

Exploring the correlation between exercise motivation, football exercise investment, and mental health among college students



^{1,2}International College, Krirk University, Bangkok, 10220, Thailand.

Corresponding author: Jian Zhao (Email: 223323808@qq.com)

Abstract

The study investigates the relationship between participation in sports activities and the mental health of the students. As an intrinsic psychological factor driving individual sports behavior, sports motivation is an essential factor influencing the persistence of individual sports participation. Individuals can improve their psychological well-being by adjusting exercise motivation and promoting active sports participation. Football exercise investment refers to an individual's autonomous, positive, lasting, and immersive psychological state, as well as their joyful experience of participating in football exercise. This study takes 1124 college students, from freshman to senior, as the research subjects. The study employs the questionnaire survey method and uses SPSS 27.0 and AMOS 24.0 as data analysis tools. It can be concluded that a negative correlation exists between football exercise investment and individual psychological health, whereas a partial mediating effect of exercise motivation exists between football exercise investment and the psychological health of college students. Football exercise investment requires students to participate personally and have a certain amount of physical load during the training. Engaging in football exercises requires communication with others, and certain sports necessitate close cooperation. It can bring pleasure to the body and mind, strengthen physical fitness, cultivate positive psychological emotions, enhance individual happiness, and promote improving mental health. The mediating effect of soccer exercise involvement on exercise motivation and mental health is analyzed and discussed. We examine the overall situation of college students' exercise motivation, soccer exercise involvement, and mental health, as well as their differences in demographic variables, by exploring the relationship between these factors.

Keywords: College students, Exercise motivation, Individual psychological health, Mental health, Soccer exercise engagement, Soccer training involvement.

DOI: 10.53894/ijirss.v8i1.4169

Funding: This study received no specific financial support.

History: Received: 22 December 2023/**Revised:** 8 December 2024/**Accepted:** 27 December 2024/**Published:** 17 January 2025 **Copyright:** © 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<u>https://creativecommons.org/licenses/by/4.0/</u>).

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: The ideas, concepts, and design of the research, the concepts, instruments development, and data analysis, J.Z.; the data analysis and formatting article, X.B. Both authors have read and agreed to the published version of the manuscript. Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no

vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Institutional Review Board Statement: The Ethical Committee of the International College, Krirk University, Thailand has granted approval for this study on 22 May 2023 (Ref. No. 2023-0522).

Publisher: Innovative Research Publishing

1. Introduction

College students, as the main body of universities, are not only the reserve force for the comprehensive development of China's modernization construction, but also the hope of realizing the Chinese dream of the great rejuvenation of the Chinese nation. Therefore, cultivating the comprehensive development of college students in both internal and external aspect and cultivating solid physical and healthy psychological qualities is one of the key points of college education. The state has also introduced a number of policies to promote the comprehensive development of college students' physical and mental health, integrate resources to support school sports and mental health, with the goal of "exercising every day, growing healthily, and benefiting for life," and comprehensively improve the quality of physical education; pay full attention to the psychological dynamics of students; and improve their personality quality. Provide qualified socialist builders and successors for society with physical and mental health.

Sports, as a specialized form of human movement, aim to strengthen the physique and promote personality development and mental cultivation [1]. Existing research shows that football exercise can bring pleasure to the body and mind, maintain physical fitness, cultivate positive psychological emotions, and enhance individual happiness. Biddle et al. found in empirical studies that football exercise has significant effects on relieving anxiety, depression, and improving psychological state [2]. Mata et al. pointed out that football exercise can promote the secretion of brain-derived neurotrophic factor (BDNF) in the brain, which helps generate positive psychological experiences such as pleasure and satisfaction[3]. In real life, individuals with positive emotional experiences often perform better than those with negative emotional experiences [4]. In addition, Seligman proposed that football exercise is positively correlated with individuals' levels of optimism and promotes positive psychological qualities in adolescents [5]. Football training induces positive emotional experiences, cognitive regulation, physiological qualities such as creativity, observation skills, and cooperation. This enhances individuals' subjective well-being and sense of achievement, stimulates learning motivation, and encourages them to explore their potential and innovate in social practice [7]. Given the critical role that football exercise plays in the overall development of individuals, conducting research on the investment in football exercise from the perspective of positive psychology is of great theoretical value and practical significance for talent cultivation in universities.

Motivation, as a psychological drive or internal force, plays a role in causing and encouraging individuals to participate in football training and physical activities [8, 9]. The motivation for exercise is based on the individual's need for physical activity, which not only encourages students to participate in sports activities but also promotes the continuous achievement of a specific exercise or sports goal [10, 11]. Empirical studies have shown that increasing adolescents' motivation in sports can increase their time and frequency of participating in football exercises, improving their physical fitness level [12, 13]. Exercise motivation closely correlates with football training. Research has shown that students believe participating in football exercise can help them maintain a good physique, make their bodies healthier, and experience the joy that other activities cannot provide [14, 15]. In addition, other studies by Hu [16]; Dai [17], and Wang and Yang [18] have pointed out that boys tend to engage in intense exercise and pay more attention to the development of abilities during exercise. In contrast, girls exercise gently and participate in sports for health, appearance, and social reasons. In short, although the dimensions of motivation are different, they all demonstrate that exercise motivation predicts physical activity and psychological health among college students.

In a word, it is self-evident to improve the mental health of college students, and exercise participation and exercise motivation are also essential to the physical health of college students. It is one of the tasks of colleges and universities to improve the participation of college students in sports and cultivate their sports motivation. Therefore, this study takes college students as the research object to explore the mediating role of sports motivation in the relationship between football participation and mental health and further explore the impact of football participation on mental health and its mechanisms, so as to obtain valuable conclusions.

2. Theoretical Background and Research Hypotheses

2.1. Research on the Relationship between Exercise Motivation and Investment in Football Exercise

There may be a close relationship between exercise motivation and exercise income and behavior, and many scholars have researched the relationship between exercise motivation and football exercise behavior. Chen Shanping used an equation model to test the internal and external factors of 186 senior college students' football exercises. The results show that exercise commitment and conditions can predict college students' football exercise behavior well. Exercise commitment examines internal factors related to practice within the motivation domain. This research also shows that stimulating exercise motivation can positively impact college students' exercise behavior Chen, et al. [19]. Li and Li [20] selected 1200 college students as the research subjects. The results of this study showed significant positive correlations between the dimensions of exercise motivation and exercise engagement, as well as between the sizes of exercise behavior and exercise engagement. Regarding exercise motivation and behavior, there is no significant positive correlation between appearance motivation and time. Still, significant positive correlations exist between other dimensions of exercise motivation [20].

