

The interplay between motivational climate, competitive anxiety and coping strategies in acrobatic gymnasts

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ABSTRACT

This study investigated the interplay between motivational climate, competitive anxiety, and coping strategies among 106 Portuguese acrobatic gymnasts (M age = 14.08, SD age = 1.99; 90.6% female), who completed three self-report measures previously adapted to the Portuguese context (PMCSQ-2, SAS-2, and Brief COPE). Mediation analysis results partially supported the study's hypothesis, revealing a significant indirect association between ego-involving climate and competitive anxiety through maladaptive coping strategies. In contrast, adaptive coping did not mediate the association between task-involving climate and anxiety, suggesting alternative protective mechanisms. Moderation analysis revealed that competitive division moderated the relationship between task-involving climate and sport anxiety. These findings highlight coping processes as a key explanatory mechanism linking ego-involving climates and competitive anxiety. Practical implications are advanced, focusing on the reduction of motivational cues that reinforce avoidance and self-blame and the importance of promoting cooperation and mastery-oriented feedback within training contexts.

Keywords: motivational climate; competitive anxiety; coping strategies; acrobatic gymnastics.

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INTRODUCTION

The psychological experience of youth athletes is shaped not only by individual characteristics but also by the motivational climate involving their sport participation (Roberts & Nerstad, 2020). Acrobatic gymnastics provides a particularly informative context, as athletes of different genders, ages and skill perform synchronized routines requiring cooperation, technical precision, and artistic coordination (Fédération Internationale de Gymnastique, n.d.; Marshall & Gibson, 2017; Merida et al., 2008). This interdependent structure generates unique challenges making it an ideal setting to explore how motivational climates shape emotional and psychological experiences and responses, particularly competitive anxiety and coping strategies. Given the limited research addressing these associations in acrobatic gymnastics, a discipline that remains understudied relative to other gymnastics forms (Marshall & Gibson, 2017), this study aims to examine the interplay between motivational climate, competitive anxiety, and coping strategies in this sport, offering insights to optimize both performance and athletes' well-being.

The motivational climate refers to the situational factors, such as coaches and teammates, which explain how individuals engage in competence-related activities (Roberts & Nerstad, 2020), based on the robust framework of achievement goal theory (Daumiller et al., 2022).

A task-involving climate (TIC) emphasizes learning, effort, and personal improvement as pathways to competence development. Competence is evaluated through self-referenced criteria, such as individual progress, skill acquisition, and persistence in overcoming challenges (Fry et al., 2021; Newton et al., 2000). Success is therefore framed as personal growth (Elliot & Hulleman, 2017; Roberts & Nerstad, 2020). Coaches tend to foster respectful and egalitarian interpersonal relationships (Erdész et al., 2023; Fry et al., 2021), a dynamic that is particularly relevant in a sport such as acrobatic gymnastics, where performance is determined by the interaction between individuals (Leite et al., 2025).

As the characteristics of the sporting environment can foster or inhibit certain athletes' emotions, cognitions, and behaviours (Elliot & Hulleman, 2017; Morales-Sánchez et al., 2022; Pineda-Espejel et al., 2021), perceptions of TIC are typically associated with more positive motivational, emotional and performance outcomes (Fry et al., 2021; Hogue et al., 2017; Jaakkola et al., 2016). Specifically, TIC has been consistently associated with better performance and lower levels of anxiety in athletes (Fry et al., 2021; Hogue et al., 2017; Smith et al., 2006).

Conversely, an ego-involving climate (EIC) emphasizes innate skill and the demonstration of superior ability. Here, success is contingent on outperforming peers, and competence is judged relative to the reference group (Roberts & Nerstad, 2020). Coaches tend to publicly punish mistakes, reward only the most talented athletes, or encourage intra-team rivalry (Fry et al., 2021; Newton et al., 2000). This climate has been consistently linked to negative outcomes (Morales-Sánchez et al., 2022; Newton et al., 2000), including reduced intrinsic motivation and higher competitive anxiety (Jaakkola et al., 2016; Morales-Sánchez et al., 2022).

In this context, competitive anxiety is a domain-specific form of trait anxiety, reflecting an athlete's predisposition to appraise competitive situations as threatening, leading to more frequent and intense experiences of psychological and physiological tension (Kalinin et al., 2019; Morales-Sánchez et al., 2022; Smith et al., 2006), both before and during competition (Ramis et al., 2017).

