

The Impact of Perceived Coaching Social Support on Athletes' Sport-Related Psychological Fatigue: The Moderating Role of Years of Athletic Participation

Ziyue Wei, Zheng Wang *

School of Kinesiology and Health Promotion, Dalian University of Technology, Dalian, China,
116023

* Corresponding Author Email: 13804111189@163.com

Abstract. In recent years, sports psychological fatigue has become an important research topic that has attracted much attention in the field of sports. In view of this, this article aims to investigate in depth the impact of perceived coach social support on athletes' exercise-induced psychological fatigue, and at the same time explore the role of exercise duration and level in this process. This study conducted a survey of 338 athletes using psychological measurement methods, including the Athlete Psychological Fatigue Questionnaire and the Athlete Perceived Coach Social Support Scale. The results showed that: (1) Perceived coach social support was significantly negatively correlated with exercise-induced psychological fatigue; (2) There is no significant difference in the interaction between perceived coach social support and exercise level; There is a significant difference in the interaction between perceived coach social support and years of exercise. Therefore, it can be concluded that: (1) Perceived coach social support has a negative predictive effect on sports psychological fatigue; (2) Only years of exercise play a moderating role in the impact of athletes' perceived coach social support on sports psychological fatigue. This study provides practical guidance and suggestions for coaches' behavior in actual training.

Keywords: Perceptual Coaching Social Support, Sport-related Psychological Fatigue, Athletic Experience, Athletes.

1. Introduction

In recent years, the psychological fatigue experienced by athletes has intensified due to high-intensity training, competitive pressures, and tightly packed schedules. The cumulative effects of these issues have made the negative impacts of psychological fatigue on athletes increasingly evident. Addressing psychological fatigue in athletes and preventing its recurrence has become a pressing challenge in contemporary competitive sports. Sport-related psychological fatigue refers to a psychological state that athletes experience during prolonged training periods, characterized by high physical and mental loads. This state typically manifests as decreased motivation, low mood, impaired concentration, and diminished memory. It not only affects the efficacy of athletes' training but may also have long-term consequences for their physical and mental health [1]. Currently, sport-related psychological fatigue is a significant area of concern within the sports community. Its impact on athletic performance is substantial and should not be underestimated. Failure to adequately address psychological fatigue may lead to a significant decline in athletes' performance; conversely, effective management of this issue can lead to notable improvements in athletic outcomes. To achieve the goals of alleviating psychological fatigue and enhancing performance, both athletes and coaches must implement appropriate changes and strategies.

In the vast majority of cases, athletes' sport-related psychological fatigue arises during training. The earliest systematic conceptual model of psychological exhaustion in sports was proposed by Maslach and Jackson in the 1980s. This model comprises three dimensions: Emotional Exhaustion, Depersonalization, and Diminished Personal Accomplishment. In 1997, scholar Reade et al. was the first to define sport-related psychological fatigue within the realm of athletics, characterizing it as "a syndrome that encompasses the comprehensive manifestations of physical and emotional depletion, devaluation of sport, and a decline in athletic performance." [2]. Zhang Zisha's research indicates that

mental fatigue is not solely a result of physical exertion, but rather a subjective state of exhaustion that can directly impact the effectiveness of athletic training. This, in turn, may lead athletes to develop feelings of aversion toward their training and a dispassionate attitude, adversely affecting their mental health. Coaches, as the primary leaders in an athlete's career, play an indispensable role in adjusting the psychological state of athletes. They occupy a critical position in the lives of athletes, providing not only guidance and advice but also managing and maintaining athletes' mental well-being, which is crucial for enhancing athletic performance. Based on the training plans developed by coaches and their objective evaluations of athletes' daily performances, as well as the social support they provide, coaches can influence the psychological fluctuations experienced by athletes, potentially leading to psychological fatigue and impacting athletic outcomes. Therefore, this study proposes the following hypothesis: H1: Perceived coach social support may negatively predict athletes' psychological fatigue.

