The Influence of Physical Exercise on College Students' Learning Stress and Mental Health

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Abstract

Physical education holds significant value within the higher education system. Sports have the potential to enhance students' physical well-being and foster their self-assurance and resilience. To enhance the athletic abilities of college students and foster their mental well-being, measures need to be taken. The study involved a group of five university students situated in a specific location. A study was conducted with a sample of 700 university students. We distributed a total of 700 questionnaires to students in all three grades for this survey. In total, 658 questionnaires were collected, and 28 invalid questionnaires were excluded due to incomplete, repeated, or continuous answers. Ultimately, a total of 630 valid questionnaires were collected, with a commendable recovery rate of 90%. The competitive learning pressure of the training group was found to be significantly lower than that of the non-training group (t (1, 39) = 45.40, <0.001). Similarly, the frustration learning pressure of the training group was also significantly lower than that of the non-training group (t (1,39) =- 32.80, <0.001). Additionally, the task-required learning pressure of the training group was observed to be significantly lower than that of the non-training group (t(1,39)=-45.79,<0.001). Lastly, the expected learning pressure of the training group was significantly lower than that of the non-training group (t (1,39) =-54.47, <0.001), the self-development learning pressure of the training group was found to be significantly lower than that of the non-training group (t (1, 39) = 21.30, p<0.001). College students can reduce their academic stress by participating in sports training. The students who engaged in sports training experienced a significant decrease in various types of learning pressure, including competitive, frustration, task requirement, expected, and self-development learning pressure, compared to their peers who did not participate in sports training.

Keywords: Exercise Frequency; Type of Motion; College Student; Learning Pressure; Sports Training.

Introduction

According to a large-scale survey of over 100,000 college students across the country, it was discovered that over 20% experienced psychological issues. These problems primarily stemmed from difficulties adjusting to the new university environment, anxiety arising from strained interpersonal relationships, emotional turmoil related to romantic relationships, and psychological imbalances resulting from disparities in economic circumstances. When it comes to college students, a small minority experience significant mental illness, while a significant portion of them are in a "sub-healthy state" (Olfert et al., 2022). The term "sub-health state" is used to describe a condition that falls somewhere between being healthy and being diseased. Individuals in sub-optimal health are unable to meet the criteria for good health. This is evident through a decline in physiological activity and adaptability over a specific period, although they do not meet the diagnostic criteria set by modern medicine. The primary issues include low learning efficiency, unclear goals, lack of motivation, poor self-control, emotional irritability, a constant feeling of life being mundane, difficulty finding energy, and a lack of gratitude, etc (Nadareishvili et al., 2022). Therefore, whether referring to physical or mental well-being, it encompasses more than just the absence of illness but also the pursuit of optimal health beyond a state of suboptimal well-being. Physical education serves as a complementary component to the academic curriculum, fostering the holistic growth of individuals' physical and mental well-being through a range of practical activities. Sports is a social activity that fulfils individuals' spiritual needs through physical exercise. Strengthening sports among college students promotes their mental health, cultivates resilience, and encourages them to face challenges with courage. Additionally, it enhances communication among students. Therefore, studying sports is essential for promoting the physical and mental well-being of college students.

The value of sports as an educational tool lies in its ability to allow individuals to experience personal growth, develop resilience, cultivate a sense of sportsmanship, and

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effectively navigate both success and failure. This unique form of education, akin to facing challenges, offers invaluable lessons that cannot be replicated through other means. Sports have a significant impact on both physical and mental well-being. They not only enhance physical fitness but also contribute to the development of one's personality, civilised spirit, pursuit of excellence, and self-improvement. It is evident that sports play an indispensable role in promoting overall health. Emotions play a significant role in various human activities; human behaviour is greatly influenced by emotions. Positive emotions have a beneficial impact on behaviour, while negative emotions can disrupt one's ability to study and work effectively. Moreover, negative emotions can have detrimental effects on both the physical and mental well-being of individuals. Prolonged experiences of depression, anxiety, and stress can even contribute to the development of various illnesses. Hence, it is crucial for students to prioritise their mental well-being to safeguard their overall mental health. Engaging in regular physical exercise can provide immense physical comfort, allowing one to experience the joy of participating in various sports. Additionally, it fosters confidence in one's daily life and helps develop a positive and open mindset.

The study involved a group of five university students at a specific location. A study was conducted on a sample of 700 university students. We distributed a total of 700 questionnaires to students in all three grades for this survey. In total, 658 questionnaires were gathered, while 28 questionnaires were deemed invalid due to incomplete, repeated, or continuous answers and were therefore excluded. Ultimately, a total of 630 valid questionnaires were collected, with a commendable recovery rate of 90%. The competitive learning pressure of the training group was significantly lower than that of the non-training group ($t\ (1, 39) = 45.40, <0.001$). Similarly, the frustration learning pressure, task-required learning pressure, and expected learning pressure of the training group were all significantly lower than those of the non-training group ($t\ (1,39) =-32.80, <0.001$; $t\ (1,39) =-45.79, <0.001$; $t\ (1,39) =-54.47, <0.001$), respectively. Additionally, the self-development learning pressure of the training group was also significantly lower than that of the non-training group ($t_{(1,39)} =-21.30, <0.001$). College students who train in sports experience less stress in their academic lives. The students who engaged in sports training experienced a significant decrease in competitive learning pressure, frustration learning pressure, task requirement learning pressure, expected learning pressure, and self-development learning pressure, as compared to the students who did not participate in sports training.

