

COMPETITIVE ANXIETY IN ATHLETES: EMOTION REGULATION AND PERSONALITY MATTER

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Abstract:

Competitive anxiety is an important issue in sport psychology since it is capable of influencing athletes' performance. This study aims to examine the role of emotion regulation and personality in explaining individual differences in competitive anxiety of athletes, considering their sex and sport modality. A total of 101 athletes (50.5% males), aged between 18 and 69 years ($M = 26.22$; $SD = 0.99$), were included in this cross-sectional study. They filled out self-report scales on emotion regulation, personality, and competitive anxiety. Multiple regressions were used to analyze the data. Results partially supported our hypotheses. While sex differences were found in competitive anxiety, with women experiencing higher cognitive and somatic anxiety and lower self-confidence in comparison to men, no differences were found according to sport modality. Additionally, cognitive reappraisal was significantly associated with self-confidence, whereas neuroticism and extroversion were significantly associated with competitive anxiety dimensions.

Key words: *emotion regulation, personality, competitive anxiety*

Introduction

Competitive anxiety (CA) can be defined as “a tendency to perceive competitive situations as threatening and to respond to these situations with feelings of apprehension and tension” (Martens, Vealey, & Burton, 1990, p. 23). CA is an important issue in sport because it has been linked to athletic performance (e.g., disrupted attention, sleep patterns and appetite disorders, and increased fatigue) (e.g., Khan, Khan, Khan, & Khan, 2017; Neil, Wilson, Mellalieu, Hanton, & Taylor, 2012). Indeed, CA can affect not only the athletes' physiological functioning by impacting body functions (e.g., muscles shaking, fast heartbeat), but also their psychological functioning by impacting their feelings and perceptions, something that can negatively influence their performance (Khan, et al., 2017). CA has been linked not only to performance but also to other important outcomes such as reduced enjoyment, discontinuation of sport participation, and injury vulnerability (Grossbard, Smith, Smoll, & Cumming, 2009).

For this reason, it is important to examine what factors are responsible for individual differences in CA in athletes. Three dimensions of CA have been widely studied in the field of sports psychology, and researchers have developed various measures

to assess each dimension separately or in combination. One of the most used measures is the Competitive State Anxiety Inventory-2 (CSAI-2), which includes three dimensions: cognitive anxiety, somatic anxiety, and self-confidence (Cox, Martens, & Russell, 2003; Martens, et al., 1990; Woodman & Hardy, 2003). Cognitive anxiety “refers to negative self-evaluations and self-doubts about an athlete's ability to perform”, being characterized by worry and negative thoughts related to one's performance; somatic anxiety “refers to athlete's perception of physiological elements of anxiety, such as muscle tension and increased heart rate”, being characterized by physical symptoms of anxiety (Lundqvist & Hassmén, 2005, p. 727), and self-confidence that refers to athlete's belief in his/her ability to be successful, being characterized by positive thoughts and feelings related to one's performance.

Several variables have been identified as potential explanations for individual differences in CA levels. These variables encompass a range of factors, including demographic characteristics and psychological factors. In terms of sociodemographic variables, in a recent review (Rocha & Osório, 2018), it was found that sex and sport modality contributed to the explanation of individual differences in CA among athletes. More specifically, women tended to

experience higher levels of anxiety in comparison to men; the same pattern was found for athletes who practiced individual sports and tended to experience higher levels of anxiety in comparison to athletes who practiced team sports (Rocha & Osório, 2018). However, in some studies no differences have been found or differences in the opposite direction have been reported (e.g., Fernandes, Nunes, Vasconcelos-Raposo, & Fernandes, 2013; Modronno & Guillen, 2011). Thus, it is important to continue to explore sex and sport modality differences in CA levels. Moreover, previous studies found gender and type of sport were important factors affecting personality and CA (Kemarat, Theanthong, Yeemin, & Suwankan, 2022; Patsiaouras, Chatzidimitriou, Charitonidis, Giota, & Kokaridas, 2017) as well as emotion regulation and CA (Bardeen & Stevens, 2015). Thus, it is important to understand how these factors interact when explaining individual differences in CA levels.