In a study on 196 college students, Xue Feng discovered a significant positive correlation between the internal motivation and identification conditions and the frequency, time, amount, and intensity of sports participation. The time, frequency, and amount of individual participation in sports exhibit a negative correlation with the external regulation and motivation dimensions [21]. He believes that the internal motivation that leans towards high self-determination is more likely to encourage individuals to engage in sports, thereby investing more time, energy, and resilience.

In his thesis, Song Xuan studied the relationship between psychological needs satisfaction, exercise motivation, and football exercise behavior among middle school students. The results showed that the Pearson correlation coefficients between internal motivation and exercise volume calculated from football exercise were 0.111 (P<0.01), and between external motivation and exercise volume were 0.80 (P<0.05). Both internal and external motivation had a significant impact on the exercise volume of middle school students. Subsequently, the author conducted a regression analysis on the satisfaction of psychological needs, exercise motivation, and football exercise behavior. The results showed that exercise motivation positively predicted exercise behavior, with a coefficient of 0.336. In the exercise motivation dimension, both intrinsic and extrinsic motivation positively influenced exercise behavior, indicating that exercise motivation can effectively predict the exercise volume calculated for football exercise [22].

*H*₁: Motivation for physical activity has a positive predictive effect on football exercise engagement.

2.2. Research on the Relationship between Exercise Motivation and Mental Health

Researchers have focused most of their research on the correlation between exercise motivation and psychological health. Numerous studies have shown that exercise motivation has a positive effect on individuals' psychological health. Specifically, happiness experience, willingness to challenge, and goal pursuit positively correlate with internal motivation in sports. External stimulation is positively associated with happiness experiences, goal pursuit, interpersonal harmony, and emotional regulation Wang, et al. [23]. Cai, et al. [24] research showed that internal motivation positively correlates with mental uplift, calmness, and active participation in football exercises. This leads to the conclusion that internal motivation improves mental health by regulating individuals' exercise behavior. This conclusion is consistent, to some extent, with the cognitive evaluation theory of motivation. However, the relationship between external stimulation and mental health is inconsistent with the research results of Wang, et al. [23]. Cai, et al. [24] believe that an increase in external motivation will lead to a decrease in the level of mental health. At the same time, there is a positive correlation between intrinsic motivation and negative exercise feelings. In general, football exercise behavior triggered by intrinsic motivation can promote positive psychological experiences and, to some extent, alleviate negative emotions such as tension and anxiety, thereby improving mental health levels [24].

H₂: There is a significant negative correlation between exercise motivation and mental health.

2.3. Research on the Relationship between Football Exercise Engagement and Mental Health

Scholars in China have focused their attention on mental health of college students, exploring various influencing factors, including the connection between football exercise involvement and mental health. Previous research has shown that football exercise is a very effective means to improve physical condition and regulate mental state. For example, after reviewing previous achievements, Zhang Xiaolin pointed out that although existing evidence indicates a significant impact of football exercise investment on students' mental health Zhang [25]. Jiang and Song [26] concluded that there is a significant correlation between the investment in college football exercise and the mental health level of college students when examining the relationship between college football exercise investment and mental health [26]. In this study, he interprets sports participation as having different dimensions such as attitude towards football exercise, time spent on football exercise, forms of football exercise, and the degree of exercise persistence. Based on these dimensions, he analyzes the degree to which each size affects the mental health level of college students. When Jiang Haiyan investigated whether there were differences in the impact of football exercise on mental health among college students of different genders, she conducted a classified survey of female college students based on factors such as their social status. The results showed that there was a clear connection between the physical fitness of female college students and their mental health at school, and the mental health condition of female college students who participated in sports was significantly better than that of those who did not. This result confirms that football exercise can enhance female college students' personalities, confidence, and spirit of challenge and have a positive effect [27]. After a one-year physical education experiment, Sun Yuhang concluded that interpersonal sensitivity, depression, anxiety, and paranoia are the main psychological symptoms of college students at present. Participating in football exercises has a specific positive effect on regulating students' mental health, but it also has certain limitations. Based on this, he proposed the organic integration of football exercises with other psychological adaptation methods for mutual learning [28]. Previous rich research results have proved that sports participation will impact college students' mental health. Choosing appropriate sports and grabbing reasonable exercise time will positively affect college students' mental health; otherwise, it may backfire and have an unhealthy impact on psychology.

Sports psychology originated abroad, so the research on the relationship between sports participation and mental health started earlier. Many of China's views and experiences are also based on foreign research findings. For example,

McLennan et al. conducted immediate tests on the research subjects after training to better explore the relationship between football exercise at different periods and mental health. They found that levels of negative psychological states such as anxiety, depression, and tension significantly decreased, indicating the short-term positive effects of sports participation on mental health [29]. Fox's experimental research has shown that football training can positively affect the psychological conditions of individuals with low self-esteem, low self-confidence, low self-worth, and low body image [30]. Fuchs demonstrated through a series of experiments that football training positively improves self-esteem and self-confidence. Especially for vulnerable groups with low levels of self-esteem and self-confidence, its promoting effect is more pronounced, such as depression patients, disabled groups, overweight and obese people, etc [31].

After reviewing the research results on the impact of sports participation on mental health abroad, it was found that most of the current research results support the promotion of mental health development through investment in football exercise.

H₃: A significant negative correlation exists between football exercise investment and mental health.

3. Research Methods

3.1. Research Subjects

This study used random sampling to select students from four universities in Shaanxi Province, including first-year students, sophomores, juniors, and seniors. We distributed 1200 questionnaires anonymously, collecting 1140 of them. Ultimately, we obtained 1124 valid questionnaires, resulting in an effective rate of 93.67%. Among the 1124 participants were 465 male college students, accounting for 41.4%, and 659 female college students, accounting for 58.6%, with a balanced gender ratio. The age distribution is 17-24, with an average age of 19.98.Table 1 presents specific demographic variables.

Table 1.

Variable	Category	Number of people	Percentage
Conton	Male	465	41.4
Gender	Female	659	58.6
	Freshman	317	28.2
Grade	Sophomore year	338	32.9
	Junior year	213	22.7
	Senior year	256	14.7
Order abild	Yes	203	18.1
Unly child	No	921	81.9
	Science and engineering	256	22.8
	Liberal arts	223	19.8
Major	Economics and management	205	18.2
•	Law	3	0.3
	Art and education	437	38.9
	City	203	18.1
Hometown	Township	153	13.6
	Rural	768	68.3
	Health	971	86.4
Health condition	General	143	12.7
	Poor	10	0.9

Demographic variables of participants

3.2. Research Method

Questionnaire survey method: [32] compiled [32] and Peng [33] revised the Chinese version of the Sports Exercise Motivation Scale [34] and Schaufeli and Enzmann [35] compiled [20, 34] and based on this, revised the Chinese version of the Football Exercise Involvement Scale; Derogatis, et al. [36]compiled, Wang [37] revised the Chinese version of the Symptom Checklist-90 (SCL-90) [37]. Using these three tools, a questionnaire survey was conducted on 1124 college students, and the questionnaires were uniformly distributed and collected.