Although perceived coach social support is a significant factor within the athletic environment, variations in athletes' years of experience and competitive levels can lead to differences in their psychological states. Research on high-level Sanda athletes in China reveals the interrelationship between sports psychology skills and coping mechanisms, highlighting that there are differences in the six dimensions of psychological skills based on gender, age, years of experience, and training duration. This suggests that both years of experience and competitive levels may have an impact on athletes' psychological skills and coping strategies [3]. Compared to elite athletes, first- and second-tier athletes typically participate in lower-level competitions and often face inferior living conditions, training environments, and compensation. They exhibit a strong desire to advance to higher levels of competition. Consequently, these athletes possess heightened intrinsic motivation for achievement, a clear sense of goals, and a robust psychological drive for progress. This manifests particularly strongly in their proactive efforts toward career advancement [4]. To better quantify the extent of their influence, it is necessary to investigate the years of experience and competitive levels of different athletes. Therefore, this study proposes the hypothesis H2: Both years of experience and competitive levels play a moderating role.

Currently, existing academic research lacks sufficient evidence regarding the specific causes of psychological fatigue in athletes and its impact on athletic performance. Previous studies have often focused on isolated factors such as athletic psychological fatigue and coach support. Building on this foundation, the present study aims to expand the discussion by integrating factors such as perceived coach social support, athletic psychological fatigue, competitive levels, and years of experience. This research offers a novel perspective on the challenge of psychological fatigue in athletes, enriching the understanding of its influencing factors and possessing significant practical significance and applicability. Furthermore, this study addresses the pressing issue of psychological fatigue among athletes in contemporary sports, proposing specific research hypotheses and solutions tailored to this critical topic.

2. Research Subjects and Methods

2.1. Research Subjects

This study employs a questionnaire survey method to explore the relationship between perceived coach social support and athletic psychological fatigue. The survey participants consist of professional athletes engaged in the sports industry. Utilizing the online platform Questionnaire Star, a total of 338 responses were collected, of which 320 were deemed valid after excluding invalid submissions, resulting in an effective response rate of 94.67%. Among the participants, 215 were male (67.19%) and 105 were female (32.81%), with an average training experience ranging from 6 to 9 years. The sample included 108 national second-level athletes, 106 national first-level athletes, and 9 national elite athletes.

2.2. The determination of the number of network layers

2.2.1 Psychological Measurement Methods

a. Athlete Psychological Fatigue Questionnaire

This study will utilize the widely adopted Athlete Burnout Questionnaire (ABQ) developed by Raedeke and Smith (2001) to assess psychological fatigue among athletes [5]. The questionnaire comprises three measurement dimensions: diminished achievement, emotional or physical exhaustion, and negative evaluation of sport, totaling 15 items. Notably, items 29 and 42 are reverse-scored. The scoring for each dimension is calculated as follows: diminished achievement is the sum of items 29, 33, 35, 41, and 42; emotional or physical exhaustion is the sum of items 30, 32, 36, 38, and 40; and negative evaluation of sport is the sum of items 31, 34, 37, 39, and 43. Higher scores indicate a greater degree of psychological fatigue in that dimension.

Previous research by Zhou and Guo (2007) applied this scale to measure psychological fatigue among athletes in China, yielding a Cronbach's alpha of 0.79. In the current assessment, the Cronbach's alpha values for the three dimensions are 0.55, 0.80, and 0.80, respectively. This scale employs a 5-point Likert format (1 = never... 5 = always) for scoring, with an estimated completion time of approximately 5 minutes. The overall Cronbach's alpha coefficient for this study is 0.943, indicating strong internal consistency.

b. Perceived Coach Social Support Questionnaire

This study will employ the Perceived Coach Social Support Questionnaire, developed by Zhao Fulian and Zhang Li, to measure athletes' perceptions of coach support. The questionnaire encompasses two dimensions: training and competition support, and life and personal development support, comprising a total of nine items. Despite the brevity of the scale, it demonstrates high internal consistency reliability. Using a 5-point Likert scale, responses range from "1" (very little) to "5" (always), with higher scores indicating a greater level of perceived coach social support. The scale has also been validated by Guo Zhengmao et al., confirming its strong reliability and structural validity. In the present study, the Cronbach's alpha coefficient for this questionnaire is 0.910, indicating excellent internal consistency.