In terms of psychosocial variables, emotion regulation and personality emerge as important dimensions, among others (e.g., cognitive bias, self-confidence, hardiness, coping, motivation) (Mella-lieu, Hanton, & Fletcher, 2009). Indeed, competitive sports create a wide range of emotions, both positive and negative (Martinent, Ledos, Ferrand, Campo, & Nicolas, 2015; McCarthy, 2011). However, researchers have focused their attention on negative emotions because they can have a detrimental effect on athletes' performance and engagement (e.g., Hanin, 2007; Martinent, et al., 2015). For this reason, emotion regulation (ER) plays a central role within the sport context. ER refers to individuals' attempts to control the type of emotions they experience, their timing, and expression (Gross, 2015; McRae & Gross, 2020). While ER is often deliberate, it can also occur outside of conscious awareness and it can target one's own emotions (i.e., intrinsic regulation) or someone else's emotions (i.e., extrinsic regulation) (McRae & Gross, 2020).

According to the process model of emotion regulation proposed by Gross (2015), individuals may regulate their emotions at five temporal points of the emotion generative process: situation selection, situation modification, attentional deployment, cognitive change, and response modulation. The first four points involve antecedent-focused strategies aiming at changing the way individuals think about the stimuli/event to change its emotional impact (e.g., cognitive reappraisal) and the last one involves response-focused strategies (e.g., expressive suppression) aiming at changing the behavioral expression of emotions (Gross, 2015). Indeed, these two strategies, cognitive reappraisal and expressive suppression, have been the most studied strategies of ER. While cognitive reappraisal has been linked to positive outcomes, expressive suppression has been linked to more negative outcomes (e.g.,

Butler, et al., 2003; Dryman & Heimberg, 2018; Moore, Zoellner, & Mollenholt, 2008). Yet, it is now recognized that the consequences linked to these ER strategies can varied if used in a flexible way or according to different contexts (e.g, Bonanno & Burton, 2013).

In the context of sport, ER has been linked to sport enjoyment (Tamminen, Gaudreau, McEwen, & Crocker, 2016), athletes' mental health – with cognitive reappraisal being positively and suppression negatively linked to mental health (Bird, Quinton, & Cumming, 2021), and greater experience of pleasant emotions (Uphill, Lane, & Jones, 2012). In a recent study, Kim and Tamminen (2022) found that when athletes used more cognitive reappraisal and less expressive suppression to regulate their emotions, they experienced more favorable sports outcomes such as pleasant emotions, confidence, satisfaction, lower emotional loneliness, and higher social connection. Molina, Oriol, & Mendoza (2018) also found that cognitive reappraisal was positively associated with positive affect, self-efficacy, and physical recovery, while expressive suppression was negatively linked to these sport-related outcomes. However, no studies have focused their attention on how ER contribute to the explanation of individual differences in CA among athletes, and on how ER interacts with sex and sport modality in this context. In fact, studies that examine sex differences in ER show that women are likely to experience higher levels of anxiety due to poor ER clarity, while men are likely to experience lower levels of anxiety due to higher perceived ER clarity (e.g., Bardeen & Stevens, 2015). Also, according to Nolen-Hoeksema (2012), cultural norms encourage males to suppress their emotions, while females are generally perceived as being more emotional (Barrett & Bliss-Moreau, 2009). Furthermore, women are typically considered to be superior in recognizing emotions and utilizing emotion-related information.

Another important psychological factor is personality. It can be defined as “the enduring configuration of characteristics and behavior that comprises an individual's unique adjustment to life, including major traits, interests, drives, values, self-concept, abilities, and emotional patterns” (VandenBos, 2015, p. 782). One of the most acceptable models of personality is the Big-Five model proposed by Costa and McCrae (1992) due to its empirical support (has consistently demonstrated its validity and reliability across cultures and demographics), comprehensiveness (covers a broad range of personality traits and dimensions), and predictive power (has been shown to predict a range of outcomes, as detailed below) (Bainbridge, Ludeke, & Smillie, 2022; Soto & John, 2017). According to this model, personality can be described using five dimensions: extroversion, agreeableness, conscientiousness, emotional stability (or neuroticism),

and openness. Extroversion is characterized by higher levels of sociability, energy, and assertiveness; agreeableness is characterized by cooperation and kindness, warmth, sympathy and honesty; conscientiousness is characterized by orderliness, responsibility, reliability, hard work, and discipline; neuroticism (the opposite of emotional stability) is characterized by insecurity, susceptibility to suggestion, lack of persistence against obstacles, feeling of inferiority or nervousness; and, finally, openness is characterized by openness to experiences, creativity, curiosity, and ingenuity (John, Naumann, & Soto, 2008; Larsen & Buss, 2009).

These personality traits have been associated with a wide range of psychological outcomes. For instance, low extroversion, high neuroticism, and low conscientiousness were associated with an increased risk of depressive symptoms (Hakulinen, et al., 2015). High neuroticism, low conscientiousness, and low agreeableness were found to be risk factors for parental burnout (Le Vigouroux, Scola, Raes, Mikolajczak, & Roskam, 2017). Other studies showed that personality was linked to relationship satisfaction, emotion regulation, quality of life, among others (e.g., Pocnet, Dupuis, Congard, & Jopp, 2017; Vater & Schroder-Abé, 2015).