Literature Review

According to a large-scale survey of over 100,000 college students, it was discovered that over 20 percent of the participants experienced various psychological issues. These issues primarily revolved around challenges related to adapting to a new environment, anxiety stemming from interpersonal conflicts, emotional turmoil in romantic relationships, and psychological imbalances resulting from economic disparities. When it comes to college students, a small number of experience explicit mental illnesses, while a significant portion find themselves in a "sub-health state." A "sub-health state" is a condition that falls between being healthy and being diseased in terms of the human body. Individuals in a suboptimal state of health exhibit signs of reduced physiological functioning and decreased adaptability over a specific timeframe. However, they do not meet the diagnostic criteria set by modern medicine. The primary issues include low learning efficiency, unclear objectives, a lack of motivation, weak self-discipline, emotional instability, frequent feelings of boredom, a lack of energy, and a lack of gratitude. Thus, whether it pertains to physical well-being or mental well-being, it encompasses more than just the absence of illness, extending to surpass the state of "sub-optimal health" (Li, 2021).

To foster well-rounded individuals and lessen the stress that college students experience, many colleges and universities have introduced a variety of physical education courses, including tennis. This paper examines the impact of tennis on the physical and mental well-being of college students. It conducts a thorough analysis of existing literature and develops evaluation indexes for both physical and mental health. The study evaluated the effects of tennis on both physical and mental well-being. Tennis has a positive impact on college students' physical and mental health, according to a recent study by Li (2021). The authors of the study are Jorge Giménez-Meseguer et al. The objective of this study is to examine the correlation between physical well-being, mental health, and overall quality of life among individuals with drug dependency. Additionally, it seeks to ascertain whether the physical condition of drug-dependent patients can serve as a predictor of their mental health status and quality of life. Physical condition (time wake and walking tests, chair standing tests, 6-minute walking tests), mental health (DASS-21]) and quality of life (brief health survey) levels were measured in 125 drug-dependent patients. Correlation analysis and stepwise multiple linear regression analysis were performed (Giménez-Meseguer & Tortosa-Martínez, 2021).

Methodology

Research Object

This study focuses on a group of university students from a specific location as the subjects of research. A random sampling survey was conducted on a total of 700 college students in three grades, in line with the study's objectives. A total of 700 questionnaires were distributed to students across all three grades for the purpose of this survey. A total of 658 questionnaires were collected, out of which 28 were deemed invalid due to incomplete or repetitive answers. After eliminating these, we were left with 630 valid questionnaires, resulting in an overall questionnaire recovery rate of 90%.

Literature Research Method

The literature retrieval method is focused on research objectives or topics, and data is obtained through investigating literature. This allows for a thorough understanding of the methods used to address the studied problems. Research methods from the field of literature are commonly employed across different academic disciplines. The functions of this are as follows: Understanding the historical context and current state of the issue can aid in identifying a suitable research topic. The object's overall impression can facilitate observation and visitation. Obtaining comparative data allows for a comprehensive understanding of the subject matter. The author conducted a thorough literature review, analysing numerous tests and experiments on learning stress. They then proceeded to study and analyse the statistical methods used in the data. Additionally, I conducted extensive research on the academic stress experienced by students and compiled a categorised summary.

Questionnaire Survey Method

The author primarily uses questionnaire surveys to gather information through practical investigations. This approach ensures the accuracy and timeliness of the data, allowing for a comprehensive understanding of the differences. By doing so, the author can select the most suitable methods for correction and ultimately obtain the desired results and answers.

Furthermore, the author employs a questionnaire that encompasses a range of inquiries pertaining to college students' exercise habits. This includes the frequency of weekly exercise and the prevalent types of physical activities among college students. This approach facilitates the acquisition of accurate responses.

Mathematical Statistics

Thorough screening is necessary during the final questionnaire recovery process to ensure the accuracy and dependability of the data. In order to facilitate the progress of mathematical statistics, it is essential to utilise the statistical software SPSS 23.0 for the analysis of the finalised data following the necessary preliminary preparations.

Research Procedure

At the outset, the author conducted a thorough examination of pertinent learning stress tests and experiments. They then proceeded to analyse and study the statistical methods employed in the data, ultimately categorising the learning stress experienced by junior students. The author developed a group intervention programme supported by theory, targeting the correlation between sports and academic stress. To gather information on the exercise habits of college students, a questionnaire survey was conducted. A questionnaire to gather information on the academic stress college students experience also used a learning pressure scale. Finally, the received data underwent statistical analysis (figure 1) (Nelekar et al., 2022).