Research has consistently distinguished competitive anxiety into cognitive and somatic components (Grossbard et al., 2009; Ramis et al., 2017; Smith et al., 2006), supporting the Multidimensional Anxiety Theory (Martens et al., 1990). Cognitive anxiety refers to the mental dimension of the anxiety response (Grossbard et al., 2009). It involves an element of worry, associated with ruminations about performance, including mistakes and outcomes (Kaiseler et al., 2009; Mercader-Rubio et al., 2023; Wilson et al., 2009), and one of concentration disruption, arising from intrusive thoughts that divert attention from task-relevant aspects (Mercader-Rubio et al., 2023; Pulido et al., 2021; Wilson et al., 2009).

Somatic anxiety reflects physiological activation of the autonomic nervous system responses (Fortes et al., 2017; Mercader-Rubio et al., 2023). It usually manifests through trembling, sweating, elevated heart rate, and shortness of breath (Castro-Sánchez et al., 2019; Fortes et al., 2017; Smith et al., 2006).

Each component can have different expressions linked to characteristics of the athlete. Younger athletes typically report higher levels of anxiety, especially cognitive anxiety, due to less advanced emotional regulation (Dias et al., 2010). In contrast, athletes competing at higher competitive levels tend to report less symptoms of anxiety (Rice et al., 2019), possibly due to more experience in the sport (Guillén & Sánchez, 2009) and they list worry as their predominant concern, due to fears of negative evaluation (Daumiller et al., 2022; Kavussanu et al., 2011; Pulido et al., 2021).

These findings highlight that competitive anxiety emerges from a broader process of self-regulation, which is proposed to mediate its relation to motivational climate. When faced with a stressor, athletes employed cognitive and behavioural efforts to balance situational demands and personal resources (Doron & Martinent, 2021; Kaiseler et al., 2009; Nuetzel, 2023), a process called coping (Crocker et al., 2015; Fry et al., 2021; Ribeiro & Rodrigues, 2004).

Authors have highlighted the heterogeneity of coping responses (Carver, 1997; Compas et al., 2001), which has led to the identification of multiple coping strategies (Carver, 1997). Some of these were later categorized by Meyer (2001) as adaptive coping strategies, promoting positive adjustment, enhanced well-being, and performance (Fry et al., 2021; Lazarus et al., 1984), including active coping, planning, emotional support, positive reframing, and acceptance. Another set was identified as maladaptive coping strategies, associated with negative outcomes such as poorer performance and exacerbated anxiety (Fry et al., 2021; Kato, 2015; Rodrigues et al., 2022), including behavioural disengagement, denial, venting, self-blame, self-distraction, and substance use.

The process of choosing a coping strategy has often been deemed as relatively stable and based on preferences (Kobylinska & Kusev, 2019; Nicholls & Polman, 2007), shaped by personal experience and personality (Carver et al., 1989; Dias et al., 2010; Purnamaningsih, 2017). Age-related differences are common, with older athletes typically relying more on adaptive strategies such as acceptance and planning, and younger athletes using more maladaptive strategies, including behavioural disengagement (Dias et al., 2010).

More recent perspectives have conceptualized a more flexible view of coping, in which trait coping styles interact with situation-specific factors (Kobylinska & Kusev, 2019; Meyer, 2001; Rodrigues et al., 2022), such as the motivational climate (Fry et al., 2021; Gano-Overway et al., 2017).

Task-involving climate (TIC) has consistently shown a tendency to foster adaptive coping, consistent with its correlation to lower anxiety levels (Daumiller et al., 2022; Fry et al., 2021; Gano-Overway et al., 2017).

However, associations with ego-involving climate (EIC) haven't been so clear. Some studies have reported no significant associations between this type of climate and coping strategies (Fry et al., 2021; Gano-Overway et al., 2017), while other authors (Harwood et al., 2008, 2015; Ntoumanis et al., 1999) suggested EIC could be associated with the use of maladaptive strategies. This discrepancy has been explained by the possible moderating effect of other variables, such as perceived competence (Harwood et al., 2015).

These findings have prompted studies to explore the mediating role of coping strategies on the association between motivational climate and competitive anxiety. Specifically, adaptive coping skills have been suggested to mediate the negative association between TIC and competitive anxiety.

Based on the established theoretical framework, this study primarily aims to examine the relationship between perceived motivational climate, competitive anxiety, and coping strategies among acrobatic gymnastics athletes. For this purpose, it was hypothesized that coping strategies will mediate the relationship between motivational climate and competitive anxiety. More precisely, adaptive coping strategies are expected to mediate the negative association between TIC and competitive anxiety while maladaptive coping strategies are expected to mediate the positive association between EIC and competitive anxiety.