Also, personality seems to influence several sport-related outcomes. For example, in a previous study with university athletes, it was found that high agreeableness, high conscientiousness, and high openness were significant predictors of athletes' performance (Habib, Waris, & Afzal, 2020). Also, Zhang et al. (2019) found that low neuroticism and high agreeableness, conscientiousness, and extraversion were associated with more self-control and self-efficacy among male and female boxers. Other studies showed the influence of personality traits in preparation strategies, coping strategies during competitions, relationship with teammates and coaches (see Allen & Laborde, 2014, and Roberts & Woodmann, 2017, for more details).

In terms of personality influence on CA, the research is scarce. A recent study (Kemarat, et al., 2022) found that among the five personality dimensions, neuroticism was the only one to have a significant effect on CA, being associated with higher levels of CA. When the subsamples were analyzed separately, it was found that agreeableness had also a positive effect on CA among athletes of team sports (only). In one study conducted only with males, it was found that high neuroticism was associated with higher levels of competitive anxiety and physiological arousal. However, this association was only significant in the experimental group, in which anxiety was manipulated by means of an incentive (Balyan, Tok, Tatar, Binboga, & Balyan, 2016). Indeed, some studies found that gender and type of sport were important dimensions in shaping personality and competitive anxiety (Kemarat, et

al., 2022; Patsiaouras, et al., 2017), thus they deserve more attention.

The present study

The aims of this study were twofold: to examine differences in competitive anxiety according to sex and sport modality, and to examine the role of emotion regulation and personality in explaining individual differences in competitive anxiety, considering the sex and sport modality.

We hypothesized that (H1) women would present higher cognitive and somatic anxiety and less self-confidence in comparison to men; (H2) athletes from individual sports would experience higher cognitive and somatic anxiety and less self-confidence in comparison to athletes from team sport (Rocha & Osório, 2018). Additionally, we hypothesized (H3) that cognitive reappraisal would be associated with less cognitive and somatic anxiety and with more self-confidence, while expressive suppression would be associated with more cognitive and somatic anxiety and less self-confidence (e.g., Bird, et al., 2021; Kim & Tamminen, 2022; Tamminen, et al., 2016). Also, (H4) athletes with higher levels of neuroticism would present more cognitive and somatic anxiety and less self-confidence (e.g., Balyan, et al., 2016; Kemarat, et al., 2022).

Methods

Recruitment

An online calculator was used to estimate the sample size needed (<https://www.danielsoper.com/statcalc/default.aspx>). Given the number of predictors in each regression model (from four to seven), to achieve 80% of power (with a significance level of $\alpha = .05$) and a medium effect size ($d = .015$; Cohen, 1988), the minimum required sample size ranged between 74 and 93.

Inclusion criteria were the following: (1) being an athlete – this means that the participant must engage in some form of sports activity; (2) have more than 18 years – this means that the participant must be 18 years old or older; (3) involved in practicing a team or individual sport – this means that the participant must be involved in either a team sport or an individual sport that involves competition with other individuals. The selection of participants was based on the personal contacts of the first author, who is also an athlete, and for that reason had personal connections within the athletic community.

Measures and instruments

Sociodemographic questionnaire – used to collect data regarding sex, age, sport modality (individual or team sport), type of sport, number of hours per week of practicing sport.

Competitive anxiety was measured with the Competitive State Anxiety Inventory – 2 (CSAI-2), developed by Martens et al. (1990) and validated to the Portuguese population by Cruz et al. (2006). The CSAI-2 has 27 items divided by three dimensions: cognitive anxiety (9 items; item example: “*I’m concerned that others will be disappointed with my performance*”), somatic anxiety (9 items; item example: “*I feel tense in my stomach*”), and self-confidence (9 items; item example: “*I’m confident I can meet the challenge*”). Items were rated on a four-point scale ranging from 1 (not at all) to 4 (very much so). Cronbach’s alpha (values above 0.6 were considered reliable and acceptable index; Nunnally & Bernstein, 1994) in this study was .90 for cognitive anxiety, .89 for somatic anxiety, and .77 for self-confidence.

