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Association Between Competitive Trait Anxiety and Coping Skills Adjusted by Gender and Sport Type: A Cross-Sectional Observational Study With Young Athletes During a National Competition

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ABSTRACT

The objective of the present study was to examine the association between competitive trait anxiety and coping skills, adjusting for gender and type of sport. The observational cross-sectional design encompassed 445 male and female athletes aged 12–17 years from both individual and team sports. The assessment of competitive trait anxiety was conducted utilizing the Sport Anxiety Scale-2, while the evaluation of coping skills was verified by the Athletic Coping Skills Inventory. Linear regressions were employed to assess the associations between anxiety (dependent variable) and coping skills (independent variable), with gender and sport type designated as adjustment variables. The results indicated that somatic anxiety exhibited an inverse relationship with concentration and freedom from worry and was higher in females and team-sport athletes; Worry was negatively associated with coping with adversity, confidence and achievement motivation, and freedom from worry and was higher in team-sport athletes; concentration disruption was inversely related to confidence and achievement motivation, concentration, freedom from worry, and coachability; finally, total competitive anxiety was negatively associated with confidence and achievement motivation, concentration, and freedom from worry, and was higher in females. In conclusion, the findings indicated an inverse relationship between various coping skills and dimensions of competitive trait anxiety, suggesting that athletes who demonstrated stronger coping abilities tended to report lower levels of anxiety. These findings suggest the significance of psychological skills training in enhancing coping resources and reducing competitive trait anxiety.

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Anxiety is a disorder characterized by excessive and anticipated worry in response to a perceived threat, as defined in the Diagnostic and Statistical Manual of Mental Disorders [DSM-5; American Psychiatric Association (APA, 2014)]. More specifically, individuals may exhibit symptoms in social situations in which they are subject to evaluation or the possibility of failure in front of observers, a condition known as social anxiety (APA, 2014). Additionally, anxiety can manifest as transient unpleasant feelings (i.e., state anxiety), or it can become a persistent personality trait, thereby increasing the likelihood of experiencing high levels of anxiety in challenging situations (Kalderon et al., 2022; Leal et al., 2017).

Worldwide, the prevalence of anxiety varies between ~9% and 28% and can manifest itself in individuals of different age groups (Errazuriz et al., 2025; Mondin et al., 2013; Shafiee et al., 2025; Somers et al., 2006). Furthermore, Rice et al. (2019) summarized five studies (a meta-analysis), highlighting that there is no significant difference in anxiety levels between athletes and non-athletes. This finding emphasizes the need for systematic evaluation and continuous monitoring of psychological factors within this population. In the context of sports, one widely used approach to investigating anxiety in competitive environments is the administration of psychometric

questionnaires (Fernandes et al., 2012; Smith et al., 2006), which provide an objective and standardized means of assessing psychological traits (Souza et al., 2017).

In this regard, the Sport Anxiety Scale-2 (SAS-2), a psychometric instrument, was developed to measure competitive trait anxiety in athletes (Smith et al., 2006). The SAS-2 is a multidimensional instrument that assesses the trait of competitive anxiety in general (i.e., total competitive anxiety score) and considers sub-scales: somatic anxiety, worry and concentration disruption (Silva-Rocha et al., 2019; Smith et al., 2006). Somatic anxiety is characterized by physiological responses such as tachycardia, muscle tension and sweating, which are elicited by stress arising from competitive circumstances (Silva-Rocha et al., 2019; Smith et al., 2006). The cognitive dimension encompasses worry (i.e., negative thoughts and fear of failure in competitive contexts) and concentration disruption [i.e., difficulty focusing on the competition and inhibiting irrelevant stimuli (Silva-Rocha et al., 2019; Smith et al., 2006)]. These instruments have been used in relevant studies in sport context (Correia & Rosado, 2019; Jaenes et al., 2022).

From a functional perspective, low levels of anxiety are not harmful (Patel et al., 2010). In fact, it is a normal response to increased cortisol levels in anticipation of competition, which

substantially enhances cognitive and attentional processes (Costa Y., 2022; Van Paridon et al., 2017). However, if anxiety becomes excessive or poorly regulated and the symptoms cause significant emotional distress and/or functional impairment, it can have a detrimental effect on the athlete's mental health (Beenen et al., 2025). In this sense, anxiety can impair athletes' performance and hinder long-term development. For instance, anxiety has been shown to negatively impact the technical and tactical performance of badminton athletes (Alkhalwaleh & Altarawneh, 2023) and the penalty kicks (i.e., high-pressure situations) of football players (Horikawa & Yagi, 2012). Moreover, athletes exhibiting functional impairments associated with anxiety are prone to dropping out of sports, which in turn undermines their capacity to achieve their maximum potential (Back et al., 2022). Therefore, considering the substantial prevalence of anxiety among athletes, the detrimental effects on mental health and sports performance, as well as the risk of dropping out, the investigation of anxiety and the associated protective and/or mitigating factors has attracted considerable interest from coaches and sports psychologists.

