Factors influencing competitive anxiety in Brazilian athletes

Fatores influenciadores da ansiedade competitiva em atletas Brasileiros

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Abstract – The study of factors influencing competitive anxiety, according to a multi-dimensional perspective and supported by valid instruments, is scarce among Brazilian athletes of different sports. The present study aims to: i) investigate the theoretical relationship between the different dimensions of the multidimensional theory of anxiety (i.e., cognitive anxiety, somatic anxiety and self-confidence); and ii) investigate the effects of gender, type of sport (individual or collective) and competitive experience levels on cognitive anxiety, somatic anxiety and self-confidence. A total of 303 athletes (233 males and 70 females), from different sports, aged between 18 and 40 years (M =24.22, SD = 5.07) completed a shortened version of CSAI-2 (i.e., CSAI-2R), about one hour before the start of competitions. Results revealed significant correlations between cognitive anxiety, somatic anxiety and self-confidence dimensions, in accordance with the assumptions of the multidimensional theory. Additionally, comparative analyses indicated that female athletes and athletes from collective sports showed higher levels of cognitive anxiety, while male athletes and athletes with high competitive experience reported higher levels of self-confidence. These results were discussed taking into account the theoretical and practical implications of these findings for planning interventions of sport psychology in Brazil with athletes of different contexts.

Key words: Anxiety; Sex; Sports.

Resumo – *O estudo dos fatores influenciadores da ansiedade competitiva, de acordo com uma perspectiva multidimensional suportada em instrumentos devidamente validados, é algo pouco existente em atletas brasileiros de diferentes modalidades. Dessa forma, o presente estudo tem como objetivos: i) confirmar a proposta teórica de que há uma relação entre as dimensões constituintes da teoria multidimensional (i.e., ansiedade cognitiva, ansiedade somática e autoconfiança) e ii) verificar os efeitos do sexo, tipo de esporte (individual ou coletivo) e experiência competitiva nos níveis de ansiedade cognitiva, ansiedade somática e autoconfiança. Trezentos e três atletas (233 do sexo masculino e 70 do sexo feminino), de diferentes modalidades desportivas, com idades compreendidas entre os 18 e 40 anos (M = 24,22; DP = 5,07) preencheram uma versão reduzida do CSAI-2 (i.e., CSAI-2R), aproximadamente, uma hora antes do início das competições. Os resultados revelaram correlações significativas entre as dimensões de ansiedade cognitiva, ansiedade somática e autoconfiança de acordo com os pressupostos teóricos da teoria multidimensional. Adicionalmente, as análises comparativas indicaram que os atletas do sexo feminino e de esportes coletivos evidenciaram níveis superiores de ansiedade cognitiva, enquanto os atletas masculinos e com alta experiência competitiva reportaram maiores níveis de autoconfiança. Estes resultados foram discutidos, tendo em conta as implicações teóricas e práticas destas evidências para o planejamento de intervenções da psicologia do esporte no Brasil, em atletas de diferentes contextos.*

Palavras-chave: *Ansiedade; Esportes; Sexo.*

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INTRODUCTION

Competitive anxiety framed in a multidimensional perspective has been the guiding theory of various studies analyzing anxiety in the competitive context[1,2]. Aiming at creating an instrument to study anxiety in the context of sport, Martens et al.[3] developed the *Competitive State Anxiety Inventory-2* (CSAI-2), an instrument comprising three dimensions: cognitive anxiety, somatic anxiety and self-confidence. According to the multidimensional anxiety theory[3], cognitive anxiety correlates positively with somatic anxiety, while both anxieties (cognitive and somatic) correlate negatively with self-confidence.

Studies on the development of this instrument revealed that the dimensions of competitive anxiety tend to be influenced by sex, type of sport and level of ability (for example, competitive experience)[3]. In regard to sex, female athletes are more prone to feel anxious than male athletes[3,4]. Thus, it appears that men and women have different perceptions in regard to the competitive situation, underscoring the need for deepening our knowledge about specificities in the Brazilian context. For Cazenave et al.[5], it is necessary to know the differences or similarities between the sexes concerning to competitive anxiety reported in sports.