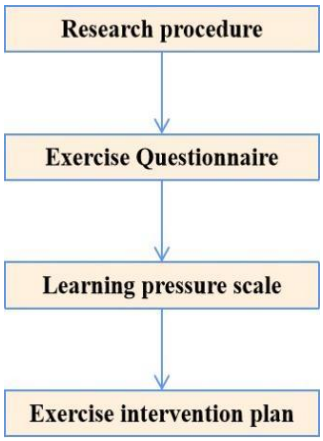

Figure 1: Study Procedures.

(1) Exercise Questionnaire

The exercise situation questionnaire consists of five questions: date of birth, gender, grade, exercise frequency per week, and type of exercise chosen. Its purpose is to gather information about the exercise habits of college students in a concise and academic manner.

(2) Learning pressure scale

The participants underwent testing using the College Student Learning Stress Questionnaire. The questionnaire is scored on a scale of one to five, with one indicating minimal learning pressure and five indicating significant learning pressure. The questionnaire consists of 62 questions, encompassing five dimensions: competitive

learning pressure, frustration learning pressure, task requirement learning pressure, self-development learning pressure, and expected learning pressure. The study found that the Cronbach 'α coefficient for the competitive learning pressure dimension was 0.95, for the frustration learning pressure dimension was 0.93, for the task requirement learning pressure dimension was 0.94, for the self-development learning pressure dimension was 0.89, and for the expectation learning pressure dimension was 0.95. The Cronbach's α coefficient of the total scale is 0.98, suggesting a high level of reliability in this study (O'Connor et al., 2022).

The author analyses the questionnaire's validity by considering two aspects: internal consistency validity and structural validity. Two questions were selected at random from each dimension. The correlation between the questions and their respective dimensions was calculated. These results were used to assess the value of the questions. The correlation coefficient between the questions and their dimensions ranged from 0.61 to 0.92, which was higher than their correlation coefficient with other sub-tests (ranging from 0.34 to 0.74). This indicates that the internal consistency and validity were strong.

In addition, the correlation coefficients for each dimension of the questionnaire range from 0.65 to 0.86, indicating a moderate level of correlation. Additionally, the correlation coefficients between each dimension and the total score of the questionnaire range from 0.80 to 0.90. The correlation between each dimension and the total score demonstrates a higher correlation coefficient compared to its correlation with other dimensions. This finding supports the strong validity of the questionnaire used in this study.

(3) Exercise intervention plan

The author conducted a study involving 40 junior students, who were randomly selected through recruitment. The experimental group, consisting of 20 students, received group intervention once a day for a total of 10 sessions, each lasting 40 minutes. The remaining 20 students served as the control group. We used the learning pressure scale to assess students' learning pressure before and after the intervention. The obtained data was analysed and summarised using the statistical software SPSS 23.0, allowing us to observe the changes in students' learning pressure following the intervention. Here is a detailed description of the operation:

1）A sample of 40 junior students (20 boys and 20 girls) from School A who do not actively participate in sports was randomly selected to assess the learning pressure scale. The questionnaires were collected and analysed using SPSS to determine the learning pressure of these students.

2) Recruit a group of 20 students (10 men and 10 women) who are willing to participate in daily physical exercise as a means to address learning pressure.

3) During the ten-day sports event, students will participate in 40 minutes of sports activities after class each day. Half of the students will engage in ball games, while the other half will participate in track and field sports. Swimming is not considered within the scope of intervention due to factors such as the venue, weather, and other considerations.

4) Two sports instructors (one is responsible for ball games and the other is responsible for track and field) oversee the daily sports activities. At the start and end, the instructors must tally the number of participants to ensure that students engage in effective sports activities within the designated timeframe.

5) After a duration of ten days, the students who engage in physical activity and those who do not will undergo another assessment using the learning pressure scale. This will determine whether there have been any alterations in the learning pressure levels of the students who exercise.

This study proves from practical data that physical education has an impact on the pressure on college students. Physical education can reduce the pressure on students, and it is best to exercise more than three times a week while these students have relatively less pressure. Especially in terms of frustration learning pressure and expectation learning pressure, the junior middle school students who participate in physical training are significantly lower than those who do not participate in physical training. Colleges and universities should pay attention to students 'physical training in ordinary times and reduce the learning pressure of students through physical training, which is more conducive to the development of students' mental health.

Results and Discussion

Training Effect Analysis

(1) Comparison of learning pressure before and after training in different groups

Table 1 demonstrates a significant decrease in the learning pressure level of students after training compared to before training. Specifically, the competitive learning pressure level and frustration level of students decreased significantly. Additionally, there was a significant decrease in the learning pressure level related to task requirements, expected learning pressure, and self-development learning pressure after training. This study demonstrates that sports training can effectively alleviate academic stress among college students.

Table 1

Comparison of Learning Pressure Before and after Training.