Given these circumstances, athletes need effective psychological resources to manage competitive stress. In this regard, the term "coping" refers to the process of seeking positive psychological states to manage stress and reduce its adverse effects (Folkman, 1997). In sport, coping strategies are considered essential skills for dealing with competitive demands and performance-related stressors (Nicholls & Polman, 2007; Silva et al., 2023). They can be assessed using instruments such as the Athletic Coping Skills Inventory [ACSI-28 (Miranda et al., 2018; Smith et al., 1995)]. This multidimensional instrument assesses total coping resources and several specific coping skills across seven subscales (Miranda et al., 2018; Smith et al., 1995): coping with adversity (i.e., the ability to remain positive in unfavorable situations, stay calm, and recover quickly from mistakes); performance under pressure (i.e., the ability perceive pressure situations as challenging.); goal setting/mental preparation (i.e., setting performance goals and plans, and mentally preparing for training and competitions, as well as developing strategies for adverse situations.); confidence and achievement motivation (i.e., confidence and motivation related to performance); concentration (i.e., the ability to stay focused on the task and avoid distractions); freedom from worry (i.e., the ability to avoid excessive concern about performance, even when it falls short of expectations); and coachability (i.e., the ability to remain open to feedback and instruction without reacting negatively to criticism).

In the sport psychology literature, coping skills have been examined across different contexts and outcomes. For instance, coping skills have been compared at different competitive levels (Rossi et al., 2016; Schoof et al., 2024), related to burnout and wellness (Pires et al., 2019; Von Guenther & Hammermeister, 2007), and used to characterize the psychological skills of football players (Csáki et al., 2017). From a theoretical perspective, coping skills are expected to play a central role in the regulation of stress caused by competition and in the management of anxiety; that is, athletes with more developed coping skills may experience lower levels of anxiety. This relationship

has been examined in populations exposed to high levels of pressure. Along these lines, Aljaffer et al. (2025), for example, have investigated the association between coping strategies and anxiety among university students. Furthermore, both gender and the type of sport (e.g., individual and team) seem important factors. Previous research has shown that anxiety levels are higher in female adolescents compared to male adolescents, and that poor peer relationships also represent a risk factor (Bao & Han, 2025). Furthermore, there is a significant gap in the literature regarding studies that have addressed young and female athletes (Runacres & Marshall, 2024). Additionally, the type of sport (team vs. individual) represents an important contextual variable (Ayranci & Aydin, 2025). This aspect has been associated with differences in emotion regulation, social support, and self-efficacy related to psychological resilience (Wei et al., 2025).

However, although the relationship between anxiety and coping is theoretically plausible, with the skills developed by athletes functioning as an important factor in anxiety management, there is still a lack of empirical evidence in the literature to support this association, particularly in competitive sport contexts and among young athletes. Therefore, the aim of the present study was to examine the association between competitive trait anxiety and coping skills, adjusting for gender and type of sport. We hypothesized that coping skills are negatively associated with competitive trait anxiety, meaning that individuals with higher coping skills tend to report lower levels of anxiety. Additionally, we expected that anxiety levels would be elevated among young female athletes (Rice et al., 2019) and that the expression of anxiety would differ according to sport type (Correia & Rosado, 2019). Therefore, the present findings help clarify how coping skills are related to competitive anxiety in young athletes facing competitive demands, with the goal of informing coaches and sports psychologist in the development of more precise and effective psychological interventions.

Material and methods

Study design

The present study constitutes an observational cross-sectional investigation which was conducted during the national phase of Brazil's "Jogos da Juventude" (i.e., each state's winning athletes and teams compete in the same city, based on the format of the Olympic Games). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations were followed to report the methods in this study. The STROBE checklist was shown in Supplemental file 1.

Setting

The study was conducted during the "Jogos da Juventude" (the most important young national competition) in the city of João Pessoa - PB from 13 November 2024 to 29 November 2024. A space was meticulously designated in the dining center (i.e., the location where all the athletes and coaching staff consumed their meals). In this manner, the

athletes were invited to participate through verbal invitations extended by researchers who remained on site during the period of operation. Furthermore, a sign bearing the word “Research” was placed at the site to identify the area and encourage athlete participation. All athletes who agreed to take part were seated comfortably at an ambient temperature of $\approx 22^{\circ}\text{C}$ to answer the questionnaires after receiving the instructions.

Participants

A non-probabilistic convenience sampling method was employed, encompassing athletes who were participating in the “Jogos da Juventude” at the time of data collection. All male and female athletes were eligible, provided they met the inclusion criteria: a) aged between 12 and 17 years old; b) actively competing in either an individual or a team sport. These criteria were adopted to ensure a homogeneous sample of adolescent athletes (critical developmental period) competing at the national phase of the “Jogos da Juventude,” as well as to consider an important contextual factor of interest to the study (team vs. individual sports). Moreover, participants who a) withdrew from the study or b) did not complete the questionnaire were excluded. This criterion was applied to ensure data completeness and quality control. All participants were volunteers and provided written consent together with their legal guardian. The research procedures followed the Helsinki Declaration for human studies and were approved by the Local Ethics Committee (protocol number: 7.193.383 - Health Sciences Center of the Federal University of Paraíba - CCS/ UFPB).