Personality was measured using the Ten-Item Personality Inventory (TIPI) developed by Gosling, Rentfrow, and Swann (2003) and validated to the Portuguese population by Nunes, Limpo, Lima, and Castro (2018). The TIPI has 10 items with two items measuring each of the Big-Five personality dimensions. Items were rated on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Cronbach’s alphas obtained in this study were similar to the original English version (range .48 - .68) and to the Portuguese translated version (range .39 - .72), ranging from .35 to .71. Despite the low-to-moderate Cronbach’s alphas (something usually found in shorter scales), the TIPI is considered a reliable measure due to their temporal stability and convergence with longer measures (Nunes, et al., 2018).

Emotion regulation was measured using the Emotion Regulation Questionnaire (ERQ), developed by John and Gross (2003) and validated to the Portuguese population by Vaz (2009). The ERQ has 10 items and contains two dimensions: expressive suppression (4 items; item example “*I keep my emotions to myself*”), and cognitive reappraisal (6 items; item example “*When I want to feel less negative emotion (such as sadness or anger), I change what I’m thinking about*”). Items were rated on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Cronbach’s alpha in this study was .71 for expressive suppression and .66 for cognitive reappraisal.

Procedure

This study was approved by the Ethics Committee from CIP – Universidade Autónoma de Lisboa Luís de Camões (Reference number: 12-2021). Data were collected via an online platform (i.e., Google Forms). Data collection for the study began during the COVID-19 pandemic when competitions were suspended. As a result, an initial pool of participants ($n = 34$; 33.7%) were asked to recall a specific and noteworthy competition they

had participated in within the preceding weeks/months. Once competitions resumed, the remaining participants completed the questionnaire after a competition had taken place.

The study was shared in social networks of sports clubs that were contacted for the purpose of this study. Informed consent was presented on the first page and was obtained from all participants. Confidentiality and voluntariness were ensured.

Data analysis

The data were organized in the following order: descriptive results of participants, differential analysis, correlations, and, finally, linear regressions. Descriptive statistics (mean, standard deviations – SD, and frequencies) were used to summarize the participants’ characteristics, including mean age, sex distribution, and sport modality. Differential analyses were performed by multivariate analysis of variance (MANOVA). A MANOVA was used due to significant correlations found between the three dimensions of competitive anxiety scale – cognitive anxiety, somatic anxiety, and self-confidence (that ranged between $r = -.54$ and $r = .68$). Wilks’ Lambda (Λ) was used to test whether there were differences between the variable means according to sex or sport modality. The partial eta-squared η^2 was used as the effect size. This effect size was interpreted following these guidelines: $\eta^2 = 0.01$ indicated a small effect; $\eta^2 = 0.06$ indicated a medium effect; $\eta^2 = 0.14$ indicated a large effect (Cohen, 1973).

Pearson correlations were used to assess the strength and direction of the linear relationships between the variables in the study. Finally, a multiple regression was conducted to assess the predictive relationship between the variables. Two hierarchical regressions (following a two-block strategy with enter method) were used to examine the role of personality and emotion regulation (block one included sex and modality; block two included emotion regulation dimensions/ personality dimensions). Sex and modality were turned into dummy variables to be included in correlations and regression analyzes.

Assumption checking was conducted to ensure that the regression analysis was appropriate. First, in terms of linearity, scatter plots revealed linear relationships between the dependent variables and each independent variable. Second, in terms of normality, the Q-Q plots and histograms of the residuals showed a relatively normal distribution. Additionally, skewness and kurtosis z-values were below 3.29 suggesting data normality (for medium-sized samples [$50 < n < 300$]; Kim, 2013) (except one dimension of personality – agreeableness that presented a skewness z-value of 4.53). Third, in terms of multicollinearity, the correlation matrix showed no correlation coefficients between the independent variables, suggesting that the assump-

tion of no multicollinearity was met. Additionally, the VIF values were below 2, further confirming that multicollinearity was not a major concern in the analyses.

To assess regression quality, we used the coefficient of determination R-squared (together with the other variables in a statistical model). It measures how well a statistical model predicts an outcome since it represents the proportion of variance in the dependent variables that is explained by the independent variables. It ranges from 0 to 100%, with a higher value indicating a stronger relationship between the independent and dependent variables. For all analyses, the significance level was set as a p-value less than 0.05. Data were analyzed using SPSS (version 28).

Results

Participants

A total of 101 Portuguese athletes (50.5% males) participated in this study. In terms of age, 69.3% ($n = 70$) were between 18 and 25 years old, 22% ($n =$

22) between 26 and 40 years, and 8.7% ($n = 9$) were between 41 and 69 years (M age = 26.22; $SD = .99$).