In respect to type of sport, athletes of individual sports tend to report high scores of cognitive anxiety and low scores of self-confidence in comparison to athletes of team sports[3]. Confirming these results, Terry et al.[6] reported that athletes of individual sports tend to be more influenced by competitive anxiety than those in team sports. Mellalieu et al.[7] also found that the perceptions of anxiety and self-confidence are influenced by type of sport.

Regarding competitive experience, athletes with "high" competitive experience report lower levels of cognitive and somatic anxiety, as well as higher levels of self-confidence, in comparison to athletes with "low" competitive experience[7]. Therefore, the level of competitive experience seems to influence the interpretation of symptoms usually experienced by athletes in the competitive situation. More recently, Hanton et al.[8] confirmed these results and pointed to competitive experience as a variable of fundamental importance in the study of multidimensional anxiety.

According to our literature review, several studies[9-13] have been carried out with Brazilian athletes and the CSAI-2 instrument; however, proper adaptation of the instrument to the Brazilian context through structural equation modeling to guarantee proper use and valid results has not been performed. A suggestion has been made to deepen the studies in order to validate the instruments[14], primarily based on the use of multivariate statistical procedures that make it possible, in a more robust manner, to measure the psychometric properties of the instruments (namely reliability and validity of the construct). The majority of tests used in Portuguese-speaking (Brazil and Portugal) and Spanish-speaking (Spain and Latin American) countries were built and developed in other cultures, with some problems reported during the translation and adaptation of these psychometric tests[15].

In the context of sport, according to Becman and Kelman,[16] in order to be effective, the inventories used in the psychological evaluation of athletes require verification of their reliability (internal consistency) and validity.

Thus, it is necessary that Brazilian researchers adopt the practice of investigating competitive anxiety with properly validated instruments, due to the reasons cited above. Recently, in the Brazilian sport context, Fernandes et al.[17] verified that the original version of the CSAI-2 (27 items) revealed inadequate adjustment indices, while its reduced version (CSAI-2R[18]) revealed good reliability indices and factorial validity, and confirmed the metric invariance of this model for sex, type of sport and competitive level. Following the example of the international scientific community[7,8], it seems relevant to conduct in Brazil studies that aim to investigate the effects of demographic and contextual variables (sex, type of sport and competitive experience) on multidimensional anxiety. For this reason, the first hypothesis of this study, based on the multidimensional anxiety theory[3], is that cognitive and somatic anxiety are positively correlated to each other, and that self-confidence correlates inversely with anxieties (cognitive and somatic). The second hypothesis, based on previous studies, is that sex[3,4], type of sport[3,6] and competitive experience[7,8] have significant effects on the levels of anxiety and self-confidence of athletes.

Thus, this study has two objectives, namely: i) to confirm the existence of a relationship between the three dimensions that comprise the multidimensional theory (i.e., cognitive anxiety, somatic anxiety and self-confidence); and ii) to compare levels of cognitive anxiety, somatic anxiety and self-confidence by sex, type of sport (individual or team) and level of competitive experience.

METHODOLOGICAL PROCEDURES

Sample

The non-probabilistic and intentional sample was composed of 303 athletes (233 men and 70 women), of different sports, aged between 18 and 40 years old ($M = 24.22$; $SD = 5.07$). The athletes were amateurs from the south and northeast regions of Brazil. They had between 1 and 28 years of practicing the sport ($M = 9.03$; $SD = 5.92$), and between 1 and 26 years of competitive experience ($M = 7.84$; $SD = 5.70$). When the sport modality was analyzed, the following distribution was obtained:). Generally, 160 of the athletes practiced individual sports (for example, judo, jiu-jitsu, karate, running, surfing, swimming and tennis), while 143 of the athletes practiced team sports (for example, soccer, volleyball, basketball, handball and futsal). According to the method of division by the median, 150 athletes were categorized with "low competitive experience," while 145 were categorized with "high competitive experience."

Instruments

Demographic information: The athletes were requested to provide infor-

mation about sex, age, sport modality, type of sport, level of competition (amateur/professional), region and competitive experience.