Variables

Outcome

The competitive anxiety was assumed as the outcome variable. Thus, the total competitive anxiety score and the three sub-dimensions (i.e., somatic anxiety, worry, and concentration disruption) were used as outcomes.

Predictor variables

The gender (i.e., male and female), type of sport (i.e., individual or team), total coping resources, and sub-dimensions of coping skills (i.e., coping with adversity; performance under pressure; goal setting/mental preparation; confidence/achievement motivation; concentration; freedom from worry; coachability) were analyzed as predictor variables.

Measurements

Socio-demographic characteristics

The request for socio-demographic information was made for the purpose of characterizing the athletes. In this regard, the athletes provided the following information: a) age; b) gender; c) sport; d) experience in sport (time spent practising); and e) number of training sessions per week. Following this, the sport underwent a categorization process that resulted in the formation of two distinct categories: individual and team.

Competitive trait anxiety

Competitive trait anxiety was measured using the Sport Anxiety Scale-2 [SAS-2 (Smith et al., 2006)], translated (Silva-Rocha & Osório, 2017) and validated (Silva-Rocha et al., 2019) into Brazilian Portuguese. This instrument consists of a 15-items questionnaire in which participants are asked to mark a number using a Likert intensity scale (1 = not at all; and 4 = very much). Subsequently, the total competitive anxiety score was calculated by summing the sub-dimensions (range: 15–60). Moreover, the sub-dimensions, somatic anxiety, worry, and disturbed concentration, were calculated as the sum of their corresponding five items (range: 5–20).

The reliability of the scale was verified by the Cronbach's alpha, which yielded values of $\alpha = 0.903$ for total competitive anxiety, $\alpha = 0.864$ for somatic anxiety, 0.857 for worry, and $\alpha = 0.811$ for disturbed concentration. These values indicate “almost perfect” internal consistency (Landis & Koch, 1977).

Total coping resources and coping skills

The coping skill in sport was assessed using Athletic Coping Skills Inventory [ACSI (Smith et al., 1995)], translated and validated into Brazilian context (Miranda et al., 2018). The inventory has 25 items (3 items were excluded from the Brazilian version during validation) in which participants are asked to mark a number between 0 (almost never) and 3 (almost always). Total coping resources were calculated by sum of all items (range: 0–75), sub-dimension (i.e., coping with adversity; peaking under pressure; goal setting/mental preparation; confidence and achievement motivation; concentration; freedom from worry; coachability) by the mean of the corresponding items (range: 0–3).

The reliability of the scale was verified by the Cronbach's alpha, which yielded values of $\alpha = 0.792$ for total coping resources, $\alpha = 0.672$ for coping with adversity, $\alpha = 0.808$ for peaking under pressure; $\alpha = 0.680$ for goal setting/mental preparation, $\alpha = 0.573$ for confidence and achievement motivation, $\alpha = 0.573$ for concentration, $\alpha = 0.687$ for freedom from worry; $\alpha = 0.530$ for coachability. These values indicate internal consistency between “moderate” to “substantial” (Landis & Koch, 1977).

Bias

To mitigate the study's potential biases, various strategies were employed. Regarding convenience sampling, the researchers strove to include as many participants as possible. Moreover, to minimize selection bias, the researcher's team was instructed to invite all eligible athletes without applying any additional screening criteria. To minimize information bias, all the instruments used were previously validated for the Brazilian context. Additionally, two independent researchers tabulated the data from the questionnaires in duplicate, and a third researcher checked for and corrected any discrepancies.

Study size

The sample size was determined for a target population of 4213 athletes who participated in the Jogos da Juventude.

A minimum of 353 athletes was required, based on a *prior* sample size calculation performed using the Raosoft calculator (<http://www.raosoft.com/samplesize.html>- Raosoft, Inc., Seattle, WA). This calculation was conducted assuming a 5% margin of error, a 95% confidence level, and 50% response distribution. Furthermore, a proportional stratified sampling approach was employed, with participants distributed proportionally across four strata in accordance with the sport types in “Jogos da Juventude”: individual female sports (132 athletes), individual male sports (127 athletes), team female sports (47 athletes), and team male sports (47 athletes). The higher proportion of individual sports was attributed to the greater number of available individual sports. Furthermore, the proportion of female athletes is slightly higher because rhythmic gymnastics is a sport exclusively for female competitors.

Data analysis

The socio-demographic characteristics were presented as both absolute and relative frequencies. The data obtained from the psychometrics scales (i.e., SAS-2 and ACSI) were presented as the mean and standard deviation (\pm SD). For the purpose of comparison, the general linear model with two factors [gender and type of sport (individual vs. team)] was utilized, adopting the partial eta squared (η_p^2) as a measure of effect size.