Sixty of the participants practiced team sports and 41 practiced individual sports. Their sport experience was, on average, ± 9.96 years ($SD = .58$) and they practiced, on average, 8.6 hours per week ($SD = .49$). Most had a national competitive experience (Tier 3: Highly Trained/National Level) with five athletes having experience in international competitions (Tier 4: Elite/International Level; according to the classification proposed by McKay, et al., 2022).

The main individual sports included: swimming ($n = 7$; 6.9%), athletics ($n = 6$; 5.9%), and combat sports ($n = 5$; 5%); and the main team sports were: volleyball ($n = 21$; 20.8%), handball ($n = 13$; 12.9%), rugby ($n = 8$; 7.9%), football ($n = 7$; 6.9%) and roller hockey ($n = 7$; 6.9%).

Descriptive analyses

Descriptive statistics for the whole sample and according to sex and sport modality are presented in Table 1.

Table 1. Descriptive statistics for the whole sample and according to sex and sport modality

Sex	Modality		ES	CR	CA	SA	SC	Ext	Amability	Cons	Emo S	Open	
Men	Individual	M	3.73	4.99	2.03	1.92	2.83	5.48	5.91	5.61	4.43	5.65	
		N	23	23	23	23	23	23	23	23	23	23	23
		SD	1.22	.89	.67	.48	.53	1.43	.98	1.16	1.44	1.21	
	Team	M	4.35	5.07	2.27	1.79	2.95	4.54	5.96	5.63	3.96	5.16	
		N	28	28	28	28	28	28	28	28	28	28	28
		SD	1.16	.94	.75	.34	.44	1.50	.84	1.02	.94	.81	
	Total	M	4.07	5.03	2.16	1.85	2.90	4.96	5.94	5.62	4.18	5.38	
		N	51	51	51	51	51	51	51	51	51	51	51
		SD	1.21	.91	.72	.41	.48	1.53	.90	1.08	1.20	1.03	
Women	Individual	M	3.94	4.88	2.50	2.36	2.47	4.92	5.83	5.75	3.78	5.44	
		N	18	18	18	18	18	18	18	18	18	18	18
		SD	1.15	.86	.65	.54	.51	1.68	.92	1.23	1.09	1.03	
	Team	M	3.95	4.63	2.73	2.07	2.57	4.97	6.09	5.50	3.97	5.48	
		N	32	32	32	32	32	32	32	32	32	32	32
		SD	1.32	.80	.65	.56	.42	1.51	.92	1.19	1.16	1.30	
	Total	M	3.95	4.72	2.65	2.18	2.53	4.95	6.00	5.59	3.90	5.47	
		N	50	50	50	50	50	50	50	50	50	50	50
		SD	1.25	.82	.654	.56	.45	1.56	.92	1.20	1.12	1.20	
Total	Individual	M	3.82	4.94	2.24	2.11	2.67	5.23	5.88	5.67	4.15	5.56	
		N	41	41	41	41	41	41	41	41	41	41	41
		SD	1.18	.87	.70	.54	.54	1.55	.95	1.18	1.32	1.12	
	Team	M	4.13	4.83	2.52	1.94	2.74	4.77	6.03	5.56	3.97	5.33	
		N	60	60	60	60	60	60	60	60	60	60	60
		SD	1.25	.89	.73	.49	.46	1.51	.88	1.11	1.05	1.103	
	Total	M	4.01	4.89	2.40	2.01	2.71	4.96	5.97	5.60	4.04	5.43	
		N	101	101	101	101	101	101	101	101	101	101	101
		SD	1.23	.88	.73	.52	.50	1.53	.91	1.13	1.17	1.11	

Note. M = mean; N = number of participants; SD = standard deviation; ES = expressive suppression; CR = cognitive reappraisal; CA = cognitive anxiety; AS = somatic anxiety; SC = self-confidence; Ext = extroversion; Cons = consciousness; Emo S = emotional stability; Open = openness.

Differential analyses

For sex, multivariate tests indicated significant differences ($\Lambda [3,97] = 6.64, p < .001, \eta^2 = .17$). Tests of between-subjects effects showed significant medium-large differences for the three dimensions, specifically for cognitive anxiety ($F [1,99] = 12.66, p < .001, \eta^2 = .11$), for somatic anxiety ($F [1,99] = 11.43, p = .001, \eta^2 = .10$) and for self-confidence ($F [1,99] = 15.71, p < .001, \eta^2 = .14$). Women presented more cognitive ($M = 2.65; SD = .65$) and more somatic anxiety ($M = 2.18; SD = .56$) than men ($M = 2.16; SD = .72; M = 1.85; SD = .41$), respectively. On the contrary, men ($M = 2.90; SD = .48$) presented more self-confidence than women ($M = 2.53; SD = .45$).