In addition, the study takes an interest in the unique mixed-age and multi-level team structure of acrobatic gymnastics and proposes a research question aiming to explore whether the associations between variables are influenced by age and competitive division.

METHOD

Participants

The sample consisted of 106 athletes that practiced acrobatic gymnastics in the 2023/2024 season, in the north of Portugal. Of those, the majority were female ($n = 96$; 90.6%) and 10 were male. Participants ranged in age from 11 to 19 years ($M = 14.08$, $SD = 1.99$). All of them reported being enrolled in school and only 2 of them reported being in college. The sample included 100 Portuguese athletes, 3 athletes with dual nationality and 3 athletes with other nationalities, mainly European.

As to the distribution across four national competitive divisions, the largest group was in the two lower competition levels ($n = 72$; 67.92%), and 12 participants were in the elite division. Athletes' experience in the sport ranged from 1 to 13 years ($M = 5.12$, $SD = 2.05$). The number of coaches that accompanied them during the 2023/2024 season ranged from 1 to 7 ($M = 4.04$, $SD = 1.52$), and the average duration of the coach–athlete relationship was 2.74 years ($SD = 1.24$), with reported durations spanning from 1 to 8 years. Weekly training ranged between 9 and 30 hours ($M = 15.36$, $SD = 6.74$).

Instruments

The survey used in the present study included an initial section regarding sociodemographic information and three main self-report instruments that assessed motivational climate, competitive anxiety, and coping strategies.

Given the target age group (athletes aged 10 years or older) and the specific context of this study, there were concerns about ensuring the clarity and appropriateness of the survey instruments. Across all measures, adaptations were made to employ gender-inclusive language and the instructions of each instrument were also adapted to include explicit reference to the period participants should reflect on when answering, the 2023/2024 competitive season, and to maintain consistent language across instruments.

Sociodemographic information

This section was developed for the purpose of the present study. It included questions regarding participants' age, gender, nationality and educational status, with the aim of providing a comprehensive characterization of the sample.

In addition, sport-specific questions were included to gather contextual information that could help interpret the variation of the psychological variables under study. These questions address the number of years of sport involvement, weekly hours of practice, number of coaches and time spent with each one, as well as their competition level, the number of competitions they participated in, and the awards and medals obtained in those competitions. These variables were included as they may reflect differences in athletes' experience, training intensity, exposure to competitive environments and stability of coach athlete relationships, all of which are relevant factors when examining motivational and emotional processes in youth sport contexts.

Perceived Motivational Climate In Sport Questionnaire 2

The *Perceived Motivations Climate in Sport Questionnaire 2* (PMCSQ-2, Santos et al., 2023), a Portuguese version of the original instrument by Newton et al. (2000), is a 33-item questionnaire that was employed to assess athletes' perceptions of task and ego involving motivational climates. The instrument includes a dimension of task-involving climate, comprising the subscales of effort/improvement, cooperative learning and important role. It also measures the ego-involving climate, which includes the punishment for mistakes and unequal recognition subscales.

Participants are asked to indicate the level of agreement with each statement on a 5-point Likert rating scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Given the specific characteristics of acrobatic gymnastics, minor linguistic adaptations were made to ensure contextual relevance (e.g., replacing "game" with "competition" and "player" with "athlete"). All adaptations preserved the meaning and structure of the original items (e.g. "Please think about how you felt when competing in your team," "The coach gets mad when an athlete makes a mistake")

The original instrument (Newton et al., 2000) presented good reliability values, in the TIC and EIC scales, as well as all its subscales. Santos et al. (2023) reported satisfactory to good alpha coefficients, ranging from .61 (punishment for mistakes) to .91 (TIC).

Sport Anxiety Scale 2

Participants' competitive anxiety was assessed using the *Sport Anxiety Scale 2* (SAS-2, Cruz & Gomes, 2007), a Portuguese version of the original instrument by Smith et al. (2006). Its 15 items give a global score for competitive anxiety by the sum of the dimensions of somatic anxiety, worry and concentration disruption.

Participants are asked to rate the intensity of their feelings and thoughts before or during competitions on a 4-point Likert rating scale ranging from 1 (Not at all) to 4 (Very much so). The items in the SAS-2 were retained in their original wording as they were deemed suitable for the acrobatic gymnastics' context (e.g. "My body feels tense", "I worry I will not perform my best").