The correlation between the SAS-2 and ACSI scores was examined using Spearman's coefficient. The association between these variables was then assessed using univariate and multivariate linear regression. The multivariate regression model was adjusted for gender and the type of sport. The input method adopted was “enter,” and the significant variables in the univariate model were included in the multivariate model. Furthermore, the Durbin-Watson test, analysis of the distribution of standardized residuals (Shapiro-Wilk test, kurtosis and asymmetry), and the variance inflation factor (VIF) were utilized to assess the quality of the models. All statistical procedures were conducted using IBM SPSS Statistics (Version 20.0. Armonk, NY: IBM Corp. software), adopting a significance level of 5% ($p < .05$).

Results

Socio-demographic characteristics

A total of 445 athletes were included in the study, with 146 (32.81%) of them being individual female, $n = 144$ (32.36%) individual male, $n = 85$ (19.10%) team female, and 70 (15.73%) team male. The individual sports were track and field, badminton, cycling, artistic gymnastics, artistic gymnastics, wrestling, judo, swimming, taekwondo, table tennis, archery,

triathlon; and team sports were basketball, handball, beach volleyball, volleyball (the detailed gross and relative frequency of sports are available in the Supplementary File 2). In addition, the study was participated in by athletes from all Brazilian states (more details see Supplementary File 2). Furthermore, Table 1 shows data on age, sporting experience, and the number of training sessions per week.

Sport Anxiety Scale-2 (SAS-2) and Athletic Coping Skills Inventory (ACSI)

Table 2 shows the descriptive statistics (mean and standard deviation) of the Sport Anxiety Scale-2 (SAS-2) and Athletic Coping Skills Inventory (ACSI) stratified by sex and type of sport. The SAS-2, both gender and type of sport, had significant effects on somatic anxiety (Gender: $F = 49.43$, $p < .001$, $\eta_p^2 = 0.101$; Type of sport: $F = 26.49$, $p < .001$, $\eta_p^2 = 0.057$) and on the total competitive anxiety score (Gender: $F = 48.69$, $p < .001$, $\eta_p^2 = 0.100$; Type of sport: $F = 6.98$, $p = .009$, $\eta_p^2 = 0.016$). A significant effect of gender only was observed for worry ($F = 36.23$, $p < .001$, $\eta_p^2 = 0.076$) and concentration disruption ($F = 13.37$, $p < .001$, $\eta_p^2 = 0.030$). No interaction effects between gender and type of sport were found for any SAS-2 variable (F values between 0.006 and 1.04, p values between 0.307 and 0.933).

Regarding the ACSI, both gender and type of sport had significant effects on Coping with Adversity (Gender: $F = 34.07$, $p < .001$, $\eta_p^2 = 0.072$; Type of sport: $F = 4.51$, $p = .034$, $\eta_p^2 = 0.010$), Peaking under Pressure (Gender: $F = 23.43$, $p < .001$, $\eta_p^2 = 0.051$; Type of sport: $F = 28.33$, $p < .001$, $\eta_p^2 = 0.060$), Goal Setting/Mental Preparation (Gender: $F = 23.43$, $p < .001$, $\eta_p^2 = 0.051$; Type of sport: $F = 28.33$, $p < .001$, $\eta_p^2 = 0.060$), and Total Coping Resources (Gender: $F = 64.35$, $p < .001$, $\eta_p^2 = 0.128$; Type of sport: $F = 7.29$, $p = .007$, $\eta_p^2 = 0.016$). A significant effect of gender only was observed for Confidence and Achievement Motivation ($F = 23.66$, $p < .001$, $\eta_p^2 = 0.051$), Concentration ($F = 10.41$, $p < .001$, $\eta_p^2 = 0.023$), Freedom from Worry ($F = 27.62$, $p < .001$, $\eta_p^2 = 0.059$), and Coachability ($F = 4.36$, $p = .037$, $\eta_p^2 = 0.010$). No interaction effects between gender and type of sport were found for any coping dimension (F values between 0.60 and 1.28, p values between 0.259 and 0.490).

Spearman's correlations

Table 3 shows the correlations between the Sport Anxiety Scale-2 (SAS-2) and the Athletic Coping Skills Inventory (ACSI). In general, negative correlations of low to moderate magnitude were observed. Specifically, somatic anxiety showed negative correlations with freedom from worry (-0.383 ; <0.001 ; low) and total coping resources (-0.355 ; <0.001 ; low); the worry

Table 1. Descriptive characteristics of the participants by sport type and gender.

Variables	Individual		Team	
	Male	Female	Male	Female
Age (years)	16.22 (0.84)	16.06 (1.00)	16.72 (0.78)	16.42 (0.86)
Sport experience (years)	5.38 (4.11)	5.54 (3.79)	4.50 (2.56)	4.55 (2.43)
TSPW (days)	5.07 (1.45)	4.94 (1.51)	4.90 (1.46)	4.16 (1.44)

Note. Sporting experience = the number of years that the sport has been practiced; TSPW = training sessions per week. Results expressed as mean (standard-deviation).