For sport modality, multivariate tests indicated significant differences ($\Lambda [3,97] = 8.50, p < .001, \eta^2 = .21$) but tests of between-subjects effects showed small effects with no significant differences in any of the three dimensions (cognitive anxiety: $F [1,99] = 3.76, p = .055, \eta^2 = .04$; somatic anxiety: $F [1,99] = 2.76, p = .100, \eta^2 = .03$; self-confidence: $F [1,99] = .48, p = .489, \eta^2 = .01$).

For ER multivariate tests indicated no differences nor according to sex ($\Lambda [2,98] = 1.66, p = .195, \eta^2 = .03$) neither according to sport modality ($\Lambda [2,98] = 1.09, p = .339, \eta^2 = .02$). Also, for personality multivariate tests indicated no differences nor according to sex ($\Lambda [5,95] = .36, p = .877, \eta^2 = .02$) neither according to sport modality ($\Lambda [5,95] = .67, p = .646, \eta^2 = .03$).

Correlations analyses

Correlations among the study variables are presented in Table 2. We found that sex was positively associated with cognitive ($r = .34, p < .01$) and somatic anxiety ($r = .32, p < .01$) and negatively associated with self-confidence ($r = -.39, p < .01$) (positive = being women; negative = being men). Modality was not significantly associated with any

study variable. Cognitive reappraisal was positively associated with self-confidence ($r = .24, p < .05$) and consciousness ($r = .20, p < .01$), and expressive suppression was negatively associated with extroversion ($r = -.37, p < .01$), consciousness ($r = -.28, p < .01$), and openness ($r = -.20, p < .01$).

Extroversion was negatively associated with somatic anxiety ($r = -.26, p < .01$) and positively associated with self-confidence ($r = .32, p < .01$). Consciousness was positively associated with self-confidence ($r = .21, p < .05$). Emotional stability was negatively associated with cognitive ($r = -.54, p < .01$) and somatic anxiety ($r = -.48, p < .01$) and positively associated with self-confidence ($r = .44, p < .01$).

Regression analyses

Regression results are presented in Table 3 (for emotion regulation variables) and Table 4 (for personality variables). Regression models explained a significant portion of the variance in competitive anxiety subscales. The entry of emotion regulation subscales in step 2 of the regression model (Table 3) did not show a relevant contribution, since emotion regulation only explained the 15% of the cognitive anxiety variance, the 15% of the somatic anxiety variance and the 21% of the self-confidence variance. Only cognitive reappraisal was associated with higher levels of self-confidence, controlling for sex and sport modality.

The entry of personality dimensions in step 2 (Table 4) explained 39% of the cognitive anxiety variance, 40% of the somatic anxiety variance, and 39% of the self-confidence variance. Those with higher levels of emotional stability tended to experience higher levels of cognitive and somatic anxiety and lower levels of self-confidence. And those with higher levels of extroversion tended to experience lower levels of somatic anxiety, controlling for sex and sport modality.

Table 2. Correlations among the study variables ($N = 101$)

	Sex	Mod	CR	ES	Cog_A	Som_A	SC	Extr	Agree	Cons	ES
Mod	.093	-									
CR	-.179	-.062	-								
ES	-.051	.125	.135	-							
Cog_A	.343**	.180	-.097	.105	-						
Som_A	.322**	-.165	-.077	.044	.681**	-					
SC	-.385**	.059	.237*	-.101	-.621**	-.538**	-				
Extr	-.004	-.150	.015	-.374**	-.195	-.256**	.315**	-			
Agree	.033	.085	.173	.063	.056	-.020	-.032	-.021	-		
Cons	-.012	-.049	.197*	-.281**	-.021	.024	.241*	.367**	.106	-	
ES	-.119	-.076	.098	-.107	-.541**	-.478**	.441**	.284**	-.079	.061	-
Open	.040	-.101	.141	-.196*	-.055	-.044	.129	.388**	.199*	.242*	.147

Note. ** $p < .01$; * $p < .05$; Mod = modality; Cog_A = cognitive anxiety; Som_A = somatic anxiety; SC = self-confidence. Extr = extroversion; Agree = agreeableness; Cons = conscientiousness; ES = emotional stability; Open = openness.