3.3. Research Implementation

Data analysis tool SPSS (Statistical Package for the Social Sciences) 27.0 was used to encode and enter the data, and reliability analysis, one-way ANOVA (Analysis of Variance), independent samples t-test, correlation analysis, and regression analysis were conducted on exercise motivation, soccer exercise involvement, and psychological health. We explored the overall status of exercise motivation, soccer exercise involvement, psychological health, the differences in demographic variables, and the relationship between these three factors. Using AMOS (Analysis of Moment Structure)

24.0 to construct the mediation path model diagram of sports football exercise investment, the theoretical model was validated and adjusted, and a well-fitting theoretical model was finally formed.

4. Research Results

4.1. Explanation of Reliability and Validity Testing

This study will use a questionnaire survey method, and the questionnaire mainly includes four parts: an introductory information survey, a football exercise input scale, a sports motivation scale, and a symptom self-assessment scale (SCL-90).

This study examined the reliability and validity of the Sports Motivation Scale. We first tested the reliability of each dimension and the overall scale of questionnaire using Cronbach's coefficient. As shown in Table 2, the alpha coefficient of this scale is 0.96, and the alpha coefficients of internal motivation, external motivation, and motivation are 0.95, 0.92, while the 0.70, respectively. Therefore, this scale has high reliability and meets the requirements. Furthermore, we examined the validity of the scale using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, as shown in the table. The KMO value for the scale was 0.96, indicating good validity.

Table 2.

and remainly test of sports mour auton search	Validity and reliability test of sports more	tivation scale.
---	--	-----------------

	Reliabi	lity test	Validity test			
Dimension	Number of items	Cronbach's α coefficient	Appropriateness index of KMO sampling	The Bartlett's sphericity test is significant (p<0.05)		
Exercise motivation	28	0.96	0.96	0.000		
Internal motivation	12	0.95	*	*		
External motivation	12	0.92	*	*		
Lack of motivation	4	0.70	*	*		
Matan windlaster a O 1						

Notes: * indicates p<0.1.

The football exercise input scale refers to the Schaufeli Work Engagement Scale, and in combination with the research theme of this study, the scale replaces 'learning' with 'football exercise.' The scale consists of three subscales: vitality, dedication, and focus, with 17 items. It adopts a 1-7 Likert 7-point rating system, where a higher score in a dimension indicates a more significant influence of that dimension on behavior Xue [21]. Yao [38] a domestic scholar, used this scale for research. The total scale's Cronbach's alpha coefficient is 0.90, and the split-half reliability is 0.89. The revised Football Exercise Involvement Scale meets the requirements of measurement theory [38].

This study examined the reliability and validity of the Sports Football Exercise Investment Scale. We first tested the reliability of the total scale and each dimension using the Cronbach's alpha coefficient. As shown in the Table 3, the alpha coefficient of this scale is 0.96, and the alpha coefficients of vitality, dedication, and concentration are 0.91, 0.93, and 0.92, respectively. Therefore, this scale has high reliability. Second, the scale's validity was tested using KMO and Bartlett's sphericity test. As shown in the table, the KMO of the scale is 0.96, indicating that the scale has good structural validity.

Table 3.

Reliability and validity test of football exercise input scale.

	Rel	iability test	Validity test			
Dimension	NumberCronbach's αof itemscoefficient		Appropriateness index of KMO sampling	The Bartlett's sphericity test is significant (p<0.05)		
Exercise involvement	17	0.96	0.96	0.000		
Vitality	6	0.91	*	*		
Dedication	5	0.93	*	*		
Focus	6	0.92	*	*		

Note: * indicates p<0.1.

This study tested the reliability and validity of the Symptom Checklist-90 (SCL-90). First, the reliability of psychological health was tested using Cronbach's α coefficient. As shown in Table 4, the Cronbach's α coefficients of the SCL-90 were all greater than 0.8, indicating high reliability of the scale. Second, the scale's validity was tested using KMO and Bartlett's sphericity test. The table shows that the KMO value of SCL-90 is 0.98, and Bartlett's sphericity test is significant (p<0.05), indicating that the scale has high validity.

Table 4.

	Reliability test		Validity test			
Dimension	Number of items	Cronbach's α coefficient	Appropriateness index of KMO sampling	The Bartlett's sphericity test is significant (p<0.05)		
Total score	90	0.98	0.98	0.000		
Somatization	12	0.93	*	*		
Compulsive symptoms	10	0.92	*	*		
Interpersonal	9	0.92	*	*		
sensitivity						
Depression	13	0.94	*	*		
Anxiety	10	0.93	*	*		
Hostile	6	0.88	*	*		
Terror	7	0.89	*	*		
Paranoia	6	0.88	*	*		
Psychotic	10	0.89	*	*		
Others	7	0.85	*	*		

Reliability and validity test of symptom checklist-90 (SCL-90).

Notes: * indicates p<0.1.

4.2. Overall Situation of Sports Motivation

Exercise motivation is composed of three dimensions: intrinsic inspiration, extrinsic motivation, and motivation. From Table 5, it can be seen that the score for exercise motivation is 133.24 ± 27.27 , the score for inherent reason is 60.57 ± 13.29 , the score for extrinsic motivation is 56.35 ± 12.68 , and the score for cause is 16.31 ± 4.59 . Table 5 shows that in terms of exercise motivation, the average score for intrinsic motivation is the highest, followed by extrinsic motivation and, finally, basis.

Table 5.

Analysis of the overall situation of college students' sports motivation.

Dimension	Mean (M)	Standard deviation (SD)	Maximum value (Max.)	Minimum value (Min.)
Exercise motivation	133.24	27.27	196.00	36.00
Internal motivation	60.57	13.29	84.00	12.00
External motivation	56.35	12.68	84.00	12.00
Lack of motivation	16.31	4.59	28.00	4.00

We conduct a one-way analysis of variance to examine the influence of health status as an independent variable on exercise motivation. We examined the differences in health status levels among various dimensions of exercise motivation. Among them, there are too few data samples for the poor health status (N=10), so the models with poor health status are deleted. The results are shown in Table 6.

