

The Correlation between Mental Health and Physical Education Instruction in Higher Education Institutions

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Abstract. This study investigates the impact of physical exercise on the psychological well-being of university students. Utilizing a sample from Beijing Sport University, the research employed a questionnaire-based approach, targeting both sports and non-sports students. A total of 800 questionnaires were distributed, with 765 valid responses received. The participants were divided into four sports categories: basketball, football (soccer), tennis, and swimming. Two of these sports were team-based (basketball and football), while the other two were individual sports. The intensity of all exercises was moderate, and the study spanned over a period of two months. Psychological well-being was assessed using the Symptom Self-Assessment Scale (SCL-90), a reliable and valid instrument. Preliminary findings suggest that moderate exercise, especially within a duration of 30-60 minutes, significantly enhances psychological health. However, excessive exercise beyond 60 minutes showed a gradual decline in mental health scores. Gender differences were also observed, with male students exhibiting higher exercise intensity than their female counterparts. The study underscores the importance of moderate physical activity for mental health and calls for personalized sports guidance based on gender preferences.

1. Introduction

1.1. Research Background

With the advancement of China's socio-economic development, the general living standards of the populace have significantly improved. As material conditions have enhanced, there is a growing emphasis on mental health issues[1]. College students, being an integral part of societal development, play a pivotal role not only in their personal well-being but also in the nation's progress and construction. Hence, addressing the mental health of college students is of utmost urgency[2].

This study aims to investigate the relationship between mental health and physical education teaching among students at Beijing Sport University (hereinafter referred to as BSU). Firstly, by surveying the lifestyle related to physical activities and the mental health status of BSU students, we can understand the current state of their physical activity habits and the factors, patterns, and characteristics affecting their mental health. Secondly, by examining the correlation between physical activity lifestyles and mental health, we can provide a foundation for BSU students to establish a scientifically healthy physical activity lifestyle. On the other hand, it offers insights for physical education professionals at BSU to optimize teaching methods and content, assisting students in cultivating a positive physical activity lifestyle, thereby promoting their mental well-being.

This will guide students to foster their mental health growth through a scientific approach to physical activity.

1.2. Research Objectives

Grounded in the reality of BSU students, this study employs questionnaire surveys to understand the current status of their physical activity lifestyle and mental health. It seeks to explore the influencing factors and the relationship between BSU students' physical activity lifestyle and their mental health. Through a systematic analysis of physical activity lifestyles, this research elucidates the significance of the main subjects of sports activities, the conditions, and the forms of activities in promoting students' mental health. It aims to provide recommendations to guide BSU students in developing a healthy physical activity lifestyle to foster mental health growth, offering both practical and theoretical foundations for BSU's physical education teaching, ultimately serving to enhance the methods of physical education teaching at BSU.

1.3. Research Objectives

Focusing on and nurturing college students' physical activity lifestyle in physical education not only improves physical fitness but also elevates their mental health[3]. This is a key initiative in the endeavor of building a sports powerhouse and cultivating well-rounded talents in higher education institutions, emphasizing moral,

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intellectual, physical, aesthetic, and labor development[4]. It embodies the comprehensive educational philosophy of "whole-process, all-inclusive, and multi-dimensional" in higher education. This research systematically analyzes the college students' physical activity lifestyle as a factor influencing their mental health. By examining the differences in the main subjects, conditions, and forms of sports activities, it describes their impact on students' mental health, identifies key issues, and subsequently proposes rational recommendations.

2. Research Subjects and Methods

2.1. Research Subjects

For this study, a questionnaire-based approach was adopted. The subjects were students from the Olympic Sports Department and the Humanities and Social Sciences Department of Beijing Sport University (BSU). Specifically, students from sports-related majors and non-sports majors were chosen. Using a random sampling method, questionnaires were distributed to 800 individuals, with 765 valid responses received. The proportion of sports-related students to non-sports students was equal, as was the male to female ratio, as shown in Table 1.

Table 1. Basic Information of the Participants.

Faculty	Olympic Sports Department		Department of Humanities and Social Sciences	
	Male	Female	Male	Female
Total Number of Valid Questionnaires	186(49.20%)	192(50.80%)	191(49.35%)	196(50.65%)
Basketball	46	48	47	49
Football	46	48	47	49
Tennis	46	48	47	49
Swimming	48	48	50	49

Figure 1 displays a basketball activity image related to the research conducted by the author.



Fig. 1. Basketball activity involved in this study.

