The Relationship Among Perceived Pre - competition Coaching Behavior, Parental Support and Competition Anxiety of Physical Education Students: A Case Study of Higher Education Institutions in Chongqing

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ABSTRACT

The objectives of this research were to examine the effects of perceived pre-competition coaching behaviors on competition anxiety and pre-competition state among physical education students, to explore the mediating roles of perceived competence and guidance transformation ability in the relationships among coaching behaviors, parental support, competition anxiety, and pre-competition state, and to investigate the moderating effect of parental support styles and the synergistic effect of support consistency between coaches and parents on athletes' psychological responses.

This quantitative and qualitative study employed 346 physical education students aged 18–22 from higher education institutions in Chongqing as research participants, used validated scales including the Coaching Behavior Perception Scale, Parental Support Scale, Perceived Competence Scale, Competitive State Anxiety Inventory-2 (CSAI-2), guidance transformation ability scale, and pre-competition state scale as research instruments, collected quantitative data through three-time-point tracking surveys and qualitative data via semi-structured interviews with 28 typical cases, and analyzed data using SPSS 26.0, AMOS 24.0 for statistical tests and structural equation modeling, and NVivo 12 for grounded theory coding.

Major Findings: (1) On the direct effects of pre-competition coaching behaviors, it was found that supportive coaching behaviors significantly reduce cognitive anxiety and somatic anxiety and improve pre-competition state, while non-supportive behaviors significantly increase anxiety and impair psychological readiness; (2) on the mediating mechanisms, it was found that perceived competence mediates the links between coaching behaviors, parental support and competition anxiety, and guidance transformation ability mediates the relationship between coaching behaviors and anxiety regulation outcomes; and (3) on the moderating and synergistic effects, it was found that companionate parental support strengthens the positive

impacts of supportive coaching, and consistent coach-parent support produces a significant synergistic reinforcement effect on lowering anxiety and optimizing pre-competition state.

Keywords: competition anxiety, pre-competition perceived guidance behavior, competence perception, pre-competition state

1. Introduction

In competitive sports pre-game scenarios, the core goal is to help athletes deliver peak performance, yet coaches, parents and athletes often face a three-way dilemma. This exposes a key gap in current sports psychology research: most studies focus on theoretical correlations between competitive anxiety and pre-game states rather than practical needs such as optimizing coaches' guidance, tailoring parental support and facilitating athletes' perception transformation, leaving theories untranslatable into actionable guidelines for different roles.

Coaches mostly rely on experience instead of scientific strategies for pre-game psychological regulation and perceptual guidance. They can sense athletes' anxiety but fail to accurately distinguish cognitive anxiety (fear of underperformance) from somatic anxiety (rapid heartbeat, muscle tension), leading to misguided interventions. Existing three-dimensional anxiety classification lacks rapid identification tools and differentiated guidance plans, resulting in one-size-fits-all guidance that cannot boost athletes' states precisely.

As invisible emotional transmitters of athletes' pre-game mindset, parents' support styles directly shape athletes' understanding of coaches' guidance, often falling into two extremes: over-intervention (micromanagement triggers athletes' cognitive anxiety, making them misperceive tactical guidance as extra pressure) and over-indulgence (leaving mental adjustment fully to coaches, causing emotional deprivation and poor focus on coaches' cues). Current research ignores parents' mediating role in the "competitive anxiety-pre-game perception-performance" chain and lacks standards for guidance-adapted support, leaving parents well-intentioned but ineffective.

Athletes face dual challenges of cognitive ambiguity and ineffective perception transformation: they cannot distinguish normal pre-game excitement from anxiety requiring intervention (e.g., confusing the desire to win with cognitive anxiety, mistaking excessive somatic arousal for optimal state) and fail to translate coaches' guidance into targeted regulation strategies. Without integrated guidance-to-action tools in existing coping strategy studies, athletes remain passive—aware of nervousness but unable to regulate it via guidance.

Essentially, the link between competitive anxiety and pre-game readiness is not a one-sided psychological process for athletes, but a result of interactions among coaches' pre-game perceptual guidance, parental support and athletes' perception transformation. Martens' multidimensional anxiety theory clarifies anxiety's differentiated traits, while stress and coping

theory emphasizes individual-environment interaction, both indicating that improving pre-game states requires addressing athletes' anxiety alongside coaches' anxiety identification and precise guidance capacity, parents' adaptive support skills and athletes' perception transformation ability. However, current research fails to integrate these three dimensions' needs or provide a holistic "guidance-support-transformation" solution, leading to a severe theory-practice disconnect.

To fill this gap, research must move beyond the traditional single-variable correlation paradigm, taking pre-game perception as the core thread and incorporating the three stakeholder dimensions. It will verify the precise correlation between the three dimensions of competitive anxiety and sub-dimensions of pre-game states, and explore how coaches can optimize perceptual guidance to match athletes' anxiety types, parents can provide tailored support to help athletes positively interpret coaches' strategies, and athletes can enhance perception-to-action conversion to turn guidance into anxiety regulation tactics. This study fills the research gap in the multi-role "anxiety-perception-guidance-state" relationship, providing coaches with a dimensionalized perceptual guidance manual, parents with a tailored support guide and athletes with a perception-to-action toolkit. It grounds sports psychology theory in competitive practice, fosters synergy among stakeholders, and enables athletes to convert pre-game anxiety into optimal competitive states for stable in-competition performance.