Table 6.

Differences in the motivation for physical activity among college students in different health statuses.

Dimension	Health (N=971) General (N=143)		4	-	
	M±SD	M±SD	ι	р	
Internal motivation	60.90±13.28	58.50±13.23	2.07	0.98	
External motivation	56.85±12.48	53.19±13.49	3.32	0.43	
Lack of motivation	16.46±4.57	15.37±4.66	2.72	0.38	
Exercise motivation	134.21±26.96	127.07±28.48	3.01	0.57	

The research results found that healthy students scored an average of 134.21 ± 26.96 , 60.90 ± 13.28 , 56.85 ± 12.48 , and 16.46 ± 4.57 in exercise motivation and various dimensions (intrinsic inspiration, extrinsic motivation, and motivation), respectively. Students with average health scored 127.07 ± 28.48 , 58.50 ± 13.23 , 53.19 ± 13.4 , and 15.37 ± 4.66 in exercise motivation and various dimensions (intrinsic motivation, and motivation), respectively.

There is no significant difference in health status among exercise motivation (p=0.98), intrinsic motivation (p=0.43), extrinsic motivation (p=0.38), and motivation (p=0.57).

4.3. Analysis of the Current Situation of College Students' Investment in Football Exercise

The content of football training investment includes three dimensions: vitality, dedication, and focus. According to Table 7, the energy score is 25.69 ± 0.23 , the dedication anxiety score is 23.89 ± 0.18 , the commitment score is 27.03 ± 0.22 , and the exercise involvement score is 76.63 ± 0.61 . The table shows that the average score for faith is the highest, followed by vitality and focus.

Table 7.

Overall analysis of college students' physical exercise involvement.

Dimension	Mean (M)	Standard deviation (SD)	Maximum value (Max.)	Minimum value (Min.)
Exercise involvement	76.63	0.61	119.00	17.00
Vitality	25.69	7.90	42.00	6.00
Dedication	23.89	6.33	35.00	5.00
Focus	27.03	7.68	42.00	6.00

We conducted a one-way analysis of variance to examine the impact of health status as an independent variable on football exercise investment. We examined the differences in health status levels among various dimensions of football exercise investment. Due to the small number of poor data samples (N=10), the inadequate sample quantity was removed. The results are shown in Table 8.

Table 8.

Differences in the impact of football exercise on health status of college students.

Dimension	Health (N=971) General (N=143)		4	T	
	M±SD	M±SD	ι	г	
Vitality	26.24±7.78	22.21±7.58	5.954	0.877	
Dedication	24.17±6.27	22.11±6.44	3.761	0.849	
Focus	27.40±7.66	24.67±7.41	4.11	0.323	
Exercise involvement	77.83±20.51	69.01±20.29	4.95	0.610	

The research results found that healthy students had average scores of 77.83 ± 20.51 , 26.24 ± 7.78 , 24.17 ± 6.27 , and 27.40 ± 7.66 in football exercise involvement and various dimensions (vitality, vitality, dedication, and focus), respectively. Students with average health conditions had scores of 69.01 ± 20.29 , 24.67 ± 7.41 , 22.11 ± 6.44 , and 22.21 ± 7.58 in football exercise involvement and various dimensions (vitality, vitality, dedication, and focus), respectively. There is no significant difference in exercise input (p=0.87), energy (p=0.84), commitment (p=0.32), or direction (p=0.61) in terms of health condition.

4.4. Analysis of the Current Situation of College Students' Mental Health

Total scores and factor scores for various dimensions measure subjective well-being. A total score exceeding 160 indicates specific psychological health issues. Factor scores greater than or equal to 2 are classified as mild, 2-2.9 as moderate, and 3-3.8 as severe. According to Table 9, the total score of college student's mental health is 121.66 \pm 1.27, indicating that the mental health of college students is good as it is below 160 points. The scores for somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and other dimensions are 1.28 \pm 0.51, 1.55 \pm 0.69, 1.39 \pm 0.64, 1.37 \pm 0.62, 1.32 \pm 0.57, 1.31 \pm 0.57, 1.31 \pm 0.57, 1.28 \pm 0.54, 1.32 \pm 0.52, 1.33 \pm 0.54, respectively. The factor scores are all less than 2, indicating that college students are in a relatively good state of mental health in various dimensions.

Table 9.

Analysis of the overall situation of college students' mental health.

Dimension	Minimum value	Maximum value	Μ	SD
Total score	90.00	306.00	121.66	1.27
Somatization	1.00	4.50	1.28	0.51
Obsessive-compulsive symptoms	1.00	4.80	1.55	0.69
Interpersonal sensitivity	1.00	4.56	1.39	0.64
Depression	1.00	4.77	1.37	0.62
Anxiety	1.00	4.30	1.32	0.57
Hostile	1.00	4.83	1.29	0.55
Terror	1.00	4.86	1.31	0.57
Paranoia	1.00	4.33	1.28	0.54
psychotic	1.00	3.80	1.32	0.52
Others	1.00	4.00	1.33	0.54

This study explores whether there are differences in mental health among demographic variables. The methods used are an independent sample t-test and a one-way analysis of variance. The specific results are as follows: one-way analysis of variance is used to examine the impact of health status as an independent variable on mental health and to investigate the differences between health status and the total score and dimensions of mental health. However, there are too few poor data samples (N=10), so the number of poor pieces is deleted. The results are shown in Table 10.

Table 10.

Differences in the mental health of college students in terms of health conditions.