Both Smith et al. (2006) and Cruz and Gomes (2007) reported good reliability, with alpha values higher than .82 (Concentration disruption; Smith et al., 2006).

Brief COPE

Athletes' coping strategies in response to stressful situations in sport were assessed using the *Brief Coping Orientation to Problems Experienced Inventory* (Brief COPE; Ribeiro & Rodrigues, 2004), a Portuguese adaptation of the instrument developed by Carver (1997). The Brief COPE contains 28 items distributed across 14 two-item subscales and assesses strategies such as active coping (e.g., "I've been concentrating my efforts on doing something about the situation") and behavioural disengagement (e.g., "I've been giving up trying to deal with it").

Regarding reliability, the original instrument presented alpha coefficients between .54 (denial) and .90 (substance use). Ribeiro and Rodrigues (2004) also reported values ranging from satisfactory (.55, acceptance) to good (.84, venting), across all subscales.

Procedure

This study received approval from the Ethics Committee of the Faculty (deleted for double-blind review). A preliminary cognitive briefing was conducted with 14 acrobatic gymnasts (11–19 years, $M = 14.3$, $SD = 2.05$) to ensure item clarity and suitability for the sport context. Informed consent was obtained from parents and adult athletes prior to participation.

Following minor wording adjustments, coaches registered with the North Gymnastics Association were invited to collaborate. After coaches confirmed participation, parental consent (for minors) and athlete consent/assent was obtained. Surveys were administered at training facilities, with athletes completing the questionnaires individually on their mobile devices via a SurveyMonkey QR code. Completion time ranged from 15 to 20 minutes.

Data analysis

Data analysis was conducted using IBM SPSS Statistics (28 version). Initially, reliability analysis was performed to assess the internal consistency of the measures, utilizing Cronbach's alpha. To provide a more detailed description of the data and compare means across related measures, Repeated Measures ANOVA (RM ANOVA) was employed. For the primary hypothesis testing, two mediation analyses were conducted. These were specifically performed using Hayes' PROCESS Model 4 for SPSS. Subsequently, moderation analyses were performed to explore the Research Question. For all statistical tests, the predetermined level of significance was set at $p < .05$.

RESULTS

Reliability analysis and descriptive statistics

To facilitate subsequent analyses and reduce the number of variables, two composite coping indicators were computed: adaptive coping strategies, calculated as the mean score of all adaptive coping strategies, and maladaptive coping strategies, calculated as the mean score of all maladaptive coping strategies. Descriptive statistics and alpha values are presented in Table 1 and correlations are presented in Table 2.

Reliability analyses indicated satisfactory to very good internal consistency across measures, except for the punishment for mistakes subscale ($\alpha = .56$), with corrected item–total correlations ranging from .25 to .45. Cronbach's alpha values if individual items were deleted ranged from .36 to .55, so all items were retained. Furthermore, sensitivity analyses showed that exclusion of this subscale did not meaningfully alter the pattern of results; therefore, it was retained in subsequent analyses.

Table 1. Descriptive statistics.

	Minimum	Maximum	Mean	SD	Skewness		Kurtosis		Cronbach's α
					Statistic	SE	Statistic	SE	
TIC	2.00	5.00	4.19	.81	-1.35	.23	1.00	.47	.95
Effort / improvement	1.88	5.00	4.22	.86	-1.51	.23	1.26	.47	.94
Cooperative learning	1.75	5.00	4.29	.87	-1.32	.23	0.99	.47	.88
Important role	1.20	5.00	4.06	.88	-1.11	.23	0.89	.47	.91
EIC	1.44	4.19	2.90	.60	-.15	.24	0.06	.47	.86
Punishment for mistakes	1.50	4.33	3.00	.53	.33	.24	0.95	.47	.56
Unequal recognition	1.00	4.14	2.78	.76	-.44	.23	-0.21	.47	.80
Competitive anxiety	15.00	60.00	44.17	10.49	-.74	.23	-0.02	.47	.95
Somatic anxiety	5.00	20.00	14.56	4.07	-.60	.23	-0.42	.47	.90
Worry	5.00	20.00	17.42	3.56	-1.64	.23	1.74	.47	.93
Concentration disruption	5.00	20.00	12.19	4.09	.28	.23	-0.88	.47	.88
Adaptive coping	1.81	3.81	2.81	.45	.15	.23	-0.25	.47	.82
Maladaptive coping	1.08	3.42	2.43	.44	-.37	.24	0.80	.47	.79

Note. SD = standard deviation; SE = standard error; TIC = task-involving climate; EIC = ego-involving climate.