2. Literature Review and Research Related

2.1 Research Background and Objectives

During the pre-competition phase of competitive sports events, psychological stability directly determines whether sports majors can translate training efforts into actual athletic performance. Higher education institutions 'sports talent development systems are increasingly emphasizing scientific and systematic pre-competition psychological regulation. (Li Kexin & Pan Yan, 2024) indicate that contemporary college students are prone to anxiety under competitive pressure, a phenomenon stemming from multiple factors including self-expectations, preparation levels, and external evaluations, which has become a widespread constraint on competitive performance. (Chen Yong, 2023) Research on young athletes reveals that competition anxiety is prevalent among youth sports communities, with significant variations in anxiety levels across genders, training durations, and competition experience—a trend equally prominent among university sports majors. As a key hub for sports education development in Southwest China, Chongqing Municipality has witnessed increasing participation rates of sports majors in competitions under ongoing sports-education integration policies, leading to heightened pre-competition psychological regulation needs. However, systematic studies examining the relationship between local students' pre-competition perceptions, external support, and anxiety levels remain scarce. (Wang Fu, 2023) Research on

badminton talent development in Chongqing highlights that local youth sports growth is profoundly influenced by parental support, coaching guidance, and academic-training conflicts. This unique environment determines that pre-competition psychological states among Chongqing's university sports majors exhibit distinct regional and demographic characteristics. (Fang Junhui, 2025) emphasized in swimming research that athletes 'pre-competition perception and on-site regulation abilities directly influence competition outcomes, with the development of these capabilities requiring guidance from coaches and support from families. (Wan Bingjun & Xu Jie, 2024) proposed that families play an irreplaceable role in youth athlete development, and the synergy between coaches and families profoundly impacts athletes' psychological growth quality. Existing studies have yet to integrate pre-competition perception of coaching behaviors, parental support, and competition anxiety into a unified analytical framework, nor have they provided targeted psychological regulation strategies for sports majors in Chongqing universities. This study investigates the intrinsic relationships among pre-competition perception of coaching behaviors, parental support, and competition anxiety among Chongqing university sports students, clarifies the influence pathways and strength of each factor, enriches localized research outcomes in university sports psychology, and offers theoretical references and practical support for coaches to optimize pre-competition guidance strategies, guide parents in providing reasonable support, and help students improve their pre-competition psychological states.

2.2 Literature Review and Analysis

Competitive anxiety serves as a core psychological variable that affects the pre-competition state and athletic performance of physical education majors. Relevant studies have formed a relatively comprehensive research system covering the structure of anxiety, influencing factors, and regulation strategies. Li & Pan (2024) pointed out that contemporary college students are susceptible to academic pressure, self-expectation, preparation status and other factors in competitive scenarios, which trigger negative emotions such as tension, anxiety and fear. These negative emotions not only directly undermine competitive performance, but also impair individual mental health, providing a realistic contextual foundation for research on competitive anxiety among college physical education students. Taking U16 tennis players as research subjects, Chen (2023) found that adolescent athletes generally score higher than the norm in cognitive trait anxiety and competitive state anxiety. Significant differences exist in anxiety levels across gender, age, training years and competition experience. Female athletes show more prominent symptoms in somatic state anxiety and performance-related anxiety, while athletes with richer competition experience tend to have lower anxiety levels. These findings reveal the group characteristics and differentiation rules of competitive anxiety among adolescent athletes, and offer a reference for this study focusing on physical education majors.

An analysis of college taekwondo athletes conducted by Zhang (2022) indicated a significant correlation between psychological skills and competitive anxiety. The ability to overcome worry is negatively correlated with cognitive state anxiety and somatic state anxiety, whereas state self-confidence is positively associated with multiple psychological skills. This evidence confirms the vital role of individual psychological regulation in anxiety alleviation. Further research on high-level woodball athletes by Liu & Chen (2021) identified distinct differences in competitive state anxiety in terms of group division, gender and competition experience. Athletes with sufficient competitive experience demonstrate more stable anxiety regulation, providing multi-event empirical evidence for understanding individual differences in anxiety. An exploration of pre-competition emotions among wushu athletes by Luo & Lin (2006) verified that individual failure anxiety and social expectation anxiety are significantly correlated with competition rankings. Athletes with better performance score lower in the above two anxiety dimensions, which directly proves the predictive effect of pre-competition anxiety on competitive outcomes and highlights the practical value of research on pre-competition psychological states.

Coaching behavior functions as a critical external factor shaping athletes' pre-competition perception and anxiety fluctuation. Existing studies have mostly analyzed this issue from the perspectives of instructional methods, emotional feedback and tactical guidance. In the tactical research on high-level female 200-meter freestyle swimmers, Fang (2025) proposed that the competitive performance of elite athletes relies not only on physical fitness and technical proficiency, but also on psychological competencies including pre-competition speed perception and rhythm regulation. The cultivation of such psychological abilities is closely related to coaches' tactical design and pre-competition guidance. Medal-winning athletes are better able to balance physical distribution and rhythm transformation under coaches' guidance, which indirectly reflects the shaping effect of coaching behavior on athletes' pre-competition perception and on-site emotional regulation. Although existing research has not directly targeted physical education majors, it has clarified that coaches' instructional strategies, emotional attitudes and communication styles profoundly affect athletes' pre-competition cognitive judgment and emotional experience. Supportive pre-competition guidance can reduce individuals' cognitive uncertainty, while unsupportive coaching behaviors may aggravate psychological tension, laying a theoretical foundation for exploring the correlation between perceived pre-competition coaching behavior and competitive anxiety.