Table 3. Hierarchical multiple regression analyses for emotion regulation variables predicting competitive anxiety levels

	Variables	Cognitive Anxiety		Somatic Anxiety		Self-confidence	
		B	B	B	B	B	B
Step 1	Sex	.32**		.34**		-.38***	
	Modality	.16		-.20*		.11	
Step 2	Sex		.32**		.34**		-.35***
	Modality		.14		-.21*		.14
	Cognitive reappraisal		-.05		-.04		.21*
	Expressive suppression		.11		.09		-.17
	Adj R ²	.14	.15	.14	.15	.15	.21
F for change in R ²		7.92	.76	8.09	.52	8.50	3.75
		.001	.472	.001	.599	.000	.027
Effect size (f ²)			0.01		0.01		0.08

Note. *p<.05; **p<.01; ***p<.001.

Table 4. Hierarchical multiple regression analyses for personality variables predicting competitive anxiety levels

	Variables	Cognitive Anxiety		Somatic Anxiety		Self-confidence	
		B	B	B	B	B	B
Step 1	Sex	.33**		.34**		-.39***	
	Modality	.15		-.20*		.10	
Step 2	Sex		.27**		.30**		-.36***
	Modality		.11		-.24**		.16
	Extroversion		-.06		-.24*		.18
	Agreeableness		-.01		-.07		-.02
	Conscientiousness		.03		.12		.16
	Emotional stability		-.49***		-.41***		.35***
	Openness		-.04		.06		.00
	Adj R ²	.14	.39	.14	.40	.16	.39
F for change in R ²		7.96	7.55	8.09	7.88	9.13	7.28
		.001	.000	.001	.000	.000	.000
Effect size (f ²)			0.41		0.43		0.38

Note. *p<.05; **p<.01; ***p<.001.

Discussion and conclusions

The purpose of this study was to investigate how emotion regulation and personality traits influence individual variations in CA among athletes, while considering their sex and sport modality. Given that CA can significantly impact athletes' performance (e.g., in terms of passing decision-making or attack/post defense attack; Costa, Fernandes, Silva, & Batista, 2019; Fortes, et al., 2018), gaining a better understanding of its underlying factors is crucial. Overall, our results showed that women tended to present more cognitive and somatic anxiety, while men tended to present more self-confidence. Additionally, cognitive reappraisal contributed to explain levels of self-confidence and personality dimensions contributed to the explanation of somatic anxiety and self-confidence, considering the sex and the sport modality of athletes.

The first aim of this study was to explore the differences in CA according to sex and sport modality. While H1 (i.e., women would present higher cognitive and somatic anxiety and less self-confidence in comparison to men) was confirmed with women presenting higher cognitive and somatic anxiety and men presenting higher self-confidence. However, H2 (i.e., athletes from individual sports would experience higher cognitive and somatic anxiety and less self-confidence in comparison to athletes from team sport) was not confirmed since no differences were found on competitive dimensions according to sport modality. As expected, women experienced higher levels of cognitive and somatic anxiety, while men experienced higher levels of self-confidence (Criticos, Layne, Simonton, & Irwin, 2020; Kemarat, et al., 2022; Rocha & Osório, 2018). However, it is important

to note that men may underestimate their levels of anxiety and overestimate their self-confidence due to sex-related stereotypes that consider anxiety as a weakness and thus men should not experience it (e.g., Dias, Cruz, & Fonseca, 2020). Also, some authors (Rocha & Osório, 2018) highlight the role of neurology when explaining sex differences in anxiety since women tend to experience more oscillations in gonadal hormones levels, which may increase their vulnerability to stress and anxiety, in comparison to men (e.g., Kundakovic & Rocks, 2022). Other factors, however, may contribute to the explanation of these differences. Women, in comparison to men, tend to focus more on the risk of failure rather than on achieving success; they are more susceptible to pressures from sport environments and are more susceptible to external stimuli (Morris & Kavussanu, 2009; Rocha & Osório, 2018; Souza, Teixeira, & Lobato, 2012; Stefanello, 1990). Additionally, women are more likely to have poor ER clarity in comparison to men, which can contribute to increasing their levels of anxiety (e.g., Bardeen & Stevens, 2015).

In terms of differences according to sport modality, our results were not in accordance with the literature (H2 not confirmed). While most of the studies showed that athletes from individual modalities tended to experience higher levels of CA (Correia & Rosado, 2019; Kemarat, et al., 2022; Patel, Omar, & Terry, 2010; Ramis, Viladrich, Sousa, & Jannes, 2015; Rocha & Osório, 2018), we did not find that in our study since no differences were found according to sport modality in athletes' CA. We would expect that athletes from individual sport modalities would experience higher CA because their performance and responsibility for achieving the desired results depend only on them, and athletes from team sports would experience lower anxiety since the responsibility for achieving the desired results is shared with the other team members (e.g., Dias, et al., 2020; Rocha & Osório, 2018). However, we did not find differences.