Table 2. Correlations among variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.Age	1.00														
2.Division	.30**	1.00													
3.TIC	-.04	.21*	1.00												
4.Effort/ improvement	-.02	.22*	.96**	1.00											
5.Cooperative learning	-.04	.17	.91**	.83**	1.00										
6.Important role	-.05	.16	.91**	.81**	.77**	1.00									
7.EIC	.24*	.20*	.01	.09	.02	-.11	1.00								
8.Punishment for mistakes	.22*	.25*	.21*	.25*	.20*	.10	.84**	1.00							
9.Unequal recognition	.17	.15	-.10	-.02	-.08	-.217*	.96**	.70**	1.00						
10.Competitive anxiety	.20*	.01	-.32**	-.34**	-.28**	-.25*	.16	.09	.16	1.00					
11.Somatic anxiety	.19*	-.03	-.34**	-.36**	-.26**	-.28**	.11	.05	.13	.92**	1.00				
12.Worry	.22*	.04	-.27**	-.25**	-.25**	-.27**	.19	.11	.18	.86**	.75**	1.00			
13.Concentration disruption	.13	.01	-.24*	-.29**	-.24*	-.12	.14	.08	.13	.88**	.72**	.63**	1.00		
14.Adaptive coping	.12	.21*	.42**	.40**	.30**	.46**	.13	.24*	.02	-.08	-.17	-.22*	.16	1.00	
15.Maladaptive coping	.18	-.04	-.38**	-.39**	-.37**	-.31**	.29**	.14	.28**	.70**	.64**	.61**	.63**	.06	1.00

Note. * $p < .05$. ** $p < .01$. All tests were two-tailed.

Correlation analyses revealed negative associations between task-involving climate (TIC) and competitive anxiety, including all its subcomponents, as well as maladaptive coping strategies. TIC also appeared positively related to adaptive coping strategies. Ego-involving climate (EIC) was positively associated with maladaptive coping. Competitive anxiety was also positively related to maladaptive coping strategies. Among the anxiety components, only the worry component showed a significant association with adaptive coping strategies, a negative association.

Mediation analyses

A mediation analysis (Hayes' PROCESS Model 4) was conducted to examine whether adaptive coping strategies mediated the relationship between TIC and competitive anxiety (Figure 1), as hypothesized.

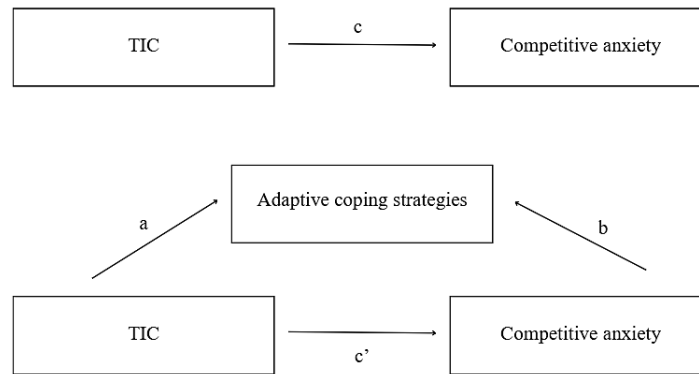


Figure 1. Model of mediation between adaptive coping strategies, task-involving climate (TIC) and competitive anxiety.

Table 3. Results of mediation analysis to explore if adaptive coping strategies mediate the relationship between task-involving climate (TIC) and competitive anxiety.

	Path Coefficients				Indirect		
	β	t	p	R ²	Effect	BootSE	95% CI
a	.23	4.73	<.001	.42			
b	1.64	.68	.50	.32			
c	-4.47	-3.36	.001	.32			
c'					.38	.80	[-1.18; 1.98]

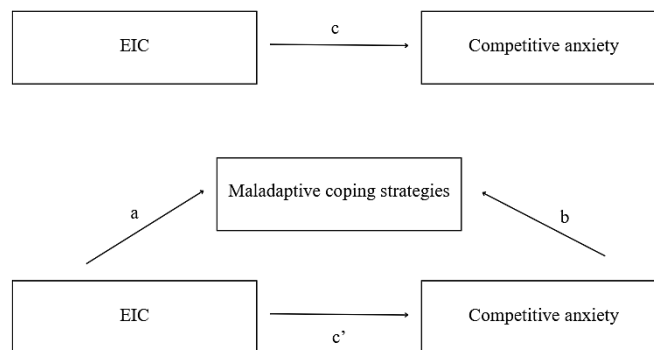


Figure 2. Model of mediation between maladaptive coping strategies, ego-involving climate (EIC) and competitive anxiety.

