSUL, D.; WILLIAMS, L.M.; HOPKINSON, P.J. & KEMP, A.H. (2008). Investigating models of affect: Relationships among EEG alpha asymmetry, depression, and anxiety. *Emotion*, 8(4): 560-572.

OBMIŃSKI, Z.; MROCZKOWSKA, H. & TOMASZEWSKI, W. (2016). Relationships between personality traits, resting serum hormones and visuomotor ability in male judokas. *Annals of Agricultural and Environmental Medicine*, 23(1): 79-83.

PETITO, A.; ALTAMURA, M.; IUSO, S.; PADALINO, F.A.; SESSA, F.; D'ANDREA, G.; MARGAGLIONE, M. & BELLOMO, A. (2016). The relationship between personality traits, the 5HTT polymorphisms, and the occurrence of anxiety and depressive symptoms in elite athletes. *PLoS One*, 11(6): e0156601.

SANADER, A.; MAZIĆ, S. & BAČANAC, L. (2009). Nova metodologija testiranja u Republičkom zavodu za sport (*trans.*: New methodology of athletes testing in Serbian Institute of Sport). [In Serbian] In A. Sanader & N. Manojlovic (Eds.), *The First Serbian Conference for coaches: "The New Olympic Cycle Challenges"* (pp. 172-189). 4-5 February 2009. Belgrade, Serbia: Serbian Institute of Sport and Sport Medicine.

SMOLLER, J.W.; BLOCK, S.R. & YOUNG, M.M. (2009). Genetics of anxiety disorders: The complex road from DSM to DNA. *Depression and Anxiety*, 26(11): 965-975.

VAN NIEKERK, R. & LYNCH, E. (2012). The relationship between anxiety and shoulder injuries among South African university and club rugby players. *South African Journal of Sports Medicine*, 24(4): 107-111.

VEALEY, R.S. & CHASE, M.A. (2008). Self-confidence in sport: Conceptual and research advances. In T.S. Horn (Ed.), *Advances in sport psychology* (pp. 65-97). Champaign, IL: Human Kinetics.

WEINBERG, R. & KERNS, J. (2015). Psychology measurement in sports and exercise. In J.R. Morrow, D.P. Mood, J.G. Disch & M. Kang (Eds.), *Measurement and evaluation in human performance* (pp. 314-353). Champaign, IL: Human Kinetics.

WIGGINS, M.S.; CREMADES, J.G.; LAI, C.; LEE, J. & ERDMANN, J.B. (2006). Multidimensional comparison of anxiety direction and burnout over time. *Perceptual and Motor Skills*, 102(3): 788-790.

Corresponding author: Mr sci Aleksandra Sanader; **Email:** aleksandra.sanader@rzsport.gov.rs

(*Subject editor: Prof. Hanlie Moss*)