	Training group		t	Non-training group		t
	Before training	After training		Before training	After training	
Competitive learning pressure	4.32±0.18	1.73±0.17	42.87***	4.38±0.18	4.26±0.16	2.22*
Frustration and learning pressure	4.28±0.22	1.75±0.26	33.11***	4.27±0.16	4.33±0.23	-1.01
Task requires learning pressure	4.33±0.18	1.77±0.13	47.40***	4.27±0.17	4.31±0.21	-0.2
Expected learning pressure	4.31±0.22	1.75±0.12	44.18***	4.31±0.21	4.30±0.16	-0.16
Self-development learning pressure	4.24±0.43	1.81±0.41	18.11***	4.31±0.38	4.31±0.30	-0
College students' learning pressure	4.31±0.11	1.74±0.08	77.54***	4.31±0.07	4.30±0.11	-0.33

The comparison of learning pressure levels between the non-training group before and after training indicates that there is no statistically significant difference in the students' learning pressure levels after training compared to before training ($t_{(1,39)}$=-0.33, p=0.736), in addition to a certain reduction in competitive learning pressure ($t_{(1,39)}$=2.22, p=0.033), the change of students' frustration learning pressure after training did not reach a significant level ($t_{(1,39)}$=-1.01, p=0.312), the task requirement learning pressure after training did not change significantly ($t_{(1,39)}$=-0.20, p=0.846), and the expected learning pressure after training did not change significantly ($t_{(1,39)}$=-0.16, p=0.867), there was no significant change after self-development learning stress training ($t_{(1,39)}$=0.00, p=1.00). This study demonstrates that the absence of sports training among college students does not have a significant impact on reducing their level of academic stress.

(2) Comparison of learning pressure of different groups after training

Table 2 demonstrates a significant difference in the learning pressure between the training group and the non-training group before and after training. The training group exhibited significantly lower levels of competitive learning pressure, frustration learning pressure, task requirement learning pressure, and expected learning pressure compared to the non-training group ($t_{(1,39)}$ =-54.56 p<0.001), the self-development learning pressure of the training group was significantly lower than that of the non-training group ($t_{(1,39)}$=-21.31, p<0.001), finally, the learning pressure of college students in the training group is significantly lower than that in the non-training group ($t_{(1,39)}$=-83.82, p<0.001), thus research findings demonstrate a notable decrease in the academic stress experienced by college students following participation in sports training. Moreover, sports training has been shown to have a beneficial impact on students' psychological well-being.

Table 2

Comparison of Academic Learning Pressure Between Training Group and Non-Training Group after Training.

	Training group	Training group	
Competitive learning pressure	1.73±0.18	4.26±0.15	-45.41***
Frustration and learning pressure	1.75±0.26	4.33±0.24	-32.81***
Task requires learning pressure	1.77±0.13	4.31±0.21	-45.78***
Expected learning pressure	1.72±0.12	4.32±0.16	-54.56***
Self-development learning pressure	1.81±0.4	4.31±0.31	-21.31***
College students' learning pressure	1.74±0.090	4.32±0.11	-83.82***

The Relationship Between Physical Exercise and Mental Health Of Local College Students

In recent years, there has been extensive research conducted on the correlation between physical exercise and the mental well-being of college students. Numerous studies suggest that physical exercise has a beneficial effect on mental health. The author explores the connection between physical exercise and mental health, emphasising the strong correlation observed among college students.

Comparison of mental health level between college students who regularly and infrequently participate in physical exercise.

Table 3

Comparison of Psychological Level of College Students who Often and Infrequently Exercise

Divisor	Almost No Participation		Occasionally		Frequently Participate		P_1	P_2	P_3
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD			
Somatization	1.52	0.44	1.51	0.43	1.44	0.41	>0.05	>0.05	>0.05
Obsessive-Compulsive Symptoms	2.02	0.61	1.95	0.57	1.93	0.57	>0.05	>0.05	>0.05
Interpersonal Relationship	1.96	0.61	1.85	0.53	1.57	0.57	>0.05	< 0.01**	< 0.01**
Depressed	1.72	0.54	1.71	0.51	1.68	0.46	>0.05	>0.05	>0.05
Anxious	1.66	0.45	1.61	0.52	1.57	0.53	>0.05	>0.05	>0.05
Somatization	1.80	0.55	1.72	0.56	1.67	0.58	>0.05	>0.05	>0.05
Obsessive-Compulsive Symptoms	1.45	0.46	1.44	0.48	1.45	0.42	>0.05	>0.05	>0.05
Interpersonal Relationship	1.62	0.54	1.68	0.51	1.63	0.46	>0.05	>0.05	>0.05
Depressed	1.61	0.45	1.56	0.46	1.58	0.53	>0.05	>0.05	>0.05
Anxious	1.70	0.51	1.66	0.50	1.61	0.50	>0.05	>0.05	>0.05

Note: P1 examines the comparison between the group with infrequent participation and the group with occasional participation. P2 investigates the comparison between the group with infrequent participation and the group with frequent participation. P3 explores the comparison between the group with occasional participation and the group with frequent participation.

Table 3 presents a comparative analysis of mental health among college students based on their participation in physical exercise at various frequencies within local colleges and universities. The table presents a comparison of mental health status between college students who engage in physical exercise rarely and those who engage in physical exercise occasionally. Among the nine factors examined, students who occasionally participate in physical exercise have lower scores in eight factors, except for the factor of "paranoia." The results of the T test indicated that there was no statistically significant difference between the group with low participation in physical exercise and the group with occasional participation in physical exercise (P>0.05); Next, the table provides a comparison between the group with minimal participation and the group with frequent participation.