Table 4. Results of mediation analysis to explore if maladaptive coping strategies mediate the relationship between ego-involving climate (EIC) and competitive anxiety.

	Path Coefficients				Indirect		
	β	t	p	R ²	Effect	BootSE	95% CI
a	.20	3.00	.003	.29			
b	17.01	9.45	<.001	.69			
c	-.72	-.56	.578	.69			
c'					3.47	1.26	[.98; 6.01]

The findings (detailed in Table 3) indicated that TIC significantly predicted adaptive coping, demonstrating a positive association. Additionally, the total effect of TIC on competitive anxiety was significant and negative.

Within this model, adaptive coping did not exhibit a significant association with competitive anxiety. The indirect effect also proved to be non-significant.

A subsequent mediation analysis was performed to examine whether maladaptive coping strategies mediated the relationship between EIC and competitive anxiety (Figure 2). This procedure (detailed in Table 4) revealed a significant positive association between EIC and both maladaptive coping strategies and competitive anxiety. While the direct effect of EIC on competitive anxiety proved not significant in this model the indirect effect through maladaptive coping strategies proved to be significant, suggesting a full mediation.

Moderation analyses

To address the research question, moderation analyses using Hayes' PROCESS Model 1 were conducted, with age and competitive division as moderators of the associations among motivational climate, competitive anxiety, and coping strategies. The results revealed no significant moderation effects because all confidence intervals included zero. Competitive level was the only significant moderator of the association between TIC and anxiety, effect = 0.36, bootstrap $SE = 0.17$, 95% $CI [0.03, 0.69]$. A similar analysis used the same moderators within the significant indirect association among EIC, maladaptive coping strategies, and competitive anxiety using Hayes' PROCESS Model 14. Neither age nor competitive level moderated this model because all confidence intervals included zero.

DISCUSSION

This study aimed to examine the interplay between perceived motivational climate, competitive anxiety and coping strategies among Portuguese acrobatic gymnasts, while also exploring the potential influence of age and competitive level on these associations.

Firstly, it is important to acknowledge the relatively low alpha score obtained in the punishment for mistakes subscale of the PMCSQ-2. Although comparable to the value reported by Santos et al. (2023), it may reflect limitations in the measurement of this dimension within this sample. It is important to consider that the original validation of the Portuguese version of the scale was conducted with young football players. Although both football and acrobatic gymnastics are team sports, the acrobatic gymnastics performance more heavily relies on coordination and interdependence between teammates and perceptions of how mistakes are treated may differ from those experienced in sports in which athletes' individual performance is more distinguishable. These distinct characteristics may contribute to differences in the functioning of the scale.

A second important consideration is the aggregation of coping strategies into broad adaptive and maladaptive composites. Although this approach facilitates the interpretation of overall coping patterns, it may overlook differences between specific strategies within each category. Coping strategies, either adaptive or maladaptive, can involve different processes, ranging from cognitive and emotional responses to more action-oriented strategies. Consequently, strategies included in the same group may not have equivalent relationships with motivational climate and competitive anxiety. The present findings should therefore be interpreted as reflecting broader patterns of adaptive and maladaptive coping rather than a nuanced understanding of each strategies' contribution.

The correlational patterns largely replicate previous findings in sport psychology literature. Athletes who perceive a more task-involving motivational climate (TIC) reported greater use of adaptive coping strategies and lower levels of sport anxiety. When athletes feel that effort, improvement, cooperation and individual contribution are valued, and perceive consistent support from their coach, they appear more likely to engage

in coping skills that facilitate effective regulation of stress (Fry et al., 2021). By emphasizing effort and the inherent benefit of athletic activity (Castro-Sánchez et al., 2019), TIC may attenuate anxiety responses.

Conversely, athletes perceiving a stronger ego-involving climate (EIC) report greater use of maladaptive coping strategies. In climates where normative comparison and demonstration of superior ability are emphasized, athletes tend to focus on innate skills, which can undermine persistence and promote avoidance-based responses such as behavioural disengagement and self-blame (Harwood et al., 2015). These findings align with previous research indicating that performance-oriented climates may foster vulnerability to maladaptive coping patterns (Harwood et al., 2008, 2015).