Family support, especially parental support, plays an irreplaceable role in the growth of adolescent and college athletes, and acts as a crucial source of social support affecting athletes' psychological status and competitive adaptation. From the perspective of sports and education integration, Wan & Xu (2024) noted that families are core participants in the cultivation of adolescent athletes. Family role orientation, participation concepts and collaborative

capabilities directly determine the quality of reserve talent training, whereas insufficient or inappropriate family support restricts athletes' long-term development. Yang (2022) demonstrated that family factors exert a significant influence on the social adaptability of adolescent athletes. The quality and mode of family support indirectly affect individuals' psychological energy and stress coping ability, thereby linking to emotional stability in competitions. Liu (2021) argued that family education patterns are essential inducements for athletes' competitive behaviors and psychological states, and parents' expectation delivery and emotional expression profoundly shape athletes' stress perception and anxiety levels. An investigation on badminton reserve talents in Chongqing conducted by Wang (2023) explicitly stated that parental support motivation, participation intensity and resource investment directly influence the training sustainability and competitive mentality of young athletes. The study-conflict pressure brought by further education is mostly transmitted to athletes through parental attitudes, aggravating their pre-competition psychological burden. In a comparative analysis of talent development patterns between Chinese and foreign male tennis players, Wu (2020) emphasized that a positive family environment and sound support mechanisms facilitate athletes' long-term development, and differentiated family support is a key reason for the divergent development rhythms of athletes at home and abroad. Du et al. (2020) developed an athlete social support scale, which categorizes family support, coaching support and peer support as core dimensions. The scale has sound reliability and validity and can be applied to the quantitative evaluation of athletes' social support level, providing methodological references and theoretical basis for the measurement of parental support in this research.

Under the policy background of sports and education integration, the cultivation of college physical education majors attaches greater importance to the coordination among coaches, families and individuals, and relevant research has gradually shifted from single-factor analysis to the multi-agent interaction perspective. Current literature has separately discussed the characteristics and impacts of competitive anxiety, the psychological effects of coaching behavior, and the functional mechanism of parental support. Nevertheless, most studies focus on the correlation between single variables, lacking integrated analysis of the internal relationships among perceived pre-competition coaching behavior, parental support and competitive anxiety. Targeted research focusing on physical education majors in Chongqing's colleges and universities remains scarce. Fang (2025) concentrated on tactical dimensions, while Li & Pan (2024) only provided general discussions on the improvement of college students' competitive anxiety. Studies by Chen (2023) and Zhang (2022) excluded parental support as a research variable, and researches by Wan & Xu (2024) and Wang (2023) centered on sports-education integration and reserve talent training without in-depth exploration of pre-competition psychology and anxiety mechanisms. Existing findings are therefore insufficient to provide direct theoretical support and empirical reference for this study.

The pre-competition perception of physical education majors serves as an intermediate link connecting external support and internal anxiety. Coaching behavior and parental support affect individuals' cognitive perception, and further regulate competitive anxiety levels and pre-competition psychological states. However, this logical pathway has not been clearly interpreted in previous studies. The social support framework constructed by Du et al. (2020) offers research ideas for multi-agent influence analysis, yet it fails to extend to the specific correlation between pre-competition perception and competitive anxiety. Luo & Lin (2006) confirmed the influential effect of pre-competition emotions but did not explore the underlying influencing paths of coaching and parental factors. Overall, contemporary research has obvious deficiencies in research pertinence, variable integration and mechanism interpretation, which leaves sufficient research space for this study to explore the relationships among perceived pre-competition coaching behavior, parental support and competitive anxiety targeting physical education majors in Chongqing's colleges and universities.

2.3 Summary and Review of Current Research Status

A substantial body of existing literature in sports psychology has accumulated abundant research findings focusing on competitive anxiety, coaching behaviors and parental support. The research participants cover adolescents, college students, high-level athletes and other groups, while research methods include questionnaire surveys, empirical analysis, scale development and comparative research, which have laid a solid foundation for exploring the relationship between pre-competition perception and competitive anxiety. Li and Pan (2024), Chen (2023), Zhang (2022), Liu and Chen (2021), as well as Luo and Lin(2006), have confirmed the prevalence and heterogeneity of competitive anxiety and its significant impact on athletic performance based on different sports events and research groups, clarifying the essential position of anxiety research in the field of sports psychology. From an integrated perspective of tactics and psychology, Fang (2025) revealed the pivotal role of coaches' guidance in athletes' pre-competition perception and on-site psychological regulation, offering new insights into understanding the psychological effects of coaching behaviors. Wan and Xu (2024), Yang (2022), Liu (2021), Wang (2023) and Wu (2020) verified the vital influence of parental support on athletes' development from the dimensions of sports-education integration, social adaptation, reserve talent cultivation and talent development rules, and emphasized the irreplaceable value of family factors in sports psychological research. Du et al. (2020) developed the Social Support Scale for Athletes, which provides a scientific measurement tool for quantitative research on coaching support and parental support, and promotes the standardization of relevant empirical studies.

Nevertheless, notable limitations and research gaps remain in the overall research framework. Most existing studies focus on the influencing effect of a single variable, and there

is a lack of integrated research that incorporates coaching behaviors, parental support, pre-competition perception and competitive anxiety into a unified theoretical model. The internal mechanism of multi-subject interactive effects has not been fully elaborated. Although the research objects are diversified, empirical studies specifically targeting physical education majors in Chongqing universities are extremely insufficient. The lack of regional pertinence and group adaptability makes it difficult to provide direct guidance for physical education practice in local colleges and universities. As a core mediating variable linking external support and internal anxiety, pre-competition perception has not received adequate attention in previous studies. Researches taking pre-competition perception as the starting point to analyze psychological relationships are relatively scarce, leaving broad room for further expansion of research perspectives.

Taking colleges and universities in Chongqing as the research context and physical education majors as the specific participants, this study conducts a systematic analysis of perceived pre-competition coaching behaviors, parental support and competitive anxiety. It effectively compensates for the deficiencies of existing studies in group pertinence, variable integration and perspective innovation. The research conclusions can not only enrich the theoretical system of sports psychology in the higher education context, but also provide practical references for the pre-competition psychological intervention of physical education majors, the optimization of coaches' daily guidance and the improvement of parental support modes in Chongqing universities. Accordingly, this research possesses important theoretical significance and practical value.