Competitive anxiety: The athletes responded to a Brazilian version[17] of the CSAI-2R[18]. This is a self-reporting instrument composed of 17 items, grouped into three factors, in the following manner: items 2, 5, 8, 11 and 14 pertain to the cognitive anxiety factor; 1, 4, 6, 9, 12, 15 and 17 to somatic anxiety; and, 3, 7, 10, 13 and 16 to self-confidence. The answers were given according to a Likert-type scale of four points (1 = not at all and 4 = very much so). It is possible to calculate a standardized score for each dimension, through the sum of the responses of the items of each factor, divided by the respective number of items, with the values varying from between 1 and 4.

Procedures

After obtaining the authorization from the organizers of the competitions and technicians for the collection of data, the athletes were informed of the objectives of the investigation, and signed a free and informed consent term (TFCC), in which anonymity and confidentiality of all data collected were guaranteed. The questionnaires were filled out approximately one hour before the beginning of the competitions.

This study was approved by the Committee for Ethics in Research (Protocol 425/2010) by the Universidade Estadual de Santa Cruz [State University of Santa Cruz] (UESC), according to Resolution CNS/MS n. 196/1996.

Statistical analysis

Analysis of the data was divided into five stages. First, the premises of normality, linearity, multicollinearity and homogeneity of the variance-covariance matrix were analyzed using frequency, *scatter plots* and *Box's M test*. Then reliability of the dimensions of the CSAI-2R was examined through calculation of the *Cronbach's alpha*. In the third stage, the relationship between the dimensions of the CSAI-2R was verified through the coefficients of the *Pearson* correlation. In the fourth stage, the *median-split hoc* method was used to dichotomize groups in "high" and "low" competitive experience, based on the number of years of competitive experience. The athletes were dichotomized in "high" and "low" competitive experience, based on the years of experience in competitions via *median-split method*. Median values were calculated by years of competitive experience of the athletes in their sports (median = 7). Athletes with values above the median were allocated in the group of "high" competitive experience, while the athletes with values below the median were included in the group with "low" competitive experience. The median split (median = 7) for competitive experience resulted in 145 athletes in the group with "high" experience (M = 12.63, SD = 4.39) and 150 athletes with "low" experience (M = 3.27, SD = 1.96). Eight athletes were removed from the analysis for being classified in the median. This methodology was previously used by Mellalieu et al.[7], who investigated the effect of experience on competitive anxiety. Finally,

in the fifth stage, according to previous studies[7,8] that aimed to analyze the effect of contextual variables on the intensity of competitive anxiety, procedures for multivariate analysis of variance (MANOVA) were applied, in order to examine the effect of sex, type of sport and competitive experience on the dimensions of the CSAI-2R. Cognitive anxiety, somatic anxiety and self-confidence were entered as dependent variables, while sex, type of sport and competitive experience entered as independent variables. These analyses were done in SPSS 17.0 with the significance level at 5% ($p < 0.05$).

RESULTS

The data relative to the scores of the dimensions from the CSAI-2R were examined for possible typing errors, omitted cases and premises for multivariate analysis. No omitted cases were registered and the data entry typing errors were corrected; similarly, no extreme cases (by *Box-plot*) in the multivariate and univariate analysis were identified.

The premises of normality, linearity and multicollinearity were not violated, nor the premise of homogeneity of the variance-covariance matrix [$F_{(12, 677)} = 2.089$, $p > 0.05$] according to the recommendations of Tabachnick and Fidell.[19] The internal consistency of the dimensions of the CSAI-2R was calculated through *Cronbach's alpha*, and the following results were obtained: cognitive anxiety = 0.834, somatic anxiety = 0.778 and self-confidence = 0.809, which are above the normal criteria of 0.70.

Intercorrelations between the CSAI-2R dimensions

Cognitive anxiety showed a positive correlation with somatic anxiety ($r = 0.44$, $p < 0.01$), representing approximately 19.4% common variance, while self-confidence revealed a negative correlation with cognitive anxiety ($r = -0.43$, $p < 0.01$), revealing approximately 18.5% common variance, and with somatic anxiety ($r = -0.28$, $p < 0.01$) indicating approximately 7.8% common variance.