The results indicate that, out of the nine factors examined, the frequently participating group scored higher than the almost non-participating group in all factors except for "paranoia." The scores for "fear" were equal between the two groups. However, in the case of the other seven factors, the almost non-participating group scored higher than the frequently participating group. The t-test revealed a highly significant disparity in the factor score for "interpersonal relationship" between the two groups (P<0.01), no significant differences were observed in the remaining eight factors. The comparison between the occasionally participating group and the infrequently participating group reveals differences in nine factors, excluding "terror" and "psychotic." The former group has lower scores than the latter group in these two factors, while the latter group has higher scores in the remaining seven factors. The T test revealed a significant difference between the two groups, except for the "interpersonal relationship" score (P<0.01). No differences were observed in the other eight factors.

The average scores of the groups with low, moderate, and high participation were 1.71, 1.67, and 1.62, respectively, indicating a decreasing trend. In summary, the mental health status of the regular group is superior to that of the occasional group and the hardly participating group. However, there is no statistically significant difference observed among the three groups.

(2) Comparison of mental health level among college students with different exercise volumes

Table 4

Presents a Comparison of the Mental Health Status of College Students Based on their Varying Levels of Physical Exercise.

Divisor	Big		Centre		Small		P_1	P_2	P_3
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD			
Somatization	1.57	0.41	1.44	0.37	1.48	0.40	<0.01**	>0.05	>0.05
Obsessive-Compulsive Symptoms	1.98	0.53	1.90	0.47	2.03	0.75	>0.05	>0.05	>0.05
Interpersonal Relationship	1.93	0.63	1.76	0.48	1.92	0.5	<0.05*	>0.05	>0.05
Depressed	1.73	0.52	1.61	0.43	1.71	0.5	>0.05	>0.05	>0.05
Anxious	1.61	0.46	1.56	0.45	1.62	0.47	>0.05	>0.05	>0.05
Hostile	1.82	0.60	1.61	0.56	1.65	0.62	<0.01**	<0.05*	>0.05
Fear	1.47	0.41	1.43	0.40	1.43	0.4	>0.05	>0.05	>0.05
Paranoia	1.74	0.53	1.61	0.43	1.64	0.56	<0.05*	>0.05	>0.05
Psychopathic	1.61	0.48	1.48	0.37	1.58	0.51	<0.05*	>0.05	>0.05
Total Average Score	1.72	0.51	1.60	0.44	1.67	0.55	>0.05	>0.05	>0.05

Note: P1 examines the contrast between extensive and moderate exercise; P2 investigates the distinction between extensive and minimal exercise; and P3 explores the differentiation between moderate and minimal exercise.

Table 4 presents a comparative analysis of the mental well-being of college students in local colleges and universities based on their varying levels of physical activity. This table presents the mean values of key characteristics related to mental health among college students with varying levels of exercise and compares them. Through a comparison of the variables between the group engaged in intense physical activity and the group engaged in moderate physical activity, the T-test revealed that the factor scores of the former group were slightly higher than those of the latter group. However, there was no significant difference ($P > 0.05$) in the four factor scores of "obsessive-compulsive symptoms," "depression," "anxiety," and "fear." On the other hand, there was a significant difference ($P<0.05$) in the three factor scores of "interpersonal relationship," "paranoid," and "psychotic" at a confidence level of 0.05.

Additionally, there were significant differences in the two factor scores of "somatizations" and "hostility" at a confidence level ($P < 0.01$) of 0.01; A comparison of the medium and small exercise groups revealed that the factor scores of the medium exercise group were generally lower than those of the small exercise group, except for the "fear" factor score, which was similar in both groups. Further analysis using a T test indicated that there was no statistically significant difference between the nine factor scores of the two groups ($P > 0.05$); Upon comparing the factors of the large exercise group and the small exercise group, it was observed that the factor score for "compulsive symptoms" in the large exercise group was lower than that in the small exercise group. Additionally, the factor scores for the other eight factors were slightly higher in the large exercise group compared to the small exercise group. Further analysis using a T-test revealed that, except for the "hostility" factor score, which showed a significant difference ($P<0.05$), the differences in the scores for the other eight factors were not significant ($P<0.05$).

Overall, there is no statistically significant difference in the mean scores among the three groups. The medium exercise group received the lowest average score, while the large exercise group and the small exercise group both received the highest average scores. The findings indicate that the moderate exercise group exhibits the highest level of mental health, whereas the small and large exercise groups demonstrate comparatively lower levels. This conclusion is connected to the conclusions drawn in previous research: Moderate-intensity exercise is more efficacious than high-intensity exercise in enhancing mood, essentially yielding similar outcomes. College students are advised to engage in suitable physical exercise to enhance their psychological well-being and refine their aesthetic preferences. However, excessive, and prolonged exercise can lead to fatigue and monotony, which not only hinder emotional benefits but also pose a risk to emotional well-being. This physical strain can negatively impact mental health and potentially result in severe mental illness. Insufficient exercise and the limited impact of physical activity on mental well-being are observed.

