

# The Influence of Physical Exercise Behaviour on College Students' Mental Health

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## Abstract

This paper provides a comprehensive analysis of the current status of college students' mental health and the impact of physical exercise on their psychological well-being, covering various aspects including research quantity, research subjects, research methodology, research depth, and the underlying principles of sports intervention. The findings underscore the significant association between physical exercise and the modulation of college students' mental states, particularly in alleviating the stress induced by academic pressures. With the aim of investigating the determinants of college students' mental health, the author sought to examine the influence of physical exercise behaviour on their psychological well-being. A questionnaire survey was conducted among 730 undergraduate students from the 2021 cohort across eight conventional universities within a province. The participants comprised 400 males and 330 females, aged between 19 and 23 years. Regular physical exercise was operationally defined as engaging in physical activities more than three times per week, with a subset of 380 individuals (212 males and 168 females) exercising for durations exceeding 40 minutes each session. The study conducted an extensive literature review, consulting over 30 domestic and international sports and psychological journals to gather comprehensive and accurate background information. To assess the mental health profiles and attributes of the participants, the SCL-90 scale, a widely recognized general mental health questionnaire, was administered. Utilizing a combination of literature review, questionnaire administration, experimental inquiry, and mathematical statistical analysis, the author systematically examined the mental health status and physical exercise habits among college students within the province. The findings indicated an enhancement in adaptability, tolerance, self-control, cognitive abilities, social interaction skills, and overall well-being among the fifty subjects assessed across six dimensions of rehabilitation. By comparing these six indicators before and after the experiment, discernible improvements were observed, suggesting that engaging in physical activity significantly contributes to the enhancement of self-assessment across these dimensions. This underscores the pivotal role of physical exercise in fostering mental health improvement. There exists a significant correlation between physical exercise and the modulation of college students' psychological condition, with a positive impact on mitigating the psychological stress stemming from academic responsibilities. Consistent engagement in moderate physical exercise over the long term contributes to the enhancement of college students' mental well-being. Sustained participation in moderate-intensity physical activities yields beneficial effects on the enhancement of college students' mental health status.

**Keywords:** Physical Exercise, Mental Health, College Students, Exercise Behaviour.

## Introduction

An individual's robust mental health is often associated with high performance across various domains (Rosenfield et al., 2013). Due to their diverse social backgrounds and cultural contexts, college students are frequently confronted with a multitude of psychological challenges (Hicks et al., 2008). Research indicates that a significant portion of college students experience varying degrees of mental health issues, with conditions such as mental illnesses and psychological disorders emerging as significant factors contributing to academic interruptions, including dropout rates and even instances of suicide among students (Hicks et al., 2008; Pedrelli et al., 2015). Consequently, the mental well-being of

college students has garnered considerable attention within psychology and education circles (Bullock et al., 2022). Health stands as the fundamental prerequisite and primary objective of educational institutions, with schools serving as ideal platforms for health promotion efforts (Dunne et al., 2006). The overarching goal of school health education is to instil in students a comprehensive understanding of health, foster health-promoting behaviours, encourage well-being, and establish a foundation for lifelong health maintenance. Addressing college students' health concerns necessitates a multifaceted approach involving medical oversight, moral and ideological guidance, mental health support systems, conducive campus environments fostering psychological wellness, and education within both social and familial

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contexts (Pedrelli et al., 2015).

Among these interventions, the impact of sports on college students' health is particularly noteworthy and irreplaceable by alternative methods (Congsheng et al., 2022; Shen et al., 2021). One of the primary objectives of university sports programs is to instil in students healthy exercise and lifestyle habits, facilitating holistic development of body and mind to enhance social adaptability. The accumulating body of research on the influence of physical activity on college students' mental health has led the academic community to recognize physical activity as a paramount strategy for enhancing students' mental well-being (DeJonge et al., 2021). Regular physical activity not only bolsters physical health but also fortifies the body's resilience against illness while regulating and fostering positive mental states. At its core, health represents a comprehensive state encompassing both physical and mental well-being, as defined by the World

Health Organization (WHO) (Organization, 2014). Mental health, therefore, constitutes a vital component of overall health (Sturgeon, 2006). As a demographic with heightened cultural awareness, the physical and mental well-being, as well as the holistic development, of college students bear significant implications for the nation's future trajectory. However, the current landscape of college students' mental health presents concerns, warranting special attention from educational institutions, families, and society at large. Consequently, health promotion efforts within educational settings, including comprehensive health education initiatives, remain imperative (Pulimeno et al., 2020; Rossen et al., 2014). The investigation conducted by the author, as depicted in Figure 1, delves into the influence of physical exercise behaviour on college students' mental health to discern the factors shaping college students' mental well-being.