2.2. Research Methods

2.2.1. Literature Review Method

Electronic resources such as CNKI (China National Knowledge Infrastructure), Wanfang, VIP, and the digital library of BSU were utilized. Keywords like "college sports," "university sports," and "college students' mental health" were used to search and collect relevant journal articles, theses, and other materials. A total of 472 related documents since 2018 were identified. By analyzing these documents, a comprehensive understanding of both domestic and international research outcomes was achieved. Emphasis was placed on analyzing and summarizing the factors influencing sports lifestyles and college students' mental health. This provided a solid theoretical foundation for the selection of survey questionnaires and the validation of the research.

2.2.2. Questionnaire Survey Method

A questionnaire was used to investigate the sports activities students were interested in[5]. Additionally, mental health scales analyzed by relevant researchers were employed to study the mental health of students before and after exercise.

2.2.3. Mathematical Statistics Method

For the data generated in this experiment, SPSS was uniformly used for analysis. To evaluate the mental health levels of students across different exercise programs, t-tests and one-way ANOVA were employed.

3. Experimental Procedure

A self-compiled questionnaire was used to categorize students' preferred sports activities into several groups. 800 questionnaires were distributed to the students, of which 765 were valid. Based on the content of the valid questionnaires, the 765 participants were allocated to four different sports activities. Among these four sports, two were team sports: basketball and soccer; and two were individual sports: tennis and swimming. The distribution of participants across these sports can be seen in Table 1. The gender ratio across the four groups was roughly balanced.

All four types of sports activities had a moderate intensity level. According to analyses by relevant researchers, when the human body undergoes moderate-intensity physical exercise, the heart rate is approximately 100-130 beats/min. By observing the students' heart rate changes during exercise, instructors can timely adjust the exercise methods accordingly. The sports activities for all four groups lasted for two months, after which the changes in students' mental health were analyzed.

The mental health scale used was the "Symptom Checklist-90" (abbreviated as SCL-90)[6]. The validity

of each symptom in this questionnaire ranged from 0.77 to 0.99, indicating good reliability and validity. The scale is divided into ten dimensions, encompassing somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoia, psychoticism, and others, totaling 90 questions. Each question is rated on a five-point scale ranging from "none" to "severe," with scores assigned as "1," "2," "3," "4," and "5" respectively. The total score ranges from a minimum of 90 to a maximum of 450. A lower score indicates milder symptoms and better mental health.

4.Results and Analysis

4.1.Relationship between Exercise Duration and Mental Health

To study the impact of exercise frequency on college students' mental health, this paper statistically analyzed the scores of the "Symptom Checklist-90" for students with different exercise durations. A one-way ANOVA was used to investigate the relationship between exercise duration and mental health. The results are shown in Table 2.

Table 2. Relationship between Different Exercise Durations and Mental Health.

	<10min	10-20min	20-30min	30-60min	60-180min	>180min	F	P
score	155.5±50.5	140.0±45.1	127.3±42.2	100.1±33.0	105.4±35.3	115.8±38.9	12.5	0.001

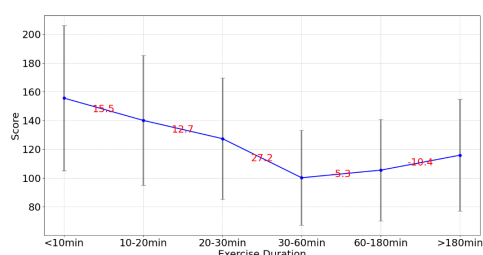


Fig. 2. Scores on 'Symptom Self-Assessment Scale' by Exercise Duration with Error Bars.

From Tables 2 and Figure 2, it is evident that students who exercised for 30-60 minutes had the lowest scores, while those who exercised for less than 10 minutes had the highest scores, with statistically significant differences. As depicted in Figure 2, as exercise duration increased, students' mental health scores also increased. However, when exercise duration exceeded 60 minutes, a gradual decrease in health scores was observed. Thus, moderate exercise can enhance students' mental health levels.

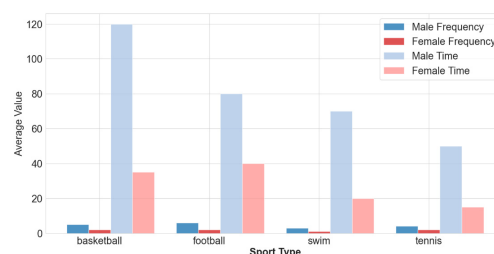


Fig. 3. Comparison of Frequency and Time in Different Sports by Gender.

Figure 3 presents a comparative analysis of the frequency and duration of physical activity across different genders. From the independent samples t-test results, significant differences ($p < 0.05$) were found in the exercise intensity between male and female students. Males had a notably higher average exercise intensity than females. These results indicate that female students participate in physical activities far less frequently than male students. Moreover, more than half of the students did not meet the standard set by the National Sports Administration, which requires at least 30 minutes of exercise per session. Given these findings, it is recommended that schools change female students' perceptions and attitudes towards sports. By introducing sports activities that appeal to female students, their enthusiasm for physical education can be enhanced, improving their overall physical fitness and cultivating a lifelong exercise habit. Thus, providing personalized sports guidance based on gender should be a focal point for contemporary universities.