(3) Comparison of mental health level of college students in different time periods and with or without fixed time exercise

College students have varying daily routines and schedules, which consequently affect the time they allocate for physical exercise. The timing of physical exercise and adherence to a fixed schedule can impact the biological rhythm of college students. The timing of exercise and its

consistency may influence the mental well-being of college students. Hence, the author has conducted a comparative analysis.

1) Comparison of mental health level among college students who take physical exercise at different time periods

The researcher examined the duration of physical exercise among college students in the local area (see Table 5). The table presents data on the number of individuals engaging in exercise during the morning, afternoon, and evening periods, along with the average scores for nine factors and the overall average score. Based on the provided data, it is evident that the factor scores of college students who exercise in the afternoon are lower compared to those who exercise in the morning. The T-test indicated no significant difference in the five-factor scores (somatization, obsessive-compulsive symptoms, interpersonal relationships, fear, and psychosis) between the morning and afternoon groups (P>0.05), statistically significant differences were observed between the factors of "depression" and "paranoia" at a confidence level of 0.05 (P<0.05).

Additionally, significant differences were found between the factors of "anxiety" and "hostility" at a confidence level of 0.01 (P<0.01). The somatization factor score is slightly higher in the evening group compared to the morning group, while the other eight factor scores are slightly lower in the evening group compared to the morning group. A t-test was conducted to examine the differences among the nine factors. Results indicated a significant difference between the two groups for all factors except the "hostile" factor (P<0.01). No significant differences were found for the remaining eight factors (P > 0.05). Lastly, a comparison between the afternoon and evening groups will be discussed. The evening group exhibits higher scores in all nine factors compared to the afternoon group. There were statistically significant differences observed between the factors of "interpersonal relationship" and "paranoia" (P<0.05), while no significant differences were found in the remaining seven factors.

Table 5

Comparison of Mental Health Level of College Students at Different Sports Time.

Divisor	Morning		Afternoon		Evening		P_1	P_2	P_3
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD			
Somatization	1.48	0.40	1.46	0.40	1.50	0.42	>0.05	>0.05	>0.05
Obsessive-Compulsive Symptoms	2.04	0.64	1.92	0.48	2.02	0.64	>0.05	>0.05	>0.05
Interpersonal Relationship	1.92	0.67	1.77	0.53	1.91	0.54	>0.05	>0.05	＜0.05*
Depressed	1.77	0.57	1.60	0.44	1.72	0.48	＜0.05*	>0.05	>0.05
Anxious	1.70	0.45	1.51	0.44	1.62	0.44	＜0.01**	>0.05	>0.05
Hostile	1.96	0.90	1.62	0.54	1.66	0.53	＜0.01**	＜0.01**	>0.05
Fear	1.50	0.41	1.44	0.41	1.46	0.41	>0.05	>0.05	>0.05
Paranoia	1.75	0.56	1.60	0.47	1.72	0.50	＜0.05*	>0.05	＜0.05*
Psychopathic	1.63	0.46	1.51	0.48	1.58	0.41	>0.05	>0.05	>0.05
Total Average Score	1.75	0.56	1.60	0.46	1.70	0.48	＜0.05*	>0.05	>0.05

Note: P1 examines the contrast between morning and afternoon, P2 explores the distinction between morning and evening, and P3 analyses the comparison between afternoon and evening.

The average scores for the morning, afternoon, and evening groups were 1.75, 1.60, and 1.70, respectively. Following the morning and evening, the afternoon has the lowest score. The t-test revealed a significant difference in the mean scores between the morning and afternoon groups (P<0.05). However, there was no significant difference observed between the morning and evening groups (P > 0.05), as well as between the afternoon and evening groups (P > 0.05). This study demonstrates that college students who engage in physical exercise during the afternoon exhibit the highest levels of mental well-being, with those who exercise in the evening and morning following closely behind. The specific reason is ominous. The author posits a potential correlation with sleep. Research conducted both domestically and internationally has shown that individuals who engage in physical exercise in the morning experience similar sleep patterns at night compared to those who do not exercise. Additionally, engaging in moderate-intensity exercise 90 or 60 minutes before bedtime can potentially reduce anxiety, improve body temperature regulation, and promote better sleep. However, it is important to note that individual responses to exercise and its effects on sleep may vary. Horne (1981) found that physical exercise specifically enhances slow-wave sleep in individuals who exercise regularly. The timing and nature of daily physical activity may play a crucial role in regulating exercise-induced changes in sleep patterns.

2) Comparison of mental health level among college students with or without regular exercise

The study revealed that the somatization factor score in the fixed-time group was slightly higher compared to the non-fixed-time group. Additionally, the other eight factor scores and the overall average score were lower in the fixed time group compared to the non-fixed time group. The T-test revealed significant differences ($P<0.05$) in the scores of "obsessive-compulsive symptoms" and "interpersonal relationships" between the two groups. However, no significant differences were found in the other seven factors: "somatization", "depression", "anxiety", "hostility", "fear", "paranoia", and "psychotic" ($P>0.05$). There is no substantial disparity in the overall mean score, suggesting that the eight factor scores of the fixed time group are lower than those of the non-fixed time group. However, the mental health level remains unchanged.