Analysis of the effect of sex

The MANOVA results by sex (male and female) are presented in Table 1. Generally, it was verified that this variable had a significant effect [$F_{(2,299)} = 6.988$, $p < 0.01$; Wilks' Lambda = 0.934, $\eta^2 = 0.066$] on competitive anxiety. The subsequent univariate analysis permitted verification that the female revealed higher levels of cognitive anxiety ($p < 0.05$) and lower levels of self-confidence ($p < 0.01$). Therefore, sex significantly affects somatic anxiety ($p > 0.05$).

Analysis of the effect of type of sport

The *MANOVA* results by type of sport (individual vs. team) are presented in Table 2. Generally, it was verified that this variable had a significant effect [$F_{(2,299)} = 6.019$. $p < 0.05$; Wilks' Lambda = 0.943. $\eta^2 = 0.057$] on competitive anxiety. The subsequent univariate analysis permitted the verification that

those practicing individual sports reported lower levels of cognitive anxiety ($p < 0.05$), with no significant differences ($p > 0.05$) existing between the scores for somatic anxiety and self-confidence.

Table 1. Comparative analysis of the factors from the CSAI-2R due to sex (female vs. male)

	Female m ± sd	Male m ± sd	F	p	η²
Cognitive anxiety	1.98 ± 0.66	1.76 ± 0.70	5.82	0.016	0.019
Somatic anxiety	1.80 ± 0.58	1.75 ± 0.56	0.51	0.474	0.002
Self-confidence	2.95 ± 0.54	3.30 ± 0.58	19.96	0.000	0.062

Table 2. Comparative analysis of the factors from the CSAI-2R due to type of sport (individual vs. team)

	Individual m ± sd	Collective m ± sd	F	p	η²
Cognitive anxiety	1.70 ± 0.71	1.94 ± 0.66	9.13	0.003	0.029
Somatic anxiety	1.80 ± 0.59	1.72 ± 0.53	1.59	0.208	0.005
Self-confidence	3.26 ± 0.62	3.17 ± 0.55	1.77	0.184	0.006

Analysis of the effect of the competitive experience

The *MANOVA* results by competitive experience (high vs. low) are presented in Table 3. Generally, it was verified that this variable has a significant effect [$F_{(3.291)} = 3.194$, $p < 0.05$; Wilks' Lambda = 0.968, η² = 0.32] on competitive anxiety.

Table 3. Comparative analysis of the factors from the CSAI-2R due to the competitive experience (high vs. low)

	High m ± sd	Low m ± sd	F	p	η²
Cognitive anxiety	1.75 ± 0.65	1.88 ± 0.73	2.52	0.114	0.009
Somatic anxiety	1.69 ± 0.54	1.81 ± 0.58	3.52	0.062	0.012
Self-confidence	3.31 ± 0.57	3.11 ± 0.60	8.33	0.004	0.028

The subsequent univariate analysis verified that athletes with a high amount of competitive experience revealed higher levels of self-confidence ($p < 0.05$), with significant differences ($p > 0.05$) in the levels of cognitive and somatic anxiety not being verified.

DISCUSSION

This study intended to investigate the relationship between the dimensions of competitive anxiety and self-confidence, measured through the CSAI-2R, as well as the influence of the variables sex, type of sport and competitive experience on these dimensions among Brazilian athletes. The Brazilian version[17] of the CSAI-2R[18], used in this study to verify competitive anxiety, showed good reliability indices and internal consistency (above 0.70), indicating homogeneity in the responses, and thus corroborating recent studies in the Brazilian context[17,20,21].