Table 2. Mean (\pm SD) of Sport Anxiety Scale–2 and Athletic Coping Skills Inventory.

Instrument	Individual		Team	
	Male	Female	Male	Female
Somatic anxiety ^{ab}	6.68 (3.40)	12.10 (4.09)	7.78 (2.69)	10.37 (3.41)
Worry ^a	12.31 (4.10)	14.31 (3.91)	12.05 (4.01)	14.84 (3.77)
Concentration disruption ^a	8.33 (2.77)	9.46 (3.31)	7.81 (2.73)	8.88 (2.98)
Total competitive anxiety score ^{ab}	30.35 (8.37)	35.88 (9.71)	27.65 (7.42)	34.10 (7.60)
Coping with adversity ^{ab}	1.62 (0.63)	1.20 (0.63)	1.71 (0.61)	1.38 (0.69)
Peaking under pressure ^{ab}	1.54 (0.72)	1.09 (0.78)	1.87 (0.67)	1.58 (0.86)
Goal setting/Mental preparation ^{ab}	1.98 (0.60)	1.72 (0.63)	1.81 (0.69)	1.69 (0.57)
Confidence and achievement motivation ^a	2.17 (0.54)	1.81 (0.67)	2.16 (0.59)	1.91 (0.65)
Concentration ^a	1.78 (0.67)	1.52 (0.70)	1.76 (0.69)	1.59 (0.69)
Freedom from Worry ^a	1.12 (0.73)	0.82 (0.64)	1.33 (0.75)	0.88 (0.67)
Coachability ^a	2.84 (0.65)	2.07 (0.66)	2.20 (0.59)	2.12 (0.72)
Total coping resources ^{ab}	43.87 (8.53)	35.66 (8.77)	45.32 (9.15)	39.11 (9.75)

Note. $p < .05$ to a = gender effect; b = type of sport.

Table 3. Spearman's correlations between Sport Anxiety Scale–2 (SAS–2) and Athletic Coping Skills Inventory (ACSI).

SAS – 2	ACSI							
	1	2	3	4	5	6	7	8
Somatic Anxiety	–0.282* (<0.001)	–0.205* (<0.001)	0.019 (0.690)	–0.168* (<0.001)	–0.187* (<0.001)	–0.383* (<0.001)	–0.075 (0.116)	–.355* (<0.001)
Worry	–0.365* (<0.001)	–0.173* (<0.001)	0.036 (0.447)	–0.329* (<0.001)	–0.189* (<0.001)	–0.649* (<0.001)	–0.152* (<0.001)	–0.484* (<0.001)
Concentration Disruption	–0.225* (<0.001)	–0.214* (0.004)	–0.137* (0.004)	–0.321* (<0.001)	–0.375* (<0.001)	–0.277* (<0.001)	–0.137* (0.004)	–0.435* (<0.001)
Global Anxiety	–0.370* (<0.001)	–0.241* (<0.001)	–0.013 (0.791)	–0.336* (<0.001)	–0.286* (<0.001)	–0.566* (<0.001)	–0.150* (0.002)	–0.525* (<0.001)

Note. Spearman's Correlation Coefficient (significance; p value). * $p < .05$. 1 = Coping with adversity; 2 = Peaking under pressure; 3 = Goal setting/mental preparation; 4 = Confidence and achievement motivation; 5 = Concentration; 6 = Freedom from worry; 7 = Coachability; 8 = Total coping resources.

dimension correlated negatively with coping with adversity (-0.365 ; <0.001 ; low), confidence and achievement motivation (-0.329 ; <0.001 ; low), freedom from worry (-0.649 ; <0.001 ; moderate), and total coping resources (-0.484 ; <0.001 ; low); the concentration disruption dimension showed negative correlations with confidence and achievement motivation (-0.321 ; <0.001 ; low), concentration (-0.375 ; <0.001 ; low) and total coping resources (-0.435 ; <0.001 ; low); finally, global anxiety correlated negatively with coping with adversity (-0.370 ; <0.001 ; low), confidence and achievement motivation (-0.336 ; <0.001 ; low), freedom from worry (-0.566 ; <0.001 ; moderate) and total coping resources (-0.525 ; <0.001 ; moderate).

Univariate linear regression

The results of the univariate linear regression analysis between competitive trait anxiety and the coping dimensions are shown on Table 4. Somatic anxiety was associated with total coping resources and all coping skills, except goal setting/mental preparation ($\beta = 0.086$; $p = .767$), and these results were similar for the worry subscale (goal setting/mental preparation: $\beta = 0.243$;

$p = .434$) and total competitive anxiety score (goal setting/mental preparation: $\beta = -0.197$; $p = .774$). Moreover, the concentration disruption was associated with total coping resources and all coping skills (see more details in Table 4).