The author advocates encouraging college students to engage in regular physical exercise, as it fosters the formation of consistent exercise routines and promotes long-term adherence, hence enhancing mental well-being. Empirical evidence indicates that: The human brain cortex serves as the primary regulatory organ for a range of physiological activities in the human body. Its fundamental mode of operation is conditioned reflex, wherein individuals develop favourable conditioned reflexes through regular engagement in specific activities over an extended period. This phenomenon is commonly referred to as "dynamic stereotyping." Once a rule is established, it will possess predictability and adaptability, which are essential for maintaining physical health, enhancing work efficiency, and promoting sustained energy levels throughout the day while reducing susceptibility to illness. Disrupting one's habitual lifestyle can lead to alterations in hormone secretion, which can have implications for both mental well-being and physical health. In severe cases, such disruptions may even contribute to the development of diseases or mortality (Niazov et al., 2022).

Discussion

Discussion on the Relationship Between Sports Training and Learning Pressure

This study discovered that sports training has a positive impact on alleviating academic stress among college students. Students who engaged in sports training experienced significant reductions in various types of learning pressure, including competitive learning pressure, frustration learning pressure, task requirement learning pressure, expected learning pressure, and self-development learning pressure, as compared to students who did not participate in sports training.

The author discovered that there is an interaction between sports type and training in relation to competitive learning pressure. Specifically, students who are interested in ball games and track and field sports experience a significant reduction in competitive learning pressure after participating in sports training. This is because students who engage in sports training do not swim, and swimming lacks the element of controlled training. The competitive learning pressure that students experience depends on their gender, the type of sports they play, and their participation in training. Specifically, in the case of track and field sports, female students who do not undergo training experience less competitive learning pressure compared to male students.

However, in other types of sports, there is no significant difference in competitive learning pressure between genders. The expected learning pressure varies based on the type of sport and training. Students who prefer ball games and track and field sports anticipate a significant reduction in learning pressure during the later stages of sports training. This is because students engaged in sports training do not participate in swimming, which lacks the ability to control the intensity of training. The relationship between sports type and training has an impact on learning pressure. Students who are interested in ball games and track and field sports experience a significant reduction in learning pressure after engaging in sports training. This is because students who participate in sports training do not swim, as swimming lacks sufficient training or is not as effective in reducing learning pressure (Kirchebner et al., 2022).

Effects of Physical Exercise on Mental Health of College Students

Physical exercise is a traditional method used to enhance students' physical well-being. It encourages students to engage in real-world activities, fostering solidarity and cooperation. Additionally, physical exercise promotes self-identity and self-confidence and alleviates physical and mental stress. Consequently, it contributes to students' psychological development and overall mental health.

(1) Promote students' willpower.

Physical exercise is a gradual process that requires long-term commitment and persistence. College students should prioritise developing their willpower and cultivating good habits of participation in various exercise programmes to achieve different fitness goals, for example, rapid movement in Physical activity can enhance college students' perception of changes in their surroundings and develop their ability to react and make quick judgements. Additionally, participating in exercise activities can further increase students' enthusiasm to engage in physical activity, creating a positive cycle that promotes the

development of a persistent, positive, and healthy state (Salas-Pilco et al., 2022).

(2) Helps to achieve intellectual growth.

Participating in physical exercise can enhance blood circulation, particularly in brain tissue, leading to improved oxygen absorption and facilitating the brain's building function. Physical exercise can stimulate cerebral cortex cells and enhance the flexibility of bioelectricity generated during exercise, thereby indirectly strengthening the cerebral nervous system. Additionally, physical exercise involves various skills and knowledge, and integrating these with body movements promotes coordination and enhances brain intelligence in students. Engaging in physical exercise can enhance students' ability to concentrate on the activity, minimise external distractions, and effectively enhance problem-solving skills. Consequently, this can lead to improvements in both cognitive and non-cognitive domains. Furthermore, the enhancement of non-cognitive skills is crucial in assisting students to cultivate emotional stability, optimism, and active concentration.

(3) Realize the improvement of interpersonal relationship

Physical exercise has the potential to enhance both the physical and mental well-being of students. Additionally, as a social activity, it can facilitate social interaction and aid in the development of interpersonal skills among students. Physical exercise is commonly performed in groups, allowing students to engage in communication, cooperation, and friendly competition. Moreover, physical exercise requires adherence to specific rules and regulations. Students engaging in physical activities must comply with activity norms, regulate their behaviour and habits, and engage in effective communication during exercise. Through gradual development, students internalise these normal behaviour patterns, enhance their psychological adaptability, and facilitate the establishment of positive interpersonal relationships.