		4	
M±SD	M±SD	ι	р
17.80±39.62	146.12±52.33	-6.40***	0.000
1.24±0.48	1.49±0.63	-4.58***	0.000
1.49±0.64	1.92±0.84	-6.05***	0.000
1.33±0.53	1.72±0.80	-5.70***	0.000
1.32±0.56	1.70±0.82	-5.51***	0.000
1.28±0.54	1.28±0.69	-3.18**	0.000
1.25±0.50	1.56±0.74	-4.91***	0.000
1.26±0.52	1.60±0.75	-5.23***	0.000
1.24±0.50	1.50±0.68	-4.41***	0.000
1.29±0.48	1.52±0.62	-4.44***	0.000
1.28±0.50	1.56±0.66	-4.81***	0.000
	M±SD 17.80 ± 39.62 1.24 ± 0.48 1.49 ± 0.64 1.33 ± 0.53 1.32 ± 0.56 1.28 ± 0.54 1.25 ± 0.50 1.26 ± 0.52 1.24 ± 0.50 1.29 ± 0.48 1.28 ± 0.50	$M\pm SD$ $M\pm SD$ 17.80 ± 39.62 146.12 ± 52.33 1.24 ± 0.48 1.49 ± 0.63 1.49 ± 0.64 1.92 ± 0.84 1.33 ± 0.53 1.72 ± 0.80 1.32 ± 0.56 1.70 ± 0.82 1.28 ± 0.54 1.28 ± 0.69 1.25 ± 0.50 1.56 ± 0.74 1.26 ± 0.52 1.60 ± 0.75 1.24 ± 0.50 1.50 ± 0.68 1.29 ± 0.48 1.52 ± 0.62 1.28 ± 0.50 1.56 ± 0.66	$M\pm SD$ $M\pm SD$ t 17.80 ± 39.62 146.12 ± 52.33 -6.40^{***} 1.24 ± 0.48 1.49 ± 0.63 -4.58^{***} 1.49 ± 0.64 1.92 ± 0.84 -6.05^{***} 1.33 ± 0.53 1.72 ± 0.80 -5.70^{***} 1.32 ± 0.56 1.70 ± 0.82 -5.51^{***} 1.28 ± 0.54 1.28 ± 0.69 -3.18^{**} 1.25 ± 0.50 1.56 ± 0.74 -4.91^{***} 1.26 ± 0.52 1.60 ± 0.75 -5.23^{***} 1.29 ± 0.48 1.52 ± 0.62 -4.41^{***} 1.28 ± 0.50 1.56 ± 0.66 -4.81^{***}

Notes: *** indicates p<0.01.

The research results found that healthy students had an average score of 117.80 ± 39.62 in the total score of mental health and various dimensions (somatic symptoms, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and others). Students with general health problems had scores ranging from 146.12 to 52.33 on the total mental health and different dimensions, such as somatic symptoms, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and others. The scores were 146.12 ± 52.33 , 1.49 ± 0.63 , 1.92 ± 0.84 , 1.72 ± 0.80 , 1.70 ± 0.82 , 1.28 ± 0.69 , 1.56 ± 0.74 , 1.60 ± 0.75 , 1.50 ± 0.68 , 1.52 ± 0.62 , 1.56 ± 0.66 . There are significant differences in health status in terms of overall mental health scores and various dimensions, and the scores of generally healthy individuals are higher than those of individuals with health issues.

4.5. Analysis of the Mediating Path Model of Football Exercise Investment

This study uses exercise motivation as the independent variable, exercise investment as the mediating variable, and mental health as the dependent variable. We construct the structural equation model of football exercise investment, exercise motivation, and mental health using AMOS 24.0, and test the mediating effect using the Bias-Corrected-Bootstrap method.

4.5.1. Structural Equation Model Fit Index Test

The structural equation model diagram was analyzed and adjusted using AMOS 24.0, and the fit indices of the mediating path model are shown in Table 11. From Table 11, it can be seen that all the appropriate indexes of the model meet the required standards, $\chi^2/df=4.6886<5$, GFI=0.998>0.9, CFI=0.997>0.9, RESEA=0.057<0.08, indicating that the constructed mediation model fits the data well.

Table 11.

Fit indices of the path mediation model.

Fitting index	CMIN	DF	CMIN/DF	GFI	CFI	NFI	RFI	IF	RMSEA
Recommended indicator range	476.63	102	<5	>0.9	>0.9	>0.9	>0.9	>0.9	< 0.08
Results	473.276	101	4.686	0.974	0.997	0.967	0.961	0.974	0.057

4.5.2. Mediation Effect Test of Football Exercise Investment

The mediating effect has received increasing attention and importance from social science researchers. The purpose of the testing of the mediating product is to understand how the independent variable affects the dependent variable. After discovering certain experiential phenomena (i.e., independent variables seemingly affecting dependent variables), we can only achieve the development and improvement of theory by understanding the essence of this experiential discovery (i.e., how independent variables affect dependent variables). This study adheres to the testing procedures of Wen and Ye [39]latest mediation effect proposal. It was also found that calculating the confidence interval of the coefficient product using the deviation-corrected non-parametric percentile bootstrap method or the MCMC (Markov Chain Monte Carlo) method with prior information is more accurate than the confidence interval obtained by the Sobel method and has higher test power for testing [40]. So this study used the Bootstrap method and repeated sampling 2000 times to check if the indirect effect exists by seeing if the 95% confidence interval of the indirect effect includes 0.

$Y=cX+e_1$	(1)
$M=aX+e_2$	(2)
Y=c'X+bM+e ₃	(3)



Diagram of mediating effect.

After reading the latest literature on mediator effects by Chinese scholarsWen and Ye [40], the following testing procedure using the Bootstrap method is proposed to test the mediator variable (as shown in Figure 1, Equation 1, Equation 2, and Equation 3):

The first step is to test the coefficient c in Equation 1. If it is significant, the argument is based on the mediating effect; otherwise, it is based on the masking result. However, regardless of their significance, follow-up tests were conducted.

In the second step, in sequence, test the coefficients a of Equation 2 and b of Equation 3. If both are significant, the indirect effect is substantial, and proceed to the fourth step; if at least one is not essential, proceed to the third step.

The third step is to test H0:ab=0 directly using the Bootstrap method. If the indirect effect is significant, proceed to step four; otherwise, stop the analysis if the indirect impact is not substantial.

In Equation 3, the fourth step is to test coefficient c. If it is not significant, it indicates that the direct effect is insignificant, and there is only a mediating effect. If it is substantial, I.e., if the immediate impact is significant, proceed to step five.

In the fifth step, compare the signs of ab and c. If they have the same sign, it falls under the partial mediation effect. Report the proportion of mediation effect ab/c to the total effect. If the signs are different, it is a masking effect. The absolute value of the ratio of the indirect impact to the direct effect is |ab/c|.



Structural equation model of football exercise investment, exercise motivation, and psychological health.

Table 12.

Analysis of bootstrap results for testing the mediating effect.