The first hypothesis of this study was supported by the results referring to correlations between the dimensions of anxiety (cognitive and somatic) and self-confidence measured through the CSAI-2R. These findings are in conformity with the multidimensional anxiety heory[3] and recent studies[17,20,21] in the Brazilian context. Thus, athletes with high scores of self-confidence tend to report low levels of cognitive and somatic anxiety, and vice versa. These data are of fundamental importance to interventions of sport psychology. When sport psychologists aim to help athletes control their pre-competition anxiety, it is suggested that these professionals emphasize the regulation and development of the self-confidence of the athletes. In this process, it is important to evaluate the dimensions that constitute the athletes' "perceived threats," since it is through cortical processing of the information that it becomes possible to intervene in a way that restructures the negative associations between cognitive anxiety and self-confidence. Further, it is important to adequately evaluate whether the levels of somatic anxiety identified may be (or may not) considered well adjusted behavior expressions to the competition situation, as it seems to be the case of physiological processes associated to the organic responses of fight or flee. As such, these findings suggest that interventions centered on cognitive restructuring to promote the control and reduction of negative thoughts and wrong interpretations of the somatic manifestations of the athletes in the pre-competitive situation will have a positive effect on levels of self-confidence, which is one of the most important dimensions of high levels of sport performance[22]. However, on this aspect, it is highlighted that the dominion of evaluation that the CSAI-2R makes possible is nomothetic. The clinical use of the data provided by this instrument should be duly based on an efficient diagnostic system, which consequently underlies the interventions that aim for the reinterpretation of the perceptions that appear as negative. The process of counseling should take into consideration mediator variables such as individual and contextual characteristics (for example, sex, age, type of sport, temperament, competitive experience, previous titles).

As such, the second hypothesis of this study sought to investigate the contribution of some of these variables (sex, type of sport and competitive experience) on the levels of anxiety and self-confidence, for which the results tend to corroborate the previous findings of international studies. Generally, sex had a significant effect on competitive anxiety of the athletes, in accordance with the results of Martens et al.[3], and Clifton and Gill.[4] Similarly, in consonance with the results of Modroño and Guillén[23]. In this study male athletes reported lower levels of cognitive anxiety than female athletes, which reported low levels of self-confidence compared to the male athletes.

In regard to type of sport, generally this variable had a significant effect on competitive anxiety, in accordance with findings of Martens et al.[3] and deTerry et al.[6]. Thus, type of sport (e.g. individual or team) is highlighted as a variable that influences levels of competitive anxiety[22]. In this study,

the individual athletes reported lower scores of cognitive anxiety than the athletes for team sports. This result may be partly explained by the perception that the athlete has higher level of control that s/he exercises over what s/he can do during the competition. Alternatively, the closeness of the relationship with the trainer may have a moderating effect, but this will be dependent on how both articulate, define and share the competitive objectives among themselves. Good trainer/athlete communication is fundamental for the proper development of strategies to deal with the resulting worries/trepidations of the competition.

Finally, in general, competitive experience also exercises a significant effect on competitive anxiety. These results are similar to the findings of de Mellalieu et al.[7] and de Hanton et al.[8], who reported that the athletes with high competitive experience reported lower scores of cognitive and somatic anxiety in comparison to the athletes with low competitive experience, which reported lower levels of self-confidence than the athletes with high competitive experience.

The findings of this study can be considered an advance in the study of competitive anxiety in Brazil, first due to the reliable and valid results obtained from the Brazilian version[17] of the CSAI-2R to assess anxiety and self-confidence in Brazilian athletes, and further by providing knowledge about the effect of demographic variable (sex) and contextual variables (type of sport and competitive experience) on competitive anxiety. These results are of fundamental importance for the planning, organization and evaluation of the interventions of sport psychology in Brazil, due to the fact that they provide indications of how male and female athletes, from different types of sport (individual and team) and different levels of competitive experience (high and low) have different perceptions of anxiety and self-confidence.

This study has some limitations that should be pointed out: i) the cross-study design, which makes causal inference impossible; ii) the sample was composed of diverse sport modalities in a non-proportional sample size; iii) the samples of men and women were not equal in number. Thus, it is suggested that in future studies, the sample related to sex is balanced in number, as well as advance with the CSAI-2R added from the dimensions of responses from direction and frequency to the dimension of intensity normally used, which is a contemporary tendency in the verification of competitive anxiety.

CONCLUSIONS

The primary results of this study involving Brazilian athletes indicate that the dimensions of the CSAI-2R are moderately correlated among themselves, as proposed by the multidimensional theory of anxiety[3]. Additionally, comparative analyses indicate that female athletes of team sports show higher levels of cognitive anxiety, while male athletes with high competitive experience report higher levels of self-confidence. These findings suggest

that the demographic and contextual variables studied influence, in a reduced and moderate manner, the way how Brazilian athletes perceive anxiety and self-confidence, constituting important references for future interventions centered on the improvement of the sport performance of these athletes.

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