2.2.2 Statistical Methods

Utilizing Excel for Basic Data Filtering and Processing; Employing SPSS for Descriptive Statistics, One-Way ANOVA, Pearson Correlation Analysis, and Regression Analysis; Additionally, Implementing the PROCESS V4.2 Plugin to Conduct Mediating Effect Analysis Using Model 1.

3. Research Findings

3.1. The Overall Characteristics of Athletes' Perceptions of Coach Social Support and Sport-related Psychological Fatigue

By selecting the load prediction results of 403 and 411 lines. We can see that the actual values of the lines basically match the predicted values, but there are also some errors, especially in the peak period of electricity consumption, as shown in Table 1.

Table 1. Overall Characteristics of Table Tennis Athletes' Perceptions of Coach Social Support and Sport-related Psychological Fatigue

	average value (M)	standard deviation (SD)
Perceived Coach Social Support	37.903	7.266
Sports related psychological fatigue	37.094	11.599

According to Table 1, it can be seen that the mean score for perceived coach social support is 37.903, with a standard deviation of 7.266, indicating a high overall level. The mean score for sport-related psychological fatigue is 37.094, with a standard deviation of 11.599, also indicating a high overall level.

3.2. The Fundamental Characteristics of Table Tennis Athletes' Perceptions of Coach Social Support and Sport-related Psychological Fatigue Across Different Athletic Experience Levels

Table 2. Results of One-way ANOVA on Athletic Experience (Mean \pm Standard Deviation)

	Less than 3 years (n=85)	3-6 years (n=83)	6-9 years (n=42)	Over 9 years (n=110)	F	P
Perceived Coach Social Support	37.73 \pm 7.89	39.90 \pm 6.16	36.86 \pm 8.27	36.93 \pm 6.92	3.126	0.026*
Sports related psychological fatigue	35.56 \pm 11.71	34.65 \pm 9.22	36.81 \pm 11.34	40.23 \pm 12.62	4.552	0.004**

Attention: * $p < 0.05$ ** $p < 0.01$

According to Table 2, a one-way analysis of variance was conducted on the perceived coach social support ability and sports psychological fatigue of athletes with different training years. It was found that there were significant differences in the perceived coach social support ability and sports psychological fatigue among athletes with different training years. After multiple comparative analyses, as shown in Table 2, it was found that athletes with 3 to 6 years of exercise experience had lower levels of exercise related psychological fatigue compared to those with 6 to 9 years of exercise experience ($p < 0.05$) and those with more than 9 years of exercise experience ($p < 0.05$).

3.3. The Basic Characteristics of Perceived Coach Social Support and Sport-related Psychological Fatigue Among Athletes of Different Competitive Levels

Table 3. Results of One-way ANOVA on Competitive Levels (Mean \pm Standard Deviation)

	No level (n=97)	National second level athlete (n=83)	National first-class athlete (n=106)	National athlete (n=9)	F	P
Perceived Coach Social Support	38.58 \pm 7.67	38.06 \pm 7.34	37.08 \pm 6.65	38.56 \pm 9.08	0.775	0.509
Sports related psychological fatigue	35.00 \pm 11.34	36.63 \pm 9.66	39.11 \pm 12.95	41.44 \pm 15.52	2.645	0.049*

Attention: * $p < 0.05$ ** $p < 0.01$

According to Table 3, a one-way analysis of variance was conducted on the perceived coach social support ability and sports psychological fatigue of athletes of different sports levels, and it was found that there were significant differences in sports psychological fatigue among athletes of different sports levels. After multiple comparative analyses, it was found that athletes without grades had lower levels of sports psychological fatigue compared to national level athletes ($p < 0.05$).