Multivariate linear regression

With regard to the application of multivariate linear regression (see Table 5), the total coping resources were not included into any of the models due to the manifestation of multicollinearity (Tolerance < 0.1 ; VIF > 10). A negative association was observed between somatic anxiety and two coping skills: concentration ($\beta = -0.633$; $p = .012$) and freedom from worry ($\beta = -1.425$; $p < .001$). Additionally, somatic anxiety was significantly associated with gender ($\beta = 1.553$; $p < .001$; reference = male) and type of sport ($\beta = 1.462$; $p < .001$; reference = individual sports). The model explained 24.8% of the variance in somatic anxiety and met the necessary criteria: although the residuals deviated slightly from normality (Kolmogorov–Smirnov $p = .002$), the values for skewness (0.475) and kurtosis (0.162) were within acceptable limits.

Table 4. Univariate linear regression between anxiety and coping dimensions.

	β	t	p(Sig.)	R ²
Somatic anxiety				
Coping with Adversity	-1.532	-5.854	<0.001*	0.070
Peaking under Pressure	-0.945	-4.266	<0.001*	0.037
Goal setting/Mental preparation	0.086	0.297	0.767	-0.002
Confidence and achievement motivation	-1.006	-3.580	<0.001*	0.026
Concentration	-1.108	-4.317	<0.001*	0.038
Freedom from worry	-2.041	-8.679	<0.001*	0.144
Coachability	-0.563	-2.048	0.041*	0.007
Total coping resources	-0.136	-7.732	<0.001*	0.117
Worry				
Coping with Adversity	-2.049	-7.418	<0.001*	0.109
Peaking under Pressure	-0.825	-3.428	0.001*	0.024
Goal setting/Mental preparation	0.243	0.783	0.434	-0.001
Confidence and achievement motivation	-1.979	-6.769	<0.001*	0.092
Concentration	-1.068	-3.842	<0.001*	0.030
Freedom from worry	-3.803	-18.456	<0.001*	0.435
Coachability	-0.956	-3.246	0.001*	0.021
Total coping resources	-0.196	-10.908	<0.001*	0.211
Concentration disruption				
Coping with Adversity	-0.932	-4.411	<0.001*	0.040
Peaking under Pressure	-0.724	-4.108	<0.001*	0.037
Goal setting/Mental preparation	-0.527	-2.311	0.021*	0.010
Confidence and achievement motivation	-1.453	-6.736	<0.001*	0.091
Concentration	-1.522	-7.797	<0.001*	0.119
Freedom from worry	-1.036	-5.283	<0.001*	0.057
Coachability	-0.605	-2.776	0.006*	0.015
Total coping resources	-0.120	-8.702	<0.001*	0.145
Total competitive anxiety score				
Coping with Adversity	-4.514	-7.397	<0.001*	0.108
Peaking under Pressure	-2.494	-4.751	<0.001*	0.047
Goal setting/Mental preparation	-0.197	-0.288	0.774	-0.002
Confidence and achievement motivation	-4.438	-6.883	<0.001*	0.095
Concentration	-3.698	-6.179	<0.001*	0.078
Freedom from worry	-6.879	-13.501	<0.001*	0.291
Coachability	-2.124	-3.266	0.001*	0.021
Total coping resources	-0.452	-11.542	<0.001*	0.230

Note. * $p < .05$.

There was also no evidence of autocorrelation (Durbin-Watson = 1.93) and multicollinearity was not an issue (tolerance = 0.677–0.927; VIF = 1.034–1.476).

For the worry dimension, significant negative associations were found with three coping skills: dealing with adversity ($\beta = -0.630$; $p = .012$), confidence and achievement motivation ($\beta = -1.083$; $p < .001$) and freedom from worry ($\beta = -3.344$; $p < .001$). Additionally, only the type of sport ($\beta = 0.791$; $p = .010$) was significantly associated with worry. The model explained 49.6% of the variance in worry, and the assumptions were acceptable: the residuals did not significantly deviate from normality (Kolmogorov-Smirnov $p = .087$, skewness = -0.351, kurtosis = 1.299), there was no autocorrelation (Durbin-Watson = 1.91), and there was no evidence of multicollinearity (tolerance = 0.677–0.967, VIF = 1.034–1.476).

In regard to concentration disruption, significant negative associations were found with four coping skills: confidence and achievement motivation ($\beta = -0.841$; $p < .001$), concentration ($\beta = -1.187$; $p < .001$), freedom from worry ($\beta = -0.625$; $p = .002$), and coachability ($\beta = -0.443$; $p = .025$). The model explained 20.7% of the variance in concentration disruption. However, the distribution of the residuals deviated more markedly from normality compared to the other models (Kolmogorov-Smirnov $p < .001$; skewness = 1.080; kurtosis = 2.243). No autocorrelation was

detected among the residuals (Durbin-Watson = 2.06), and there were no indications of multicollinearity (tolerance values between 0.677 and 0.967; VIF values between 1.034 and 1.476).