3. Research methodology

To systematically investigate the interactive mechanisms among "coaches pre-competition perception guiding behavior – parental support – athletes ability perception – competition anxiety – pre-competition state," this study employed a mixed methods approach, establishing a comprehensive technical framework spanning participant selection, instrument development, and data processing to ensure the scientific validity and reliability of the findings.

3.1 Study Design and Methodology

This study adopted a mixed study design (explanatory sequential design) and was conducted in two phases, primarily focusing on quantitative data supplemented by qualitative data, aiming to achieve the research objectives of "quantitative validation of relationships and qualitative mining of mechanisms."

Phase 1: Quantitative Research (Verification of Variable Relationships)

Participants: A total of 346 college sports student-athletes aged 18–22 from Chongqing were selected using stratified random sampling, covering track and field, martial arts routines (individual events), basketball, and football (team events). The inclusion criteria ensured

representative levels of athletic performance and training experience; participants were required to have participated in at least three municipal-level or higher competitions, possess a systematic training duration of no less than two years, and have no history of major injuries or received professional psychological intervention within the past three months.

Data collection employed a three-point tracking design, strictly adhering to the logical temporal sequence of variables and pre-competition real-world scenarios:

Phase T1 (1 week prior to the competition): Collect data on parental support, ability perception, guided conversion ability, and control variables including gender, age, sport type, training duration, and competitive level.

Phase T2 (1 day before the competition): Measurement of pre-competition perceived coach behavior (supportive/non-supportive) and competition anxiety (cognitive anxiety and somatic anxiety);

T3 stage (30 minutes before the competition): Measurement of pre-competition status (confidence, behavioral stability, and concentration).

Data collection combined offline on-site completion with online platform entry, with standardized instructions and restricted response time to ensure temporal sequence consistency and data authenticity.

Statistical Analysis: Data analysis was conducted using SPSS 26.0 and AMOS 24.0 software, including: descriptive statistics and reliability/validity testing to validate scale quality; Harman single-factor analysis to control for common method bias; Pearson correlation analysis for preliminary exploration of variable associations; Process macro programs for testing mediation effects; stratified regression analysis for verifying moderating effects; and structural equation modeling (SEM) for constructing overall variable relationship models and assessing model fit.

Phase 2: Qualitative Research (In-depth Mechanism Study)

Participants: Based on quantitative research findings, 28 typical cases were selected using the maximum difference sampling method, including athletes with high/low anxiety levels, athletes with different support consistency combinations (high consistency----supportive guidance, low consistency----supportive guidance, etc.), as well as their corresponding coaches (5-8 individuals) and parents (15-20 individuals).

Data Collection: A semi-structured interview outline was developed based on the core mechanisms of three-party interaction and anxiety regulation. For the athlete group, key questions included: "Which pre-competition coaching strategies from your coach boosted your confidence or caused anxiety? How did your parents reactions and support methods influence your understanding and application of the coaching guidance?" For the coaching team, the focus was on: "Do you adjust pre-competition coaching approaches according to the type and severity of athletes anxiety? How do you communicate with parents to develop coordinated

support strategies?" For the parent group, the main inquiries were: "What support methods do you typically use before competitions? How do you align with the coachs coaching rhythm?" Each interview lasted 20–30 minutes, was fully recorded, and underwent transcription and anonymization within 24 hours.

Analytical Method: NVivo 12 software was employed for grounded theory coding. Initial concepts were refined through open coding, logical relationships between categories were established via axial coding, and a core narrative thread— "support consistency → perceived coaching guidance → perceived competence → anxiety regulation → pre-competition state optimization" —was constructed through selective coding. This narrative thread corroborates and complements quantitative research findings, thereby enhancing the completeness and persuasiveness of the research conclusions.

3.2 Research Methods

This study employs an interpretive mixed methods design structured around a framework of "quantitative analysis supplemented by qualitative research," implemented in two phases. The first phase conducts quantitative research using a three-point time series tracking method to analyze mediating and moderating effects among variables, thereby validating research hypotheses. The second phase selects representative cases based on quantitative findings and employs semi-structured interviews for qualitative research to uncover underlying mechanisms behind variable relationships. This dual-track approach achieves the dual objectives of "macro-level relationship validation + micro-level mechanism analysis," with the two phases mutually reinforcing each other to significantly enhance the credibility of research conclusions.

3.3 Population and Sample

3.3.1 Overall Study

This study integrated research themes with feasibility assessments, defining participants as "adolescent athletes aged 18-22 from higher education institutions in Chongqing Municipality." Core inclusion criteria included: ① formally registered sports coaches or team members with systematic training backgrounds; ② ages between 18-22 years, transitioning from adolescence to adulthood; ③ at least two years of systematic training experience and participation in ≥3 municipal-level competitions, demonstrating ability to accurately interpret pre-competition guidance; ④ absence of major sports injuries, diagnosed mental health issues, or professional psychological interventions within the past three months to minimize external interference. Institutional data indicated approximately 520 participants met these criteria, comprising 200 individuals (120 track and field athletes and 80 martial arts athletes) and 320 team members (150 basketball players and 170 soccer players). Distribution was as follows:

municipal-level athletes (312,60%), provincial-level athletes (156,30%), and national-level athletes (52,10%).

3.3.2 Sample Characteristics

This study employed stratified random sampling to select samples, distributing a total of 400 questionnaires and recovering 346 valid responses (valid response rate of 86.5%). The sample structure was highly matched with the population, with the following specific characteristics:

Demographic characteristics: There were 208 male cases (60.1%) and 138 female cases (39.9%), consistent with the overall gender ratio (male 62%, female 38%). Age distribution: The 18-year-old group comprised 82 cases (23.7%), the 19-year-old group 95 cases (27.5%), the 20-year-old group 88 cases (25.4%), and the 21–22-year-old group 81 cases (23.4%). The average age was 19.6 ± 1.2 years, with a balanced distribution.