3.4. Correlational Analysis of Athletes' Perceived Coach Social Support and Sport-related Psychological Fatigue

Table 4. Pearson correlation analysis

	Sports related psychological fatigue
Perceived Coach Social Support	-0.430**

Attention: * $p < 0.05$ ** $p < 0.01$

According to Table 4, it is evident that a correlational analysis was conducted to examine the relationship between perceived coach social support and sport-related psychological fatigue, utilizing the Pearson correlation coefficient to indicate the strength of the relationship. The analysis revealed a correlation coefficient of -0.43 between perceived coach social support and sport-related psychological

fatigue, which was significant at the 0.01 level. This indicates a significant negative correlation between perceived coach social support and sport-related psychological fatigue.

3.5. Regression analysis of athletes' perception of coach social support and sports psychological fatigue

Table 5. Regression analysis of perceived coach social support and exercise-induced psychological fatigue

	Non standardized coefficient		Standardized Coefficient	t	p
	B	Standard Error	Beta		
constant	63.117	3.119		20.238	0.000
Perceived Coach Social Support	-0.687	0.081	-0.430	-8.495	0.000
R ²			0.182		
ΔR ²			0.185		
F value	F (1,318)=72.173, p=0.000				

Dependent variable: Sports related psychological fatigue

According to Table 5, it can be observed that a linear regression analysis was conducted with perceived coach social support as the independent variable and sport-related psychological fatigue as the dependent variable. The resulting model equation is: Sport-related Psychological Fatigue = -0.687 × Perceived Coach Social Support + 63.117. The model's explanatory power, indicated by the R² value, is 18.2%, meaning that perceived coach social support accounts for 18.2% of the variance in sport-related psychological fatigue. In summary, the analysis indicates that perceived coach social support has a significant negative predictive effect on sport-related psychological fatigue.

3.6. The Moderating Role of Competitive Level in the Impact of Perceived Coach Social Support on Athletes' Sport-related Psychological Fatigue

Table 6. Analysis Results of the Adjustment Effect of Sports Levels

	Model 1	Model 2	Model 3
constant	37.094** (63.270)	37.094** (63.788)	37.098** (63.544)
Perceived Coach Social Support	-0.687** (-8.495)	-0.672** (-8.367)	-0.672** (-8.325)
Sports level		1.691* (2.495)	1.691* (2.490)
Perceived Coach Social Support * Sports level			0.010 (0.112)
R ²	0.185	0.201	0.201
Adjust R ²	0.182	0.196	0.193
F value	F (1,318)=72.173, p=0.000	F (2,317)=39.794, p=0.000	F (3,316)=26.451, p=0.000
△ R ²	0.185	0.016	0
△ F value	F (1,318)=72.173, p=0.000	F (1,317)=6.227, p=0.013	F (1,316)=0.013, p=0.911

Attention: The dependent variable is sport-related psychological fatigue, with * p < 0.05 and ** p < 0.01, where the values in parentheses represent the t-values.

According to Table 6, the interaction between perceived coach social support and years of exercise is significant (t=2.352, p=0.019<0.05). This suggests that when considering the impact of perceived coach social support on exercise-induced psychological fatigue, the moderating variable (years of exercise) exerts significant differences in its impact at various levels. This can be further elaborated through the subsequent simple slope analysis.

3.7. The Moderating Role of Athletic Experience in the Impact of Perceived Coach Social Support on Athletes' Sport-related Psychological Fatigue

Table 7. Analysis of the Moderating Effect of Athletic Experience

	Model 1	Model 2	Model 3
constant	37.094** (63.270)	37.094** (63.980)	37.211** (64.400)
Perceived Coach Social Support	-0.687** (- 8.495)	-0.667** (- 8.310)	-0.656** (- 8.222)
Years of physical activity Perceived Coach Social Support *		1.375** (2.860)	1.451** (3.034)
Years of physical activity			0.153* (2.352)
R 2	0.185	0.205	0.219
Adjust R 2	0.182	0.2	0.212
F value	(1,318)=72.173, p=0.000	(2,317)=40.991, p=0.000	(3,316)=29.562, p=0.000
ΔR 2	0.185 F	0.02 F	0.014 F
ΔF value	(1,318)=72.173, p=0.000	(1,317)=8.179,p =0.005	(1,316)=5.533,p =0.019

Attention: The dependent variable is sport-related psychological fatigue, with * $p < 0.05$ and ** $p < 0.01$, where the values in parentheses represent the t-values.