Finally, the total competitive anxiety score showed significant negative associations with three coping skills: confidence and achievement motivation ($\beta = -1.883$; $p = .003$), concentration ($\beta = -1.942$; $p < .001$), and freedom from worry ($\beta = -5.389$; $p < .001$). Additionally, somatic anxiety was significantly associated with gender ($\beta = 2.180$; $p = .003$; reference = male). The model explained 39.9% of the variance in the total competitive anxiety score. Moreover, the distribution of the residuals deviated slightly from normality (Kolmogorov-Smirnov $p < .001$; skewness = 0.379; kurtosis = 2.044). However, no autocorrelation of residuals was detected (Durbin-Watson = 1.84), and multicollinearity was not present (tolerance values between 0.677 and 0.927; VIF values between 1.034 and 1.476).

Discussion

The aim of the present study was to examine the association between competitive trait anxiety and coping skills, adjusted for gender and type of sport. In this regard, somatic anxiety levels were found to be higher in female athletes and in those

Table 5. Multivariate linear regression between anxiety and coping dimensions.

	β	t	p(Sig.)	R ²
Somatic anxiety				
Coping with Adversity	-0.492	-1.723	0.086	0.248
Peaking under Pressure	-0.197	-0.877	0.381	
Confidence and achievement motivation	0.046	0.157	0.875	
Concentration	-0.641	-2.535	0.012*	
Freedom from worry	-1.425	-6.070	<0.001*	
Coachability	-0.155	-0.643	0.521	
Gender	1.553	4.506	<0.001*	
Type of Sport	-1.462	-4.248	<0.001*	
Worry				
Coping with Adversity	-0.630	-2.511	0.012*	0.496
Peaking under Pressure	-0.129	-0.653	0.514	
Confidence and achievement motivation	-1.083	-4.176	<0.001*	
Concentration	-0.112	-0.503	0.615	
Freedom from worry	-3.344	-16.210	<0.001*	
Coachability	-0.292	-1.373	0.171	
Gender	0.393	1.298	0.195	
Type of Sport	0.781	2.580	0.010*	
Concentration disruption				
Coping with Adversity	0.175	0.748	0.455	0.207
Peaking under Pressure	-0.256	-1.371	0.171	
Goal setting/Mental preparation	-0.022	-0.093	0.926	
Confidence and achievement motivation	-0.841	-3.399	0.001*	
Concentration	-1.187	-5.717	<0.001*	
Freedom from worry	-0.625	-3.108	0.002*	
Coachability	-0.443	-2.242	0.025*	
Gender	0.232	0.824	0.410	
Type of Sport	-0.328	-1.160	0.247	
Total competitive anxiety score				
Coping with Adversity	-0.949	-1.571	0.117	0.399
Peaking under Pressure	-0.585	-1.232	0.219	
Confidence and achievement motivation	-1.883	-3.015	0.003*	
Concentration	-1.942	-3.628	<0.001*	
Freedom from worry	-5.389	-10.849	<0.001*	
Coachability	-0.891	-1.741	0.082	
Gender	2.180	2.990	0.003*	
Type of Sport	-1.1007	-1.382	0.168	

Note. Reference category: Gender = male; Type of sport = individual sports; R² = Adjusted R square.

participating in individual sports. However, coping skills such as concentration and freedom from worry appear to attenuate somatic anxiety. Worry levels were higher among team sport athletes but could be reduced through coping skills including coping with adversity, confidence and achievement motivation, and freedom from worry. Concentration disruption was not associated with gender or sport type. Nevertheless, coping skills such as confidence and achievement motivation, concentration, freedom from worry, and coachability proved helpful in reducing concentration disruption. Finally, total competitive anxiety scores were higher among female athletes, and confidence and achievement motivation, concentration, and freedom from worry were associated with anxiety levels. In general terms, the initial hypotheses were partially confirmed, since not all coping skills were associated with anxiety.

In regard to gender, there was a tendency for higher levels in female athletics, especially somatic anxiety ($\beta = 1.553$) and total competitive anxiety score ($\beta = 2.180$). Consistent with findings in the general population (Bao & Han, 2025; Farhane-Medina et al., 2022; Pinho & Varsori, 2026), female athletes also exhibited higher levels of anxiety (Pranoto et al., 2024; Rice et al., 2019). Moreover, this trend was previously supported mainly in general anxiety and somatic anxiety within a heterogeneous sample of Portuguese athletes aged 12 to 47 (Correia & Rosado, 2019). Thus, the body of evidence seems to support the fact that anxiety remains higher throughout

a woman's sporting life. Moreover, these differences in relation to male athletes may be explained by specific biological mechanisms involving brain structure, genetic factors and fluctuations in sex hormones. According to a robust systematic review conducted by Farhane-Medina et al. (2022), women exhibit greater activation of the amygdala, a brain region associated with emotional processing and anxiety regulation (Stevens & Hamann, 2012), and more frequent expression of genes that stimulate the hypothalamic-pituitary-adrenal (HPA) axis, which regulates stress hormone (i.e., cortisol) release (Russell & Lightman, 2019). Additionally, female hormones such as estrogen and progesterone directly influence neurotransmitter systems, including that fluctuation for serotonin, dopamine and GABA (Farhane-Medina et al., 2022). These neurotransmitters are critical to emotional regulation and stress response (Wang et al., 2020; Wiczorek et al., 2023).