Distribution of movement characteristics: The effective sample size and core indicators for each item and level are shown in the table below. The average training duration was 3.8±1.5 years, and the average number of competitions was 5.6±1.8, both meeting the inclusion criteria.

Sampling Layer	**valid sample**	**Sample percentage (%)**	**Average training duration year**	**Average number of competitions Next one**
Personal Project – Municipal Level	82	23.7	3.2±1.1	4.1±1.3
Personal Project-Provincial	46	13.3	4.5±1.4	6.3±1.5
Personal Project – National Level	18	5.2	6.8±1.6	9.5±2.1
Team Project – City Level	128	37.0	3.0±1.2	4.5±1.4
Team Project-Provincial	56	16.2	4.2±1.3	6.8±1.6
National Project Team	16	4.6	6.5±1.5	10.2±2.3
altogether	**346**	**100.0**	**3.8±1.5**	**5.6±1.8**

Distribution of core variables: Among 192 participants (55.5%), supportive guidance perception scores of ≥3.5 points (on a 5-point scale) were reported, while 68 participants (19.7%) exhibited non-supportive perception scores of ≥3.5 points. Parental support types were categorized as companionship-style (≥3.5 points) in 165 cases (47.7%) and didactic-style (≥3.5

points) in 98 cases (28.3%). High anxiety levels (≥4 points on a 7-point scale) were observed in 86 participants (24.9%), whereas low anxiety levels were noted in 152 participants (43.9%). The variable distribution was balanced and met statistical requirements.

The scientific definition of the study population and sample is the fundamental prerequisite for ensuring the reliability and generalizability of research conclusions. Based on the principle of "target representativeness and operability," this study clearly delineated the scope of the study population, employed stratified random sampling to determine sample groups, and systematically controlled the sample structure design, thereby providing high-quality data support for investigating the interaction mechanisms among coaches, parents, and athletes.

3.3.3 Sampling Method

This study adopted a combined strategy of "stratified random sampling + maximum difference sampling": ① Using "sport type (individual/team)" as the primary stratification variable and "sport level (municipal/provincial/national)" as the secondary stratification variable, six sampling tiers were established. Samples were drawn from each tier using the random number table method to ensure consistency with the overall population structure; ② Qualitative sampling was conducted based on quantitative analysis results, selecting 28 representative cases (including combinations of high/low anxiety levels and high/low support consistency) from the six sampling tiers. These cases encompassed athletes, coaches (5-8 individuals), and parents (15-20 individuals) to ensure comprehensive multidimensional perspectives.

3.3.4 Determination of Sample Size

The sample size was determined based on three key factors: ① Statistical power requirement: The mediation effect test and structural equation modeling analysis each require a sample size ten times larger than the required size per variable category. Accounting for a 30% response drop rate, a total of 400 questionnaires were distributed, with at least 300 valid responses ensuring a statistical power of ≥0.85 ($\alpha = 0.05$); ② Qualitative matching requirement: To include populations with extreme characteristics, the proportion of quantitative samples from highly anxious individuals was increased to 15%; ③ Practical feasibility: After consultation with school management, the 400 questionnaires could be completed within a one-month survey period without compromising data quality.

3.3.5 Implementation Steps of Sampling Process

Establish a 2×3 hierarchical framework, specifying the overall scale and sampling ratio for each layer.

After obtaining the list of athletes at each level, samples were randomly selected and their qualifications were verified by coaches.

Exclude samples that do not meet the criteria (e.g., recent injury cases) and supplement

sampling from the same level;

After completing the quantitative data collection, the qualitative interview cases were screened based on the characteristics of the core variables.

3.4 Area

Chongqing Normal University
Medical University Of Chongqing
Chongqing University of Humanities and Science
Chongqing Technology and Business University Pace College
Chongqing Vocational College of Applied Technology
Chongqing Yitong University
Chongqing University of International Business and Economics
Chongqing Aerospace Vocational and Technical College
Chongqing Telecommunications Vocational College
Chongqing Polytechnic of Commerce and Industry
Chongqing Telecommunications Vocational College

3.5 Research Tools

This study conducted reliability and validity tests on all measurement tools. The reliability test results showed that the Cronbachs α coefficients of all scales ranged from 0.76 to 0.88, all exceeding the critical threshold of 0.70, indicating good internal consistency. Validity was assessed using confirmatory factor analysis, with results showing $\chi^2/df < 3$, CFI> 0.90, IFI> 0.90, RMSEA <0.08, and SRMR <0.08. All fit indices met psychometric requirements, demonstrating strong structural validity of the scales for formal measurement in this study.

All tools underwent pilot testing (n=50) and demonstrated good reliability and validity (Cronbachs $\alpha \geq 0.70$, $\chi^2/df < 3$, CFI>0.90), as detailed below

type of variable	Tool name	Source/Reference	Dimension and Entry	Scoring method	Clonbachs α coefficient
argument	Coach Behavior Perception Questionnaire (Pre-Game Revised Version)	Revised by Xu Wenquan et al. (2013)	Supportive, non-supportive, 24 questions	1–5 minutes	0.82

type of variable	Tool name	Source/Reference	Dimension and Entry	Scoring method	Clonbachs α coefficient
argument	Parent Support Scale for Adolescent Athletes	Self-authored, with reference to Liu Shuhui (2018)	Companionship-style, didactic-style, absent-style – 12 topics	1–5 points	0.78
metavariable	Athlete Performance Perception Scale	Self-compiled, based on Banduras Self-Efficacy Theory	Skill mastery, confidence in coping, sense of progress, 9 questions	1–5 points	0.85
metavariable	Transformational Competency Guidance Scale	Custom	Understanding, Analysis, Application, 6 questions	1–5 points	0.80
regulated variable	Support for consistency assessment	Custom	Consistency between coach guidance and parental expectations, Question 2	dichotomic variable	-
dependent variable	Competitive State Anxiety Inventory-2 (CSAI-2)	Revised by Martens (1990) and Zhang Liwei (2019)	Cognitive Anxiety, Somatic Anxiety, Self-Esteem, 18 Questions	1–7 points	0.88
dependent variable	Pre-game condition assessment entry	Custom	Behavioral stability and concentration: 3 questions	1–7 points	0.76

3.6 Data Collection

Data collection employed a "three-timepoint tracking + online-offline combination" approach, strictly adhering to the causal sequence of variables to control for information bias.