From the table 7 above, it can be observed that the interaction term between perceived coach social support and athletic experience is significant ($t = 2.352, p = 0.019 < 0.05$). This indicates that the influence of perceived coach social support on sport-related psychological fatigue varies significantly at different levels of the moderating variable (athletic experience). This can be further elucidated through the subsequent simple slope analysis.

Table 8. Simple Slope Analysis

Adjust variable level	regression coefficient	standard error	t	p	95% CI
high level (1SD)	-0.47	0.115	-4.074	0.000	-0.696 -0.244
Low level (-1SD)	-0.842	0.109	-7.721	0.000	-1.055 -0.628

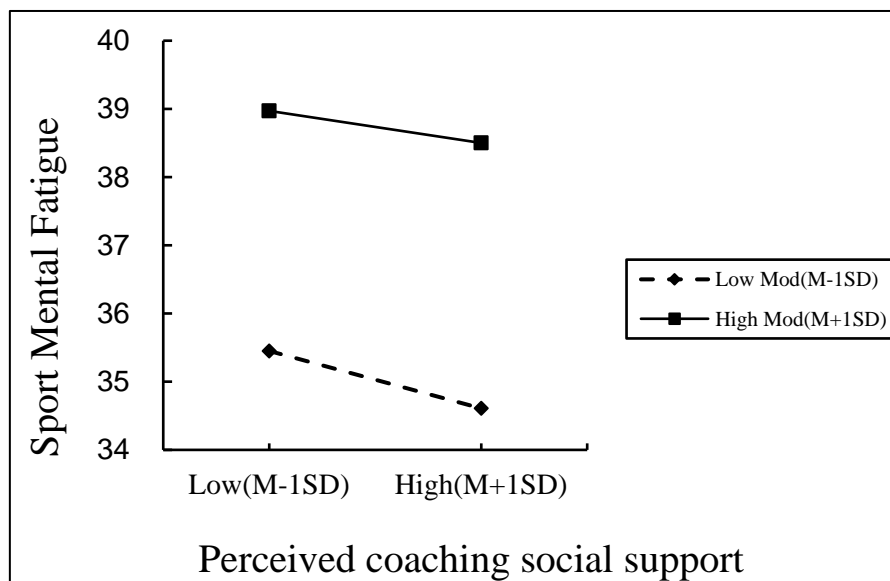


Figure 1. Simple Slope Analysis

From Table 8 and Figure 1, it can be observed that when the moderating variable (athletic experience) is at a high level, the negative predictive effect of perceived coach social support on sport-related psychological fatigue is diminished. Conversely, when the moderating variable (athletic experience) is at a low level, the negative predictive effect of perceived coach social support on sport-related psychological fatigue is amplified. This suggests that as an individual's athletic experience increases, the negative predictive effect of perceived coach social support on sport-related psychological fatigue gradually decreases, indicating that athletic experience plays a moderating role in the impact of perceived coach social support on athletes' sport-related psychological fatigue.

4. Conclusion and Discussion Analysis

4.1. Conclusion

(1) The negative predictive effect of perceived coach social support on exercise-induced psychological fatigue. (2) Only years of exercise play a moderating role in the perceived impact of coach social support on athletes' exercise-induced psychological fatigue.

4.2. The Overall Characteristics of Athletes' Perceptions of Coach Social Support and Sport-related Psychological Fatigue

The results of this study indicate that perceived coach social support has a negative predictive effect on athletes' sport-related psychological fatigue; specifically, the greater the level of social support perceived by athletes from their coaches, the lower their levels of sport-related psychological fatigue. This finding aligns with previous research, such as that by Smith et al., who noted that social support can serve as a buffer against stress, thereby reducing psychological pressure on athletes [7]. The research by Raedeke and Smith indicates that social support plays a crucial role in preventing fatigue and burnout among athletes [5]. Coaches' social support behaviors can reduce sport-related psychological fatigue by fulfilling athletes' basic psychological needs and enhancing their self-esteem [8], which is consistent with the findings of this study. Additionally, a study by Liu Shuqiang et al. (2021) confirmed that coach support is one of the key factors influencing athletes' psychological states [10]. This further substantiates the direct impact of perceived coach social support on sport-related psychological fatigue observed in this study.