			Bootstrap	
Variables	Mediation	Standardized	95% confidence interval	
	effect	estimates	Upper limit	Lower limit
Football exercise input \rightarrow Mental health	Overall effect	-0.663	-0.625	-0.699
Football exercise investment \rightarrow Exercise	Indirect	-0.270	-0.215	-0.329
motivation \rightarrow Mental health	effects			
Football exercise investment \rightarrow Exercise	Direct offect	-0.393	-0.324	-0.467
motivation \rightarrow Mental health	Direct effect			

According to the principle of mediation effect (Figure 1), the direct impact of college students' football exercise investment on mental health is first examined. According to the table, the standardized coefficient between football exercise investment and mental health is -0.66, and P < 0.000. Based on the testing steps, this study can further verify the hypothesis of the mediation effect. In the overall structural equation model (Figure 2) path test (Tables 11 and 12), the p-values of the three direct paths, 'Exercise investment \leftarrow Exercise motivation,' 'Psychological health \leftarrow Exercise investment perception,' are all less than 0.000, indicating significance. The overall structural model suggests that investing in football exercise positively influences exercise motivation that investing in football exercise negatively impacts mental health and that investing in football exercise negatively impacts mental health. In other words, a is a positive value, coefficients b and c' are harmful, and the p-values are all less than 0.001, indicating that coefficients a, b, and c's are all significant. Running the data and performing corresponding calculations shows that the 95% confidence interval of the indirect effect in Bootstrap does not include 0, indicating the presence of a mediating result. The 95% confidence interval of the direct impact on the Bootstrap also does not include 0, indicating the presence of an immediate effect. Further comparison of the signs of ab and c' confirms the existence of partial mediating results in this study: exercise motivation mediates the relationship between football exercise investment and mental health. Therefore, hypothesis 4 is validated.

According to the validation model (Table 13), two paths can influence the level of mental health among college students: (1) college students can directly impact mental health through the path of 'exercise motivation \rightarrow mental health,' with a direct effect value of -0.393, accounting for 59.27% of the total effect value; (2) college students can indirectly influence mental health through the path of 'exercise motivation \rightarrow football exercise engagement \rightarrow mental health' based on their engagement in football exercise. In other words, exercise motivation mediates between football exercise engagement and mental health, with a mediation effect value of -0.270, accounting for 40.72% of the total effect value.

Path	Standardization coefficient	Non-standardized coefficient	S.E.	C.R.	Р
Exercise input \leftarrow Motivation for exercise	0.679	1.088	0.049	21.977	***
Mental health ← Exercise engagement	-0.393	-0.258	0.024	-10.827	***
Mental health \leftarrow Exercise motivation	-0.397	-0.163	0.016	-10.441	***
External motivation ← Exercise motivation	0.830	0.943	0.032	29.627	***
Lack of motivation ← Exercise motivation	0.764	0.315	0.011	27.812	***
Vitality ← Exercise investment	0.883	1.000	0.013	27.617	***
Dedication ← Exercise investment	0.942	.856	0.018	48.330	***
Focus on exercise involvement	0.922	1.016	0.022	47.032	***
Embodiment ← Mental health	0.748	1.000	0.032	29.762	***
Obsessive symptoms ← Mental health	0.813	1.230	0.043	28.425	***
Interpersonal sensitivity ← Mental health	0.812	1.020	0.036	28.340	***
Depression ← Mental health	0.845	1.489	0.050	29.762	***
Anxiety ← Mental	0.769	0.962	0.036	26.856	***

Path test of structural equation model.

Table 13.

Path	Standardization coefficient	Non-standardized coefficient	S.E.	C.R.	Р
health					
Hostile← Mental health	0.763	0.552	0.021	26.478	***
Terror ← Mental health	0.863	0.754	0.025	30.617	***
Paranoia ← Mental	0.696	0.496	0.021	23.901	***
health					-114-64
Psychosis ← Mental	0.718	0.809	0.033	24.789	***
health					
Others ← Mental health	0.884	0.727	0.023	31.575	***

Note: *** indicates p<0.01; S.E.: Standard errors; CR: Critical ratios.

5. Discussion and Suggestions

5.1. Discussion

5.1.1. Discussion on the Relationship between Football Exercise Engagement and Mental Health

Based on the research findings on the relationship between the two, it can be concluded that a negative correlation exists between football exercise investment and individual psychological health. Simultaneous football exercise investments, as well as its various dimensions, have a negative predictive effect on mental health. The above results are consistent with the research findings of Yao [38]; Wen and Ye [40], and Jiang [27]. Football exercise investment requires students to participate personally and have a certain amount of physical load during the training. Engaging in football exercises requires communication with others, and certain sports necessitate close cooperation. This helps students experience different social roles and improves their communication and adaptability skills. Acquiring sports skills is also a process of training students to resist setbacks. From not knowing to knowing, from unfamiliar to proficient, from solving minor problems to facing setbacks, continuous exercise promotes growth. Students gain satisfaction and joy from sports exercise, experience the pleasure and freedom of real life, and improve their life satisfaction. It also encourages positive emotions, reduces the negative impact of negative emotions, and promotes mental health development.

5.1.2. Discussion on the Mediating Path Model of Sports Motivation

The study establishes a path model diagram of football exercise involvement, exercise motivation, and psychological well-being, with exercise motivation as the mediating variable, to explore the mediating effects of exercise motivation on football exercise involvement and psychological well-being. The study's results indicate that exercise motivation partially mediates the relationship between football exercise investment and the psychological health of college students. Based on the theoretical model of this study, college students can improve their mental health through two paths.

The first path is 'exercise motivation \rightarrow psychological health,' with a direct effect value of -0.393, accounting for 59.27% of the total effect value, indicating that the exercise motivation of college students can directly influence their psychological health level. Improving college students' sports motivation generates positive psychological emotions, consistent with previous findings (measurement of college students' exercise investment by (Bao LinDong). The reason for physical exercise is the internal psychological factor that guides individuals to participate in football exercise activities under the goal of training, reflecting the internal needs of individuals for football exercise. According to the self-determination theory, exercise motivation includes intrinsic and extrinsic motivation. Sports motivation is the desire to obtain pleasure through football exercise. College students usually engage in football exercises through games and competitions. The exercise process is exciting and challenging, which can stimulate college students' interest in football exercise in football exercise in football exercises in the exercise in the provide the metal health.

The second path is 'Exercise Motivation \rightarrow Soccer Exercise Engagement \rightarrow Mental Health.' The mediation effect value of soccer exercise engagement is -0.270, accounting for 40.72% of the total effect value. This path shows that exercise motivation can be not only a consequence variable of football exercise involvement but also a predictor variable of mental health, indicating that college students' football exercise involvement indirectly affects their mental health through exercise motivation, and there is a mediating effect between the two. Exercise motivation can indirectly affect mental health.