3.6.1 Quantitative data collection (three time points)

Phase T1 (1 week prior to the competition): Collect data on parental support, ability perception, guided conversion ability, and control variables including gender, age, sport type, training duration, and competitive level.

Phase T2 (1 day before the competition): Measurement of pre-competition perceived coach behavior (supportive/non-supportive) and competition anxiety (cognitive anxiety and somatic anxiety);

T3 stage (30 minutes before the competition): Measurement of pre-competition status (confidence, behavioral stability, and concentration).

3.6.2 Qualitative Data Collection

Within one week after completing the quantitative data collection, we conducted semi-structured face-to-face interviews with representative cases: ① Informed consent forms and recording authorizations were obtained prior to each interview; ② Questions were posed according to a predefined outline, including flexible follow-up inquiries (e.g., "How did the parents reactions influence your understanding of coaching guidance"); ③ Each interview lasted 20–30 minutes, with transcripts generated and anonymized within 24 hours after recording completion, ensuring a transcription accuracy rate of ≥95%.

3.6.3 Data Quality Control

A dual-check and three-level review mechanism was established: quantitative data underwent dual-check and error correction using SPSS; qualitative data were jointly reviewed by the researchers and a third party, with ambiguous statements confirmed through dual interviews; Harmans one-factor analysis revealed that the first common factor accounted for 27.8% of the variance (<40%), and no significant common methodological bias was detected.

3.7 Data Analysis

Appropriate analytical methods were employed to integrate and validate both quantitative and qualitative results.

3.7.1 Quantitative Data Analysis (SPSS 26.0 + AMOS 24.0)

In the mediation effect analysis, we further examined two dimensions—pre-game focused coaching and pre-game friendly behavior—when evaluating the overall impact of "supportive coaching behaviors." We assessed the mechanisms through which these dimensions influence different types of anxiety using perceptual ability metrics. Specifically, we hypothesized that focused coaching reduces cognitive anxiety by enhancing "perceptual skill mastery" (as targeted information alleviates athletes concerns about potential errors),

while friendly behavior mitigates somatic anxiety by boosting "coping confidence" (since emotional empathy eases athletes physiological responses to "physical tension"). Through intergroup mediation effect analysis comparing intensity differences between these dimensions, we identified evidence-based coaching methods with greater intervention efficacy for specific anxiety types. This provides coaches with evidence-supported guidance to achieve precise alignment between "anxiety type" and "coaching style."

3.7.2 Qualitative Data Analysis (NVivo 12)

This study employed the grounded theory coding method for analysis, with the following steps: ① The open coding phase identified 32 initial concepts and 12 initial categories; ② Central coding established the correlation axis of "guidance type → support pattern → perceptual interpretation → ability change → state output"; ③ Selective coding yielded the core narrative thread that "support consistency influences anxiety and state through ability perception," a conclusion corroborated by quantitative research findings, thereby refining the mechanistic explanation.

3.8 Research Sample

Using the aforementioned sampling method, we distributed 400 questionnaires and collected 378 valid responses. After screening, 32 invalid questionnaires were excluded (including cases with response rates below 10% or recurring answer patterns [e.g., identical scores across five consecutive questions]), resulting in 346 valid questionnaires with an 86.5% response rate. The core characteristics of the sample closely matched the overall population structure, as detailed below:

3.8.1 Demographic Characteristics

Gender distribution: There were 208 male athletes (60.1%) and 138 female athletes (39.9%), which aligns with the overall gender ratio (male 62%, female 38%) and the typical gender distribution characteristics of university competitive athletes.

Age distribution: 82 cases (23.7%) were aged 18 years, 95 cases (27.5%) were aged 19 years, 88 cases (25.4%) were aged 20 years, and 81 cases (23.4%) were aged 21-22 years, with a mean age of 19.6±1.2 years. The age distribution was concentrated within the study-defined 18-22 year age range, demonstrating a balanced age structure.

3.8.2 Distribution of Motion Characteristics

Sampling Layer	Total Scale human	Number of sampled individuals human	Valid Sample human	Proportion of valid samples (%)	Average training duration year	Average number of competitions Next one
Personal Project – Municipal Level	120	90	82	23.7	3.2±1.1	4.1±1.3
Personal Project-Provincial Level	60	50	46	13.3	4.5±1.4	6.3±1.5
Personal Project – National Level	20	20	18	5.2	6.8±1.6	9.5±2.1
Team Project-City Level	192	140	128	37.0	3.0±1.2	4.5±1.4
Team Project-Provincial	96	70	56	16.2	4.2±1.3	6.8±1.6
National Project Team	32	30	16	4.6	6.5±1.5	10.2±2.3
altogether	520	400	346	100.0	3.8±1.5	5.6±1.8

3.8.3 Correlation characteristics of core study variables

To validate the applicability of the study, we conducted an initial analysis of the core variables distribution: Among 192 participants (55.5%), scores of ≥3.5 were recorded for perceived supportive coaching behaviors (5-point scale), while 68 participants (19.7%) achieved ≥3.5 scores for non-supportive coaching behaviors. Regarding parental support, 165 participants (47.7%) received peer support scores ≥3.5, and 98 participants (28.3%) obtained didactic support scores ≥3.5. A total of 86 participants (24.9%) exhibited high anxiety levels

(cognitive/somatic anxiety scores ≥4 on a 7-point scale), while 152 participants (43.9%) demonstrated low anxiety levels. The variables showed balanced distribution across different characteristic levels, meeting the requirements for testing mediating and moderating effects.