There are also studies showing that athletes can better regulate their psychological state, reduce stress and emotional fatigue when they perceive emotional support from their coaches. Perceived coach support is not only an emotional comfort, but also plays a role in promoting athletes' focus on training tasks and goals, enabling them to effectively alleviate fatigue generated during long-term training. In addition, coaches help athletes establish positive psychological resources by enhancing their sense of achievement and autonomy, which further strengthens their ability to withstand pressure and effectively reduces sports psychological fatigue.

From the perspective of emotion regulation theory [11], perceived coach support as an external social knowledge resource can help athletes better manage their psychological burden and reduce exercise-induced psychological fatigue.

Empirical research at home and abroad provides theoretical support and practical evidence for the results of this article, confirming that coach social support is crucial in alleviating athletes' sports psychological fatigue. These studies span across different cultural and sports backgrounds, pointing to similar conclusions that coach support for athletes is an important protective factor for their psychological well-being. In theory, different models and theoretical perspectives, such as basic psychological needs theory, self-determination theory, and social support theory, can provide multidimensional analysis for this study, elucidating the mechanism by which coach support reduces psychological fatigue and the buffering pressure and enhancing psychological resilience effects of social support. The consistency between the results of this study and existing literature further strengthens the conclusion that perceived coach social support has an impact on athletes' sports psychological fatigue, and provides empirical evidence for the sports field. It points out that

optimizing coach social support behavior can effectively reduce athletes' sports psychological fatigue and improve sports performance.

4.3. The regulatory effect of exercise duration

There are differences in the psychological resilience of athletes with different years of experience when facing perceived threats in sports situations, which may lead to different situations of sports related psychological fatigue. [12]. With the increase of professional training years, the degree of sports psychological fatigue deepens. Specifically, athletes with longer training years have a deeper negative evaluation of sports, and there is no significant difference in the three dimensions of competition state anxiety among athletes with different training years [13]. Athletes without grades are in the initial stage of sports, mostly exploring sports skills out of interest, with little training pressure, and are not limited by high-level competitions and strict performance evaluations. They simply trust their coaches, and sports psychological fatigue mainly stems from the difficulty of improving their own skills, resulting in a lower overall level of fatigue. National level athletes are at a higher level and face strict performance evaluations, high-intensity training, and intense competitive pressure. They have a complex perception of the coach's social support, both relying on and feeling a burden. Once they lose a game or training is not smooth, they are prone to overinterpreting the coach's opinions, leading to higher levels of sports psychological fatigue.

The hypothesis of this study is that the results of H2 indicate that athletes with 3 to 6 years of exercise experience have lower levels of exercise related psychological fatigue compared to those with 6 to 9 years of exercise experience ($p < 0.05$) and those with more than 9 years of exercise experience ($p < 0.05$). It was found that athletes without grades had lower levels of sports psychological fatigue compared to national level athletes ($p < 0.05$). These two findings also validate our initial research hypothesis H2, and the final research conclusion is that only years of exercise have a moderating effect.

4.4. Research Shortcomings and Future Research Directions

This study reveals the impact of perceived coach social support on athletes' exercise-induced psychological fatigue, and concludes that years of exercise play a moderating role in athletes' exercise-induced psychological fatigue. However, this study still has certain limitations: on the one hand, the research sample is limited to certain specific sports and does not cover all sports widely, which may not fully represent the entire athlete population. Different sports may have significant differences in the demand and perception of coaches' social support, which may affect the universal applicability of the research results. On the other hand, this article adopts a cross-sectional design, which makes it difficult to determine the causal relationship between variables. Although the research results indicate a significant negative correlation between perceived coach social support and exercise-induced psychological fatigue, the causal relationship needs to be further verified through longitudinal studies.