College students experience significant academic pressure. Junior college students experience the highest level of academic stress. Girls experience greater academic pressure compared to boys in relation to gender. Track and field sports impose the greatest academic demands on students, followed by ball games and swimming, in terms of sports preferences. Students who engage in exercise once a week or less experience the highest levels of academic stress. The author conducted an intervention experiment on sports training and observed a positive impact on reducing the level of learning pressure among college students. Students who engaged in sports training experienced significant reductions in various types of learning pressure, including competitive learning pressure, frustration learning pressure, task requirement learning pressure, expected learning pressure, and self-development learning pressure, when compared to students who did not participate in sports training (Bist et al., 2022).

Conclusion

This study provides empirical evidence that sports significantly influence the academic pressure experienced by college students. Engaging in sports activities has been found to effectively alleviate academic pressure. Furthermore, it is recommended that students participate in sports activities at least three times a week, as this frequency is associated with lower levels of academic pressure among students. Junior students who engage in sports training experience lower levels of academic pressure and expectations, particularly in terms of frustration, compared to their counterparts who do not participate in sports training. Universities should prioritise students' sports training and utilise it to alleviate academic pressure, thereby fostering the enhancement of students' mental well-being.

There are notable variations in individual factors among college students who engage in different levels of exercise, but there is no statistically significant difference in the overall average score. The author conducted a comparison of the mental health levels of college students who engaged in physical exercise at different times of the day. The study revealed differences in the mental health status of students who exercised in the morning versus those who exercised in the afternoon. However, no significant difference was observed in the mental health status of students who exercised at fixed times versus those who did not. College students undergo ongoing physical and mental transformations. Physical education is essential for promoting the holistic development of college students, benefiting their physical and mental health. Schools should harness the enthusiasm of college students to engage in sports activities and prioritise their mental well-being. By leveraging various resources, schools should encourage students to participate in sports, aiming to enhance their physical and psychological well-being. This approach can foster resilience and endurance and promote the holistic development of students' physical and mental health. To enhance the overall well-being of college students, it is important to investigate the impact of physical activities on the treatment of mental illnesses and address the prevalent issue of suboptimal health. By incorporating physical activities into their routines, we can facilitate the development and improvement of college students.

References

Bist, A. S., Rawat, B., Rahardja, U., Aini, Q., & Prawiyogi, A. G. (2022). An Exhaustive Analysis of Stress on Faculty Members Engaged in Higher Education. *IAIC Transactions on Sustainable Digital Innovation (ITSDI), 3*(2), 126-135. https://doi.org/10.34306/itsdi.v3i2.533

Giménez-Meseguer, J., & Tortosa-Martínez, J. (2021). The influence of physical condition on mental health and quality of life in patients with drug dependence. *Journal of Addictions Nursing, 32*(1), 32-38. https://doi.org/10.1097/JAN.0000000000000383

Kirchebner, J., Sonnweber, M., Nater, U. M., Günther, M., & Lau, S. (2022). Stress, schizophrenia, and violence: a machine learning approach. *Journal of Interpersonal Violence, 37*(1-2), 602-622. https://doi.org/10.1177/0886260520913641

Li, Y. (2021). College Students'physical and Mental Health Exercise Based on Tennis. *Revista Brasileira de Medicina do Esporte, 27*, 14-16. https://www.cabidigitallibrary.org/doi/full/10.5555/20210078655

Nadareishvili, I., Syunyakov, T., Smirnova, D., Sinauridze, A., Tskitishvili, A., Tskitishvili, A., Zhulina, A., Patsali, M. E., Manafis, A., & Fountoulakis, N. K. (2022). University students' mental health amidst the COVID-19 pandemic in Georgia. *International Journal of Social Psychiatry, 68*(5), 1036-1046. https://doi.org/10.1177/00207640221099420

Nelekar, S., Abdulrahman, A., Gupta, M., & Richards, D. (2022). Effectiveness of embodied conversational agents for managing academic stress at an Indian University (ARU) during COVID-19. *British Journal of Educational Technology, 53*(3), 491-511. https://doi.org/10.1111/bjet.13174

Niazov, Z., Hen, M., & Ferrari, J. R. (2022). Online and academic procrastination in students with learning disabilities: the impact of academic stress and self-efficacy. *Psychological Reports, 125*(2), 890-912. https://doi.org/10.1177/0033294120988113

O'Connor, J., Lindsay, K., Baker, C., Kirby, J., Hutchins, A., & Harris, M. (2022). The impact of ashwagandha on stress, sleep quality, and food cravings in college students: Quantitative analysis of a double-blind randomized control trial. *Journal of Medicinal Food, 25*(12), 1086-1094. https://doi.org/10.1089/jmf.2022.0040

Olfert, M. D., Wattick, R. A., Saurborn, E. G., & Hagedorn, R. L. (2022). Impact of COVID-19 on college student diet quality and physical activity. *Nutrition and Health, 28*(4), 721-731. https://doi.org/10.1177/02601060221086772

Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student engagement in online learning in Latin American higher education during the COVID-19 pandemic: A systematic review. *British Journal of Educational Technology, 53*(3), 593-619. https://doi.org/10.1111/bjet.13190