Unexpectedly, no direct association emerged between EIC and sport anxiety. Previous research has frequently linked ego-involving climate to heighten negative affect, including higher competitive anxiety (Castro-Sánchez et al., 2022; Newton et al., 2000). However, as suggested by Harwood et al. (2008), associations between EIC and other concepts, such as anxiety, might not be as consistent as they may be contingent upon moderating variables such as perceived ability.

The positive association obtained between maladaptive coping strategies and competitive anxiety is consistent with what was expected. It reinforces that avoidance, disengagement and self-critical responses may intensify anxiety symptoms rather than alleviate them (Crocker et al., 2015; Kato, 2015).

Contrary to expectations, adaptive coping strategies were not significantly associated with overall sport anxiety. This finding may be explained by the strong influence of situational factors. Given coping has been conceptualized as a flexible regulatory process that interacts with the context (Kobylinska & Kusev, 2019; Meyer, 2001; Rodrigues et al., 2022), adaptive strategies may not directly reduce anxiety, but rather shape how athletes adjust to stress, depending on the immediate context. It is also important to consider that the aggregation of different coping strategies in a broad category could mask potential differences in how each strategy relates to competitive anxiety.

The proposed mediation hypothesis received partial support. Adaptive coping strategies did not mediate the association between TIC and competitive anxiety. Although athletes perceiving a task-involving climate reported lower anxiety, this association was not explained by the increased use of adaptive coping strategies, despite the positive association between these strategies and this type of climate (Gano-Overway et al., 2017). These findings suggest that the potential protective association between a task-involving climate with competitive anxiety is explained through processes other than coping strategies. Previous studies have suggested alternative mechanisms may explain how TIC and the psychological experiences of athletes are related. The promotion of a collaborative environment in which every athlete is valued for their contribution to the team may be critical in a sport where successful performance depends heavily on coordination and trust among teammates. This may foster a sense of mutual support and shared responsibility, reducing the extent to which challenges and mistakes are experienced as individual failures and, consequently, shaping athletes' affect. In addition, the emphasis on improvement rather than normative comparison may be associated with the athletes feeling safer when facing mistakes and difficulties, perceiving greater support from coaches (Daumiller et al., 2022; Fry et al., 2021) and reporting greater perceived ability (Harwood et al., 2008), constructs that often appear related to athletes' well-being and motivational climate.

In contrast, a significant indirect relationship between EIC and competitive anxiety was found through maladaptive coping strategies. This finding is consistent with some prior research (Ntoumanis et al., 1999), provides preliminary support for the proposed theoretical pathway, and highlights maladaptive coping as a

relevant process in understanding the association between EIC and competitive anxiety. In environments characterized by normative comparison, emphasis on demonstrating ability, and concern about mistakes, athletes may experience greater pressure to meet external standards (Jaakkola et al., 2016), making the way they respond to competitive demands an important aspect of their psychological functioning. This may be particularly relevant in acrobatic gymnastics, where the interconnected nature of athletes' performances may influence how they respond to challenges, as these may involve concerns about their impact on teammates and the team as a whole. In this context, responses such as self-blame and self-distraction may compound the psychological demands experienced by athletes in performance-oriented climates.

Although the statistical model indicated full mediation, these results should be interpreted with caution, particularly when considering the relatively small sample size and the potential for smaller effects to remain undetected, as found in previous research (Harwood et al., 2008). Other psychological processes associated with both motivational climate and athletes' psychological experiences, such as psychological safety, the relationship with coaches, and perceived ability, may also be relevant to understanding the association between EIC and competitive anxiety.

Regarding the research question, many of the moderation pathways involving age and competitive level proved not significant. Although developmental and sport literature consistently reports age and level-related differences in anxiety and coping, often attributed to increasing competitive demands, progressive development of emotional regulation and heightened fear of negative evaluation (Daumiller et al., 2022; Dias et al., 2010), these characteristics did not substantially alter the core relationships between motivational climate, coping and anxiety in the present sample.

Nonetheless, competitive division appeared as a significant moderator of the negative association between TIC and competitive anxiety. Athletes in higher competitive levels, especially those in elite divisions tend to report lower levels of anxiety (Rice et al., 2019) which can be explained by their general greater years of experience that allowed them to develop successful ways to adapt to stressful circumstances (Guillén & Sánchez, 2009).