In relation to the type of sport (individual vs. team), athletes involved in individual sports reported higher levels of somatic anxiety and total competitive anxiety scores than those involved in team sports. On the other hand, team athletes showed higher levels of worry than individual athletes. In line with earlier investigation, the present results indicate that individual sports have been associated with higher levels of general sport anxiety and somatic anxiety, whereas worry has been more strongly linked to team sport, suggesting that distinct anxiety patterns are expected

according to the type of sport (Correia & Rosado, 2018; Widya; Pranoto et al., 2024). These patterns can be mainly explained by contextual factors. In relation to individual sports, higher levels of general anxiety and somatic anxiety may be associated with excessive self-demand, less social support, and direct responsibility for performance (Correia & Rosado, 2019; Freire et al., 2020). In team sports, the most excessive worry may be due to social pressure to perform in front of teammates and coaches. Studies conducted with athletes have pointed to an excessive worry linked with negative evaluations of performance (Correia & Rosado, 2018; Gabrys & Wontorczyk, 2023). In addition, athletes who tend to worry excessively are also more inclined to react negatively to cheering (Gabrys & Wontorczyk, 2023), and show personality traits associated with negative affectivity and social inhibition (Kaplánová, 2021)

It is particularly important to manage anxiety levels because high levels increase the risk of injury (Ivarsson et al., 2013), reduce sports performance (Costa Y. P. D. 2019; Guillén & Sánchez, 2009; Lochbaum et al., 2022), and increase the likelihood of dropping out of sport (Back et al., 2022). Furthermore, anxiety can lead to the development of other mental health issues, such as depression and substance abuse (Farhane-Medina et al., 2022). In contrast, coping skill have been frequently linked to anxiety regulation strategies. Previous evidence from non-athletic population, such as university students, has showed relation between coping strategies and anxiety levels (Morales & Pérez-Mármol, 2019). Moreover, in sport contexts, the use of coping strategies seems useful to manage anxiety levels and regulate emotions (Li et al., 2025; Nogueira et al., 2025)

In this sense, our data shows that some coping skills (i.e., concentration, freedom from worry, coping with adversity, confidence and achievement motivation, concentration, and coachability) are linear negatively associated with anxiety. In other words, high developed coping skill, lower levels anxiety are expected. In addition, coping skills also contribute to the athlete's sporting performance (Schoof et al., 2024) and well-being (Von Guenther & Hammermeister, 2007). Although gender and type of sport have been associated with anxiety (i.e., somatic anxiety, worry, and total competitive anxiety score), these variables are not easily modified. Conversely, coping skills can be developed through psychological interventions to prepare athletes mentally (Fogaca, 2021; Griffith et al., 2024; Tobar, 2014; Vella-Fondacaro & Romano-Smith, 2023).

However, we suggest that coaches and sports psychologists consider assessing athletes' anxiety competitive trait to tailor interventions that foster the most effective coping strategies. For instance, athletes who experience predominantly somatic anxiety may benefit from techniques that promote concentration, while those who worry excessively may find it helpful to develop coping with adversity, confidence and achievement motivation. Finally, athletes who struggle with concentration disruption may benefit from strategies that promote concentration and coachability. Additionally, freedom from worry was the only coping skill useful to all anxiety manifestation. Therefore, it is essential that psychological interventions help athletes to avoid

attributing unnecessary worries to their performance, even in unfavorable scenarios (e.g., mistakes, bad results). Moreover, more attention should be given to young female athletes.

Although this study has provided relevant insights into the relationship between competitive anxiety and coping strategies, it is important to consider some limitations. Firstly, the data was obtained from a homogeneous sample of young athletes from different sports, which limits the generalizability of the findings to more experienced or high-performance athletes. Secondly, the cross-sectional design adopted does not allow causal relationships to be established. However, it is theoretically plausible to assume that coping skills are more susceptible to intervention and therefore support the hypothesis that developing them can help to mitigate anxiety symptoms (Fogaca, 2021; Griffith et al., 2024; Tobar, 2014; Vella-Fondacaro & Romano-Smith, 2023). Finally, gender, type of sport, and coping skills explained between 20% and 49% of the variance in anxiety indicators. Therefore, future studies should explore additional variables (e.g., coach-athlete relationship) that may contribute to a more comprehensive understanding of competitive anxiety and examine moderation effects.

Conclusion

In conclusion, coping skills were negatively associated with competitive trait anxiety. More specifically, there was a negative association between concentration and freedom from worry with somatic anxiety, as well as between coping with adversity, confidence, achievement motivation and freedom from worry with worry. There was also a negative association between confidence and achievement motivation, concentration, freedom from worry and coachability with concentration disruption and between confidence and achievement motivation, concentration and freedom from worry with total competitive anxiety scores. Additionally, coping skills, gender, and type of sport explained between 20.7% and 49.6% of variance in competitive trait anxiety. Future studies could consider how interventions in coping skills alter the competitive trait anxiety of young athletes.

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