In response to the above issues, future research should further expand the findings of this study from the following aspects: Firstly, different project characteristics (such as training intensity, competition frequency, individual and team project differentiation, etc.) and cultural backgrounds may have an impact on the relationship between perceived coach social support and athlete sports psychological fatigue. Therefore, a wider range of sports should be considered, and the sample size and types of sports should be expanded to improve the universality and depth of the research. Secondly, future research can introduce more moderating variables, such as team atmosphere, individual characteristics of athletes (such as psychological resilience), etc. [14], to explore the specific mechanisms of perceived coach social support in different contexts. Finally, longitudinal studies using experimental designs can provide stronger support for causal relationships between variables, thereby further deepening our understanding of the complex relationship between perceived coach social support and exercise-induced psychological fatigue.

References

- [1] Linling, the tension is the current research status of exercise-induced psychological fatigue [J] *Progress in Psychological Science*, 2007, (03): 524-531
- [2] Raedeke Thomas D. Is athlete burnout more than just stress[J]. *A sport commitment perspt*, 1997.
- [3] He Ying, Wang Xiangquan, Lu Qiuyun A Study on the Correlation between Sports Psychological Skills and Coping Modes of High level Sanda Athletes: A Case Study of Sichuan Team [J] *Journal of Chengdu Sport University*, 2014, 40 (02): 54-59. DOI: 10.15942/j.jcsu.2014.02.011Ma Kunlong. Short term distributed load forecasting method based on big data [D]. Changsha: Hunan University, 2014.
- [4] Li Jing, Liu He The characteristics of psychological resilience in adolescent athletes [J] *Sports Journal*, 2009, 16 (05): 83-86. DOI: 10.16237/j.cnki.cn44-14404/g8.2009.05.024.
- [5] Raedeke T D, Smith A L. Development and preliminary validation of an athlete burnout measure [J]. *Journal of sport and exercise psychology*, 2001, 23 (4): 281-306.
- [6] Guo Zhengmao, Yang Jian. The relationship between adolescent athletes' belief in a fair world and their athletic performance: a chain mediation of perceived coach support and fair sports environment *Journal of Shenyang Sport University*, 2021, 40 (01): 85-93
- [7] Smith AP, Smeed H, Ullah S, et al. *Social support, fatigue and the common cold* [J]. Koç University-SAGE Publishing, 1998.
- [8] Fan Rong, Wang Bin, Ye Lv, etc The Influence of Coach Support Behavior on Athletes' Psychological Resilience: The Chain Mediating Effect of Satisfying Basic Psychological Needs and Self Esteem *Journal of Beijing Sport University*, 2020, 43 (01): 134-145
- [9] The tension is Liang Zhanpeng. The life satisfaction of athletes: the contribution of individual self-esteem and collective self-esteem *Journal of Psychology*, 2002, 34 (2): 160-167
- [10] Liu Shuqiang, Zhang Zhongqiu, Qiu Jun, etc.. Research on the Monitoring and Regulation Effect of Pre Competition Psychological State of Excellent Sailing and Windsurfing Athletes in China [J] *Journal of Shandong Sport University*, 2021, 37 (6): 70-76.
- [11] Yang Yunxia Emotion regulation: theory, measurement tools, and influencing factors [J] *Frontiers of Social Sciences*, 2024, 13 (8): 551-556.
- [12] Liu Yueyuan, Wang Zhiqiang, Zhang Bei, etc The Influence of Sports Motivation on Sports Psychological Fatigue in National Off road Skiing Teams: The Chain Mediating Effect of Psychological Resilience and Coping Modes *Psychological Progress*, 2022, 12 (5): 1683-1692. DOI:10.12677/AP.2022.125201.
- [13] Li Jie, Pang Yan, Liu Shijin, etc Research on the Impact of Competition State Anxiety on Psychological Fatigue in Young Martial Arts Sanda Athletes: A Case Study of the 8th World Youth Martial Arts Championships in 2022 [J] *Journal of Henan Normal University (Natural Science Edition)*, 2024, 52 (02): 139-145.
- [14] Cai Duanwei Research on the Influence of Coach Leadership Behavior and Motivational Atmosphere on the Internalization of Athletes' Motivation [D] *Shanghai Sport University*, 2016.