3.8.4 Sample Representativeness and Quality Assurance

This study ensured sample representativeness and data quality through the following measures to support the reliability of research conclusions:

Structural consistency assurance: The deviation between the proportion of valid samples and the overall proportion at each sampling level should be ≤3% (for example, for a single event, the overall proportion at the municipal level is 23.1%, while the sample proportion is 23.7%). Core characteristics such as sports level and event type should align closely with the overall data to avoid conclusion distortion due to sampling bias.

Data Quality Control: The data collection methodology combined "on-site distribution + on-site verification" with "online platform + IP verification," effectively reducing the incidence of missed reports or erroneous responses. The Harman single-factor test (with the first common factor explaining 27.8% <40%) indicated that the common method bias was not statistically significant, demonstrating good data quality.

Qualitative sample support: Twenty-eight representative cases were selected from the quantitative sample (including high/low anxiety levels and various combinations of support consistency) for interviews. These cases covered all sampling levels to ensure consistency between qualitative and quantitative data sources, thereby enhancing the integrative validity of the research conclusions.

In conclusion, this study features clearly defined research scope, scientifically selected samples, rational and representative sample structure, as well as reliable data quality. It provides a solid data foundation for exploring the "coach-parent-athlete" interaction mechanism and factors influencing competitive anxiety.

4. Research results

4.1 Descriptive Statistics of Participants and Core Variables

This study employed a stratified random sampling method to select physical education majors from higher education institutions in Chongqing as the research subjects. A total of 400 questionnaires were distributed, with 346 valid responses collected, yielding an effective response rate of 86.5%. The participants ranged in age from 18 to 22 years, with a mean age of 19.6 ± 1.2 years; among them, 208 were male (60.1%) and 138 were female (39.9%). The average training duration was 3.8 ± 1.5 years, and the average number of competitions participated in was 5.6 ± 1.8, both meeting the inclusion criteria of this study.

In terms of sports event distribution, individual events (athletics, martial arts routines) comprise 146 events, accounting for 42.2%, while team events (basketball, football) total 200

events, representing 57.8%. Regarding competitive levels, there are 210 municipal-level athletes (60.7%), 102 provincial-level athletes (29.5%), and 34 national-level athletes (9.8%). The sample structure aligns closely with the overall distribution of students majoring in physical education at Chongqing universities, demonstrating strong representativeness.

Core variable analysis revealed that 55.5% of athletes reported highly supportive coaching behaviors before competitions, while 19.7% observed highly unsupportive coaching behaviors. Regarding parental support styles, companion-style support accounted for 47.7%, didactic support represented 28.3%, and lack of supportive guidance constituted 24.0%. In terms of competition anxiety levels, 24.9% of athletes exhibited high anxiety states, 43.9% displayed low anxiety states, and the remaining 31.2% showed moderate anxiety states. The overall distribution of variables demonstrated balanced characteristics, providing a robust data foundation for subsequent correlation analysis, regression analysis, and structural equation modeling validation.

4.2 Common Method Bias Test

Harmans single-factor test was employed to analyze common method bias. The results showed that the first common factor, which had not undergone rotation processing, explained 27.8% of the variance, below the critical threshold of 40%. This indicates the absence of significant common method bias in the data, suggesting reliable data quality suitable for subsequent statistical analysis.

4.3 Reliability and Validity of Measurement Scales

Reliability tests demonstrated that the Cronbachs α coefficients for the Coach Behavior Perception Scale, Parent Support Scale, Perceived Ability Scale, Competitive State Anxiety Scale-2 (CSAI-2), and Pre-Game State Scale ranged from 0.76 to 0.88, all exceeding 0.70, indicating strong internal consistency reliability across all scales.

Regarding structural validity, confirmatory factor analysis (CFA) demonstrated that all measurement models met ideal fit indices: $\chi^2/df<3$, CFI>0.90, IFI>0.90, and RMSEA<0.08. This indicates that all variables possess robust structural validity and stable measurement properties.

4.4 Correlation Analysis of Research Variables

Pearson correlation analysis revealed the following significant correlations:

Pre-competition supportive coaching behaviors showed a significant negative correlation with cognitive anxiety and somatic anxiety ($p<0.001$), while exhibiting a significant positive correlation with perceived competence, instructional transformation ability, and pre-competition state ($p<0.001$).

Companion parenting support and perceived competence showed a significant positive correlation with pre-competition status ($p<0.001$), while exhibiting a significant negative correlation with cognitive anxiety and somatic anxiety ($p<0.001$).

Sermonizing and absent parental support showed significant positive correlations with cognitive anxiety and somatic anxiety ($p<0.001$), while exhibiting significant negative correlations with perceived competence and pre-competition state ($p<0.001$).

Perceptual ability showed a significant negative correlation with cognitive anxiety and somatic anxiety ($p<0.001$), and a significant positive correlation with pre-competition state ($p<0.001$).

The transformation guidance ability showed significant positive correlation with supportive coaching behaviors, perceived competence, and pre-competition state ($p<0.001$), while exhibiting significant negative correlation with match anxiety ($p<0.001$).

These results confirm that the direction of relationships among variables aligns with theoretical expectations, fulfilling the prerequisite conditions for subsequent tests of mediating and moderating effects.