Football exercise investment refers to individuals' psychological scenario, joyful experience, and the courage to challenge and immerse themselves in the game. Improving college students' exercise engagement can help promote the generation of positive psychological emotions. Football exercise engagement refers to the psychological situation and joyful experience that individuals hold towards football exercise, as well as the participation state of daring to challenge and immersing themselves in it. The positive emotions of football exercises are present throughout the three stages of training: before, during, and after. Before engaging in football exercises, the expectations and enthusiasm of college students towards football exercise contribute to enhancing vitality and maintaining a high level of mental state, which is beneficial for college students to shape a good mental outlook and positive attitude. During the exercise process, football engages college students in a state of immersion, fostering a high level of focus and immersion. This allows them to fully experience the smooth experience of exercise, as well as the sense of achievement and satisfaction they feel when they complete complex movements. It helps improve concentration and experience the pleasure of football exercise [41]. After

football exercise, college students can perceive positive physical and mental reactions and changes, which help affirm the importance of exercise and improve their enthusiasm and persistence in football exercise, thereby enhancing their psychological well-being. As a result, investing in football exercise helps college students achieve a higher level of mental health.

5.2. Suggestions

5.2.1. Stimulate Internal Exercise Motivation and Optimize External Exercise Motivation

First, it stimulates internal motivation and enhances awareness of autonomous learning. The students' football exercise learning is primarily attributed to their degree of psychological motivation for sports. If students do not have sufficient subjective motivation for sports, they will naturally not be interested in them. As mentioned earlier, internal motivation is essential to stimulating students' participation in football exercises. Therefore, we can use internal motivation as a starting point. For example, organizing inter-class or inter-school team competitions can externally induce students' internal social motivation, allowing them to perceive the fun of participating in football exercises with friends and transforming factors such as curiosity, interest in learning, and improvement of their skill levels into internal motivation itself, thereby increasing students' enthusiasm and focus on exercise. In addition, teachers responsible for physical education can also offer elective courses on sports psychology so that students who are not very interested in improving their physical health can learn how to cultivate their interest in sports subjectively. Therefore, this point can significantly enhance students' awareness of independent exercise.

Furthermore, external exercise motivation has an objective role in sports learning. External influences and stimuli induce a type of motivation, external to the activity itself. A high level of motivation can positively influence students' football exercise behavior. On the current campuses of many universities, many students participate in football exercises due to the pressure of exams, physical fitness tests, and other external interventions. Some universities even make it mandatory to pass physical education to apply for a degree. The original intention of these requirements was to improve the student's physical health, but this is not a long-term solution and needs to correct their exercise motivation. Students also do not feel the relaxation and joy brought by sports activities. These external interventions may have a counterproductive effect to some extent. Therefore, we can make mandatory classroom regulations, like exam requirements and attendance, more flexible to allow students to enjoy the joy of physical education. Teachers can focus on exploring teaching design in active lesson preparation. 'Behavior change' is an essential goal in teaching. Therefore, when explaining scientific exercise methods and the value of physical health development, teachers should use clear and directive language, such as 'benefit for a lifetime,' to encourage students to try and explore independently. This will help improve students' motivation levels.

5.2.2. To Promote Students' Active Participation in Football Exercises, Starting from Three Aspects: School, Teachers, and Students.

Firstly, in terms of schools, we should strengthen the construction of school sports clubs and create a diversified platform for sports learning. Starting with the needs of students, enhance the support of sports clubs in schools and improve the execution of sports activities carried out by sports clubs. In addition, create a diversified sports learning platform to provide enriching conditions for students' sports learning. Incorporate application-oriented sports apps into the teaching process, where students can complete corresponding exercise tasks on fitness running apps and receive rewards in the final evaluation. Or use short video apps like 'Kuai' and 'TikTok' for skill demonstrations or video competitions to showcase the achievements of students' sports learning and contribute to encouraging others to participate in football exercises.

Secondly, in the classroom, physical education teachers provide activity guidance and technical exchanges, promote sports culture, and shape sports values, gradually creating an intense sports atmosphere on campus. In situations where senior students have low enthusiasm for participation, taking turns participating in club activities should be adopted to allow each student to receive as much cultivation as possible.

Finally, from the perspective of students, increase the investment in their football exercise. After entering college life and learning, students have a lot of leisure time due to the complete difference from their previous high school life and the absence of parental and teacher constraints. This quickly leads to the development of unhealthy habits—for example, behaviors such as playing games and staying late in the dormitory. Therefore, after entering college, high school students should improve their enthusiasm for participating in football exercises based on their physical fitness level and the knowledge of sports they have learned in physical education classes. They should also set reasonable and scientific goals for football exercises with the help of teachers and excellent sports enthusiasts, and continuously take action.

5.2.3. Improve the Mental Health Level of College Students

Firstly, universities should offer elective courses and public courses related to mental health knowledge so that college students can quickly understand the information about their mental health.

Furthermore, providing psychological counseling and guidance is an essential and effective way to promote the mental health of college students, and it is also a necessary aspect of college students' mental health work. Psychological counseling and guidance are ways for psychological workers to help people who are psychologically confused or conflicted

through discussions, advice, and other means. Many universities have already established or are preparing to develop psychological counseling centers for college students, a new development in the work of college students' mental health. It targets college students and provides practical guidance and inspiration for various maladaptations and psychological problems, helping them to genuinely mature psychologically.