This moderation highlights the potential importance of competitive level while also suggesting that disentangling the independent contributions of age and division remains difficult. In acrobatic gymnastics, competitive divisions typically encompass a relatively broad age range, resulting in mixed development stages within the training contexts (Marshall & Gibson, 2017). Consequently, it is challenging to observe the unique effect of one variable as the effect of the other cannot be statistically controlled. This methodological difficulty is further compounded by the limited body of research focusing on acrobatic gymnastics (Marshall & Gibson, 2017), restricting the availability of conceptual and empirical frameworks that account for its structural particularities. As such, interpretations regarding age and competitive level effect warrant further sport-specific investigation.

The present findings offer several practical implications for athletes, coaches and sport psychology. They suggest that intervention efforts shouldn't be prioritizing anxiety per se, but the coping patterns fostered within environments perceived as performance oriented. Coaches in acrobatic gymnastics should limit normative comparison, focus on innate ability and punishment for mistakes, considering their potential implications on athletes' psychological and sports well-being.

Specifically, coaches can align goal setting, feedback and error-management strategies with the values of effort, learning and cooperation. This may include defining appropriately challenging individual and shared

team goals focused on skill development and breaking broader objectives into clear and achievable tasks. These goals can be supported through specific technical feedback that emphasizes progress and encourages support from teammates. Mistakes can also be normalized as part of the learning process and used as a starting point for identifying possible adjustments. Collective reflective moments involving athletes and coaches may further encourage shared responsibility and collaborative problem-solving, which can be particularly relevant in the highly interdependent context of acrobatic gymnastics.

Coach education may also benefit from incorporating basic knowledge about coping processes, allowing coaches to complement the work of sport psychologists. While practicing or competing, athletes can benefit from support in identifying their coping patterns and when they are not being useful. They can also be guided in exploring more adaptive ways of responding to challenging situations, such as planning and seeking instrumental support. These practices may support more positive adaptation to competitive demands and contribute to longer and healthier sport careers.

Despite its relevance this study presents several limitations. The relatively reduced number of participants may have limited the statistical power to detect smaller effects and nuanced relationships. In addition, the sample was predominantly female, with male athletes representing a small portion of participants, and was primarily composed of athletes competing in lower competitive divisions. Although this composition reflects the participation patterns within acrobatic gymnastics, it restricts the generalizability of findings and a deeper examination of gender, age, experience, and competition level differences. This is particularly relevant given that perceptions of motivational climate, competitive anxiety and coping responses may vary across gender, competitive level and experience (e.g. Daumiller et al., 2022). Thus, future studies should prioritize larger, more balanced, and diverse samples.

Additionally, its cross-sectional design primarily allows for analysing associations, restricting causal interpretations; future research would significantly benefit from the exploration of cause-effect relationships through other study designs. Furthermore, reliance on self-report measures may introduce social desirability bias, and necessary instrument adaptations could affect their psychometric properties. Therefore, multi-informant designs and qualitative approaches are recommended for a deeper understanding of athletes' psychological experiences.

Future research should also examine additional moderators, such as perceived ability, psychological safety, and coach-athlete relationship, to further clarify associations between the sports environment and athletes' psychological experiences. Analysing individual coping responses could also be interesting to clarify whether specific strategies are more strongly associated with motivational climate and competitive anxiety.

Overall, the present findings reinforce the importance of examining motivational processes within specific structural realities of each sport. By situating competitive anxiety within a broader self-regulatory and environmental framework, this study contributes to a more contextualized understanding of young athletes' psychological experiences. Such an approach holds practical relevance for promoting healthier sport environments that support both well-being and better performance.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Contributions are specified according to the CRediT (Contributor Roles Taxonomy) as follows:

Conceptualisation: Sofia Brandão and Luísa Faria. Methodology: Sofia Brandão and Luísa Faria. Formal analysis: Sofia Brandão. Investigation: Sofia Brandão. Data curation: Sofia Brandão. Writing – original draft: Sofia Brandão. Writing – review & editing: Sofia Brandão and Luísa Faria. Supervision: Luísa Faria.

All authors have critically reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

AI USE DISCLOSURE

In accordance with current publishing ethics and transparency recommendations, the authors used artificial intelligence tools, namely ChatGPT -5.3, exclusively to assist with the translation, spelling correction and improvement of the overall readability and quality of the English writing. No AI tools were used in the generation of scientific content, including the study design, data collection, analysis, interpretation of results, or the formulation of conclusions. The authors retain full responsibility for the content of the manuscript and confirm its originality, integrity, and accuracy.

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