4.5 Direct Effect Test

4.5.1 Direct impact of coach behavior on match anxiety and pre-match state

After controlling for factors such as gender, type of exercise, training duration, and competitive level, a hierarchical regression analysis was conducted. Supportive pre-competition coaching behaviors exhibited significant negative predictive effects on cognitive anxiety ($\beta = -0.35$, $p < 0.001$) and somatic anxiety ($\beta = -0.31$, $p < 0.001$), while also showing a significant positive predictive effect on pre-competition state ($\beta = 0.40$, $p < 0.001$). Non-supportive coaching behaviors, on the other hand, demonstrated significant positive predictive effects on both cognitive anxiety ($\beta = 0.29$, $p < 0.001$) and somatic anxiety ($\beta = 0.26$, $p < 0.001$), as well as a significant negative predictive effect on pre-competition state ($\beta = -0.27$, $p < 0.001$).

4.5.2 Direct Impact of Parental Support Methods

Parental companionship support exhibited significant negative predictive effects on cognitive anxiety ($\beta=-0.28$, $p<0.001$) and somatic anxiety ($\beta=-0.24$, $p<0.001$), while showing significant positive predictive effects on pre-competition state ($\beta=0.33$, $p<0.001$). In contrast, didactic support and absent support demonstrated opposite effects: the former significantly exacerbated anxiety levels and reduced pre-competition state stability, whereas the latter weakened the positive support effects.

4.6 Mediation Effect Test

4.6.1 The Mediating Role of Perceptual Ability

The Process Model 4 was used to test the mediating effects. The results demonstrated

that supportive coaching behaviors indirectly reduced cognitive anxiety (indirect effect = −0.16,95% CI = [−0.21, −0.12]) and somatic anxiety (indirect effect = −0.13,95% CI = [−0.17, −0.09]) by enhancing perceived competence, while improving pre-competition state (indirect effect = 0.18,95% CI = [0.14,0.23]). Companionate parental support also indirectly alleviated competitive anxiety by elevating individual perceived competence (indirect effect = −0.12,95% CI = [−0.16, −0.08]). Non-supportive coaching behaviors, didactic guidance, and lack of parental support exacerbated anxiety and impaired pre-competition state by reducing perceived competence. These findings confirm that perceived competence plays a significant mediating role between external support and competitive anxiety/pre-competition state.

4.6.2 Mediating Role of Guidance Transformation Capacity

The study results indicate that instructional transformation ability significantly mediates the relationship between coaching behavior and anxiety regulation outcomes (indirect effect = −0.11,95% CI = [−0.15, −0.07]). Supportive coaching instruction enhances athletes instructional transformation ability, enabling them to more effectively convert external directives into self-regulation strategies, thereby further reducing anxiety levels and improving pre-competition stability.

4.7 Testing of Regulatory Effects and Synergistic Effects

4.7.1 Modulatory Role of Parental Support Modes

The hierarchical regression analysis revealed that parental support styles significantly moderated the relationship between coaching behaviors and match anxiety (ΔR^2=0.08, $p<0.001$). Simple slope analysis indicated that under companion-style support, the anxiety-reduction effect of supportive coaching behaviors was markedly enhanced; whereas under didactic guidance and absent support conditions, the positive effects of supportive coaching diminished significantly, while the negative impacts of non-supportive behaviors intensified further.

4.7.2 Coordinated Effect of Consistency Between Coaches and Parental Support

Consistency was used as a grouping variable for multivariate analysis. The high-consistency group (supportive coaching guidance + companionate parental support) exhibited significantly lower anxiety levels and higher pre-game state scores compared to the low-consistency group. Support consistency demonstrated a significant synergistic reinforcement effect throughout the entire pathway of "coaching behavior → perceived competence → anxiety → state," with high consistency enhancing the overall model explanatory power by approximately 12%.

4.8 Qualitative Research Findings

Based on quantitative analysis, this study conducted semi-structured interviews with 28 representative cases and employed NVivo 12 software for three-level coding analysis under grounded theory methodology to deeply explore the underlying mechanisms of tripartite interactions.

5. Conclusion and discussion

The following conclusions are drawn from the research of this paper.

Firstly, based on the existing research theories, this paper researches the tourism consumption behavior of college students in Qujing City, designs a questionnaire, takes 600 students from four universities in Qujing City as the survey object, and learns about college students' tourism consumption behavior from the aspects of "basic information of college students, characteristics of college students' tourism behavior, motivation of college students' tourism consumption, factors affecting college students' tourism consumption, and suggestions of college students' tourism consumption". "The survey was conducted to understand college students' tourism consumption behavior. In this way, we can grasp the characteristics, motives, and influencing factors of college students' tourism consumption behavior in Qujing City.

Secondly, combined with the results of the survey, based on an in-depth analysis of the characteristics of college students tourism consumption behavior, linear regression analysis was applied to analyze their motivation survey data, and the regression results showed that professional needs, study tours, touring the mountains, relieving study pressure and relaxing are the most obvious motives for college students' tourism consumption behavior, and these motives are subject to the different degrees of their school, gender, grade, discipline, and average monthly income factors. These motives will be affected by their school, gender, grade, discipline, and average monthly income factors to different degrees. At the same time, college students' consumption behavior is most affected by seven factors: attraction to products, distance, time, transportation, price, safety, and consumption ability. Thus, we can further develop the college students' tourism consumption market based on these characteristics and influencing factors of college students' tourism consumption behavior in Qujing City.

Thirdly, for the current tourism market in Qujing City in terms of attraction products, travel road away and time, means of transportation, price, and safety, combined with the characteristics of tourism consumption behavior of university students in Qujing City and the factors affecting them, it puts forward the innovation and development of diversified tourism products, optimization of transportation routes and time-saving, increase of attractions bus directly to the operating vehicles, appropriate concessions for students' fares through promotions, and improvement of tourism safety coefficient. Countermeasures.

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