References

- [1] S. Guo Kelei, "On the "education" of sports," *Journal of Xi 'an Institute of Physical Education*, vol. 35, no. 1, pp. 74-81, 2018.
- [2] J. H. Biddles and Asarem, "Physical activity and mental health in children and adolescents: A review of reviews," *British Journal of Sports Medicine*, vol. 45, no. 11, p. 886 895, 2011.
- [3] J. Mata, R. J. Thompson, and I. H. Gotlib, "Genotype moderates the relation between physical activity and depressive symptoms," *Health Psychology*, vol. 29, no. 2, p. 130, 2010. https://doi.org/10.1037/a0017261
- [4] E. C. Chang, "Optimism & Pessimism: Implications for theory, research, and practice." Washington: American Psychological Association, 2001, pp. 217-238.
- [5] M. E. P. Seligman, Learned optimism: How to change your mind and your life. New York: Vintage, 2006.
- [6] R. Baoley, "Evaluating the relationship between physical education, sport, and social inclusion," *Educational Review*, vol. 57, no. 1, pp. 71-90, 2005.
- [7] H. Gong and M. Liu, "Scientific evidence-based integration of sports and education: The correlation between football training and cultural learning," *China Sports Science and Technology*, vol. 56, no. 10, pp. 19-28, 2020.
- [8] D. I. d. B. Lishkina and P. Anique, "Understanding self-regulated learning through the lens of motivation: Motivational regulation strategies vary with students' motives," *International Journal of Educational Research*, vol. 113, p. 101956, 2022.
- [9] M. Xiong, "Belief model of exercise health and its research review," *Journal of Hubei Sports Science*, vol. 23, no. 3, pp. 323-324, 2004.
- [10] B. Guo and F. Jiang, *Self-efficacy theory and its application*. Shanghai: Shanghai Education Press, 2008.
- [11] E. A. Locke, "Social foundations of thought and action: A social cognitive theory," *Academy of Management Review*, vol. 12, no. 1, pp. 169-171, 1987.
- [12] M. Leyton, M. Batista, and R. Jiménez-Castuera, "Prediction model of healthy lifestyles in physical education students based on self-determination theory," *Revista de Psicodidáctica (English ed.)*, vol. 25, no. 1, pp. 68-75, 2020. https://doi.org/10.1016/j.psicoe.2019.05.002
- [13] H. Zheng, "Research on college students' motivation of sports participation from the perspective of self-determination theory," *Journal of Hunan University of Science and Engineering*, vol. 38, no. 2, pp. 152-153, 2017.
- [14] C. Ji, Y. Wang, and Y. Sun, "Research on the ideological and political reform and innovation of sports psychology course from the perspective of self-determination theory," *Journal of Tianjin Institute of Physical Education*, vol. 35, no. 1, pp. 17-22, 2020.
- [15] Chenglong, S. Huang, and P. L. Zeng, "A study on the physical health test results of Guangdong university students," *Journal* of Guangzhou Institute of Physical Education, vol. 29, no. 1, pp. 48-49, 2009.
- [16] Q. Hu, "Analysis and research on the physical fitness status of college students in Central China And the reform of physical education," *Fujian Sports Science and Technology*, vol. 27, no. 2, pp. 45-47, 2008.
- [17] W. Dai, "The current situation of college students' physique and the reform of physical education curriculum in colleges and universities —— Take Panzhihua university as an example," *Journal of Aba Teachers College*, vol. 33, no. 3, p. 4, 2016.
- [18] D. Wang and S. Yang, "Research on the development status and countermeasures of college students' physical health in China," *Boxing and Gedou*, vol. 12, pp. 34-36, 2021.
- [19] S. Chen, S. Li, and J. Rong, "The influence of exercise commitment and exercise conditions on college students' physical exercise behavior," *Journal of Beijing Sport University*, no. 11, pp. 48-49, 2005.
- [20] C. Li and L. Li, "The influence of college students' exercise motivation on exercise behavior," *Journal of Hubei Sports Science*, vol. 39, no. 5, pp. 415-419, 2020.
- [21] F. Xue, "The relationship between college students' exercise motivation and exercise behavior from the perspective of selfdetermination theory," *Journal of Wuhan Institute of Physical Education*, vol. 44, no. 6, pp. 43-47, 2010.
- [22] X. Song, *Study on the relationship among middle school students' psychological needs satisfaction, exercise motivation and physical exercise behavior*. Hunan University of Technology, 43-46, 2020.
- [23] H. Wang, Y. Song, and Q. Tang, "Research on the relationship between sports motivation and mental health of science and engineering students under the background of "three walks" activities," *Bulletin of Sports Science and Technology Literature*, vol. 26, no. 4, pp. 44-45, 2018.
- [24] G. Cai, L. Ji, and J. Su, "Study on the relationship between physical exercise feeling and motivation of primary and middle school students and mental health," *Psychological Science*, vol. 27, no. 4, pp. 844-856, 2004.
- [25] X. Zhang, *Study the relationship between shyness, self-identity, and mental health of college students.* Jinan University, 35-53, 2018.
- [26] H. Jiang and C. Song, "Research on the relationship between physical exercise and college students' mental health," *Entrepreneur's World*, vol. 2008, no. 8, pp. 80-81, 2008.
- [27] H. Jiang, Correlation between physical exercise and mental health of female graduate students. Sichuan University, 34-36, 2007.
- [28] Y. Sun, "Research on college physical education promoting college students' mental health," *Journal of Jilin Institute of Technology*, vol. 25, no. 2, pp. 100-102, 2009.
- [29] A. D. McInman and B. G. Berger, "Self-concept and mood changes associated with Aerobic dance," Australian Journal of Psychology, vol. 45, no. 3, pp. 134-140, 1993. https://doi.org/10.1080/00049539308259130
- [30] K. R. Fox, "Self-esteem, self-perceptions, and exercise," *International Journal of Sport Psychology*, vol. 31, no. 2, pp. 228-240, 2000.
- [31] Y. A. Foster, "Brief aikido training versus karate and golf training and university students' scores on self-esteem, anxiety, and expression of anger," *Perceptual and Motor Skills*, vol. 84, no. 2, pp. 609-610, 1997.

https://doi.org/10.2466/pms.1997.84.2.609

- [32] L. G. Pelletier, K. M. Tuson, M. S. Fortier, R. J. Vallerand, N. M. Briere, and M. R. Blais, "Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The sport motivation scale," *Journal of Sport and Exercise Psychology*, vol. 17, no. 1, pp. 35-53, 1995. https://doi.org/10.1123/jsep.17.1.35
- [33] J. Peng, "Research on the correlation between sports motivation and trait fluency based on self-determination theory," *Capital Institute of Physical Education*, pp. 45-47, 2012.
- [34] W. B. Schaufeli, M. Salanova, V. González-Romá, and A. B. Bakker, "The measurement of engagement and burnout: A two sample confirmatory factor analytic approach," *Journal of Happiness Studies*, vol. 3, pp. 71-92, 2002.
- [35] W. Schaufeli and D. Enzmann, *The Burnout companion to study and practice: A critical analysis*. Boca Raton, FL: CRC Press, 2020.
- [36] L. R. Derogatis, H. Yevzeroff, and B. Wittelsberger, "Social class, psychological disorder, and the nature of the psychopathologic indicator," *Journal of Consulting and Clinical Psychology*, vol. 43, no. 2, pp. 183-191, 1975.
- [37] X. Wang, "Manual of mental health rating scale: Symptom checklist 90," *Chinese Mental Health Journal*, vol. 1993, no. Supplement, pp. 31-35, 1993.
- [38] X. Yao, "The relationship between football exercise input and middle school students' subjective well-being," *Teaching and Exploration*, vol. 23, no. 6, pp. 76-78, 2015.
- [39] Z. Wen and B. Ye, "Analyses of mediating effects: the development of methods and models," *Advances in Psychological Science*, vol. 22, no. 5, p. 731, 2014.
- [40] Z. Wen and B. Ye, "Mediating effect analysis: Method and model development," *Advances in Psychological Science*, vol. 22, no. 5, pp. 731-745, 2004.
- [41] D. L. Felta, "Self-confidence and sports performance. In Pandolf K. B. (Ed.), Exercise and sport sciences reviews," vol. 16. New York: MacMillan, 1998, pp. 423-457.