4.2.Exercise Statistical Analysis by Gender

To study the exercise statistics of college students by gender, we compiled statistics on the weekly participation frequency and weekly exercise duration for the four sports activities for both genders, as shown in Table 3. In Table 3, A, B, C, D, E, F, G, and H correspond to Gender, Project, Frequency, t-value (frequency), p-value (frequency), Time, t-value (time), and p-value (time), respectively.

Table 3. Exercise Statistical Results by Gender.

A	B	C	D	E	F	G	H
male	basketball	5	3.97	0.007	120	3.31	0.016
male	football	6			80		
male	tennis	4			50		
male	swim	3			70		
female	basketball	2			35		
female	football	2			40		
female	tennis	2			15		
female	swim	1			20		

4.3.Impact of Team Sports vs. Individual Sports on Mental Health

To study the impact of team sports and individual sports on college students' mental health, this paper statistically analyzed the scores of the "Symptom Checklist-90" for students participating in both types of sports. The results are shown in Table 4. In Table 4, A, B, C, and D correspond to Sports Major (Pre-test), Sports Major (Post-test), Non-Sports Major (Pre-test), and Non-Sports Major (Post-test), respectively.

Table 4. Analysis of Students' Mental Health in Team Sports vs. Individual Sports.

	Team Sport (Basketball)	Team Sport (Football)	Individual Sport (Tennis)	Individual Sport (Swimming)
A	133.8±21.7	136.3±42.8	141.3±29.8	142.8±39.7
B	103.5±35.6	108.5±50.1	119.6±48.4	117.5±25.1
C	157.2±31.5	159.1±48.2	167.4±42.9	163.1±33.6
D	112.9±41.8	115.7±31.5	125.7±35.8	122.6±30.9

From Table 4, it can be observed that students majoring in sports generally scored lower in team sports (basketball, soccer) than in individual sports (tennis, swimming). This could be attributed to the enhancement of social skills through teamwork and communication, providing participants with a sense of belonging and identity, thereby boosting their confidence and self-esteem. On the other hand, the mental health scores of sports-majoring students before the test were generally lower than those of non-sports-majoring students. This is due to sports-majoring students typically engaging in sports activities more frequently and for longer durations than their non-sports-majoring counterparts. Moreover, through this experiment, it was found that the mental health scores of sports-majoring students, when exercising regularly (controlling exercise duration and frequency), were also lower than their pre-test scores. These findings provide valuable data support for formulating effective physical education activities.

5. Conclusion

Through the survey of 800 students from the Olympic Sports Department and the Humanities and Social Sciences Department of Beijing Sport University, we have discerned that physical activity can bolster the mental health of college students. The primary findings can be summarized in the following three aspects:

5.1. Optimal Duration Promotes Mental Health

While physical activity undoubtedly enhances the mental well-being of college students, both insufficient and excessive exercise can have adverse effects. Therefore, determining the appropriate duration of exercise tailored to each student's physical capabilities is crucial to maximize mental health benefits.

5.2. Gender's Impact on Mental Health

From our survey of 765 participants, we observed that female students tend to exercise both less frequently and for shorter durations than their male counterparts. This discrepancy may arise from the selected sports not aligning with the preferences of female students. Consequently, when formulating physical education curricula, institutions should consider gender-specific exercises, such as dance and yoga, to cater to female students.

5.3. Influence of Team Sports on Mental Health

Our research indicates that college students participating in team sports, like basketball and soccer, generally score better in terms of mental health than those engaged in individual sports. When comparing the mental health status of sports and non-sports students in team versus individual sports, we found that team sports, emphasizing collaboration and social interaction, are more conducive to cultivating participants' social skills, sense of belonging, and self-esteem. In contrast, individual sports like tennis and swimming, while offering athletes opportunities to independently manage stress and enhance self-efficacy, provide fewer social interactions. Thus, regardless of whether students major in sports or not, team sports might exhibit certain advantages in some aspects of mental health. However, each form of sport has its unique benefits, catering to the diverse needs and preferences of individuals.

5.4. Future Research

With the rapid societal progression, the mental health of college students is garnering increasing attention. This study offers a fresh perspective on promoting college students' mental health through sports lifestyles, providing new research directions and practical strategies for university physical education. In the future, we can delve deeper into the specific impacts of various sports lifestyles on college students' mental health and explore how to better guide students in forming healthy sports habits within university physical education. Additionally, integrating this concept into the broader university education system can be researched, positioning it as a pivotal means to foster holistic student development.

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