In one study (Fernandes, et al., 2013), it was found that athletes from individual modalities experienced less cognitive anxiety (because they would have more control in what they were doing during the competition) and no differences were found for somatic anxiety and self-confidence. As emphasized by some authors (Fernandes, et al., 2013; Pluhar, et al., 2019), it is possible that other variables, such as relationship with the trainer or good trainer/athlete communication, may play a major role in explaining individual differences in CA.

Our results partially confirmed our H3 saying that cognitive reappraisal would be associated with less cognitive and somatic anxiety and with more self-confidence, while expressive suppression would be associated with more cognitive and somatic anxiety and less self-confidence. Only cognitive

reappraisal had a positive effect on self-confidence, a result that was found in a previous study (Molina, et al. 2018). Because cognitive reappraisal is a strategy that allows changing the meaning of an event or situation, it would be expected that it would contribute to increase athletes' self-confidence during competitions (Lane, Beedie, Jones, Uphill, & Devonport, 2012; Oriol, Molina, DaCosta, & Páez, 2015). Also, it is possible to hypothesize that cognitive reappraisal is not linked to cognitive and somatic anxiety because cognitive reappraisal is usually linked to more positive emotions within sport contexts (e.g., Uphill, et al., 2012).

Expressive suppression, however, was not linked to CA. While previous studies have found that expressive suppression contributes to reducing athletes' capacities for reducing emotional intensity triggering symptoms of cognitive or somatic anxiety (Molina, et al., 2018) and even resulting in physical costs (e.g., blocks and muscular tension, difficulties in physical recovery and injuries; Mankad & Gordon 2010; Wagstaff, 2014), we did not find this pattern of association in this study. Expressive suppression was not linked to CA. More studies are needed to better understand the role of expressive suppression, since some studies have shown that expressive suppression is not always linked to adaptational costs (especially when used in a flexible way; Bonanno & Burton, 2013) and can even be associated with better performance in some contexts.

Finally, our H4 saying athletes with higher levels of neuroticism would present more cognitive and somatic anxiety and less self-confidence, was also partially confirmed. As found in a previous study (Balyan, et al., 2016), neuroticism (the opposite of emotional stability) was associated with higher levels of cognitive and somatic anxiety and lower levels of self-confidence. According to personality theories, it possibly hypothesizes that athletes with elevated levels of neuroticism would be more emotionally reactive being more vulnerable to experiencing anxiety symptoms and, in this specific case, CA. Also, they tend to present excessive worry and ordinary situations as threatening (Widiger & Oltmanns, 2017), something that can contribute to increased CA.

Limitations and future research

Some limitations of this study must be noted. First, this is a cross-sectional study that relies only on self-report measures. Thus, causality cannot be inferred, and results are susceptible to biases. Future studies should collect data over time and should use other type of information (e.g., physiological measures). Additionally, a portion of the participants were requested to recall a significant competition they had participated in within the preceding weeks/months. Consequently, retro-

spective data have the potential to be influenced by memory failures and can pose certain limitations. However, it should be noted that evaluating CA retrospectively is a method utilized in previous studies (e.g., Harger & Raglin, 1994; Lundqvist & Hassmén, 2005). Additionally, the CA scale was used online which can also add some bias to our results.

Also, this study is limited by the wide age range of our participants, spanning from 18 to 69 years old. Due to the heterogeneity of the age groups, we were unable to investigate potential age-related differences in CA. However, age may be a relevant variable in explaining such differences, and future research should aim to explore this aspect in greater detail.

Finally, the internal consistency of the TIPI is small to moderate. While authors recognized that this is a characteristic of shorter scales, it is important to consider that results may be influenced by this issue.

Practical implications

Findings from this study can have several practical implications. Firstly, it can help psychologists,

coaches, and trainers to develop tailored interventions and techniques to enhance athletes' emotion regulation skills to facilitate the management of their anxiety levels, namely by promoting the use of cognitive reappraisal to enhance self-confidence, especially in female athletes that are likely to present less self-confidence. This can ultimately improve their performance and increase their chances of success in competitive sports.

Secondly, understanding the personality traits that contribute to CA can assist in identifying athletes who may be more prone to experiencing anxiety in competitive situations. Such knowledge can help coaches and trainers in providing targeted support and interventions to help these athletes to better cope with anxiety, thus minimizing its negative impact on their performance (especially for athletes with elevated levels of neuroticism).

Finally, by considering the role of sex and sport discipline, this research can highlight potential sex or sport-specific strategies for managing CA in athletes. While no differences were found according to sport modality, women may be at greater risk for presenting higher CA. Thus, they may benefit more from this type of intervention.

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