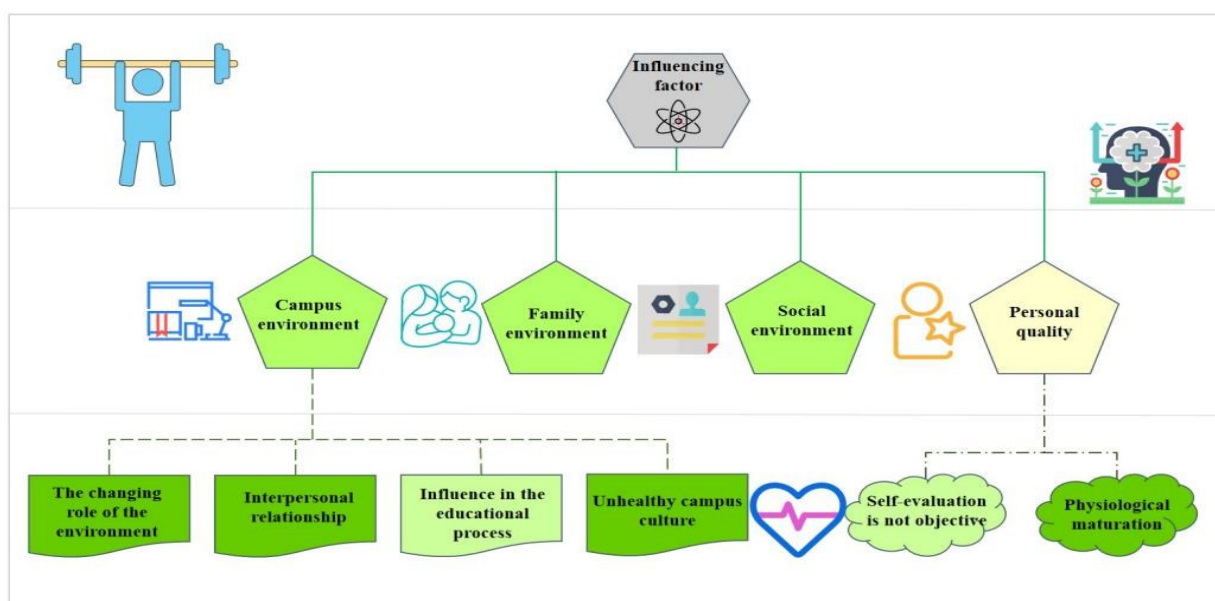


Figure 1: College Students' Mental Health.

The study holds significance as it illuminates the critical relationship between physical exercise behaviour and the mental health of college students. By delving into the factors influencing students' mental well-being, the study offers valuable insights into potential strategies and interventions to bolster and enrich their mental health. Understanding the role of physical exercise in fostering positive mental health outcomes can guide the development of tailored programs and initiatives within educational institutions aimed at enhancing students' overall well-being. Furthermore, the research findings have the potential to contribute to the expanding body of knowledge on mental health within college environments and may also inform policies and practices geared towards prioritizing students' mental well-being. The research was structured into five chapters, encompassing an introduction, literature review, research methods, research findings,

discussion of findings, and future recommendations.

## Literature Review

Inglis, a scholar from abroad, posits that "mental health represents a continuous psychological state wherein the individual exhibits good adaptability and vitality, fully tapping into their physical and mental potential (Inglis et al., 2023)." Another academic, Maillinger, suggests that a mentally healthy individual should maintain a calm disposition, sharp intellect, socially appropriate conduct, and pleasant demeanour. Although influenced by social context, regional culture, and national identity, individuals with sound mental health generally exhibit characteristics such as normal intelligence, emotional stability, behavioural coherence, interpersonal adaptability, moderate responsiveness, and age-appropriate

psychological traits. Data from a survey conducted by the State Education Commission indicate that by the conclusion of 1997, over 24 percent of college students were afflicted with mental disorders. Moreover, according to a sampling survey of 16 undergraduate institutions conducted by relevant authorities in Beijing, in recent years, 37.9 percent of students suspended their studies due to mental health issues, while 64.4 percent dropped out for similar reasons, both figures ranking highest. The Shanghai Institute of Mental Health reports that China is home to 10 million individuals with mental illnesses, with hundreds of millions more grappling with mental disorders or experiencing severe psychological distress. These statistics underscore the escalating severity of mental health issues, particularly among college students.

Traditionally, health was primarily associated with the absence of physical ailments, with scant attention paid to mental or emotional well-being. However, in the age of electronic information, inundated with a deluge of complex and superfluous data, individuals face immense pressure on their senses and cognition. The rapid pace of daily life exacerbates emotional challenges, with mounting stress impelling individuals forward relentlessly, leaving both body and mind vulnerable to afflictions. Increased awareness of mental health has been prompted by reports indicating that college students are disproportionately affected by mental illnesses. Consequently, mental health education has become integral to their academic training. Psychological disorders not only influence an individual's psychological state and daily functioning but can also induce pathological changes in bodily processes, leading to physical ailments. Moreover, mental health impacts various facets of life; college students grappling with mental health issues may lose confidence in their academic pursuits and personal lives, potentially leading to feelings of inferiority, introversion, and impaired communication skills. Only those with sound mental health can navigate the challenges of a rich and demanding college experience, fostering personal growth and charting their future trajectory. Given the pivotal role that college students' physical and mental well-being, as well as their overall development, play in national progress, the current state of their mental health demands urgent attention from educational institutions, families, and society at large. Building upon existing scholarship, this paper aims to review the literature on the influence of physical exercise on college students' mental health, identifying prevalent issues in this domain and proposing relevant recommendations.

### **Current Situation of Physical Exercise and Mental Health of College Students**

#### **Many College Students Lack Physical Exercise**

According to pertinent surveys, it is evident that a substantial portion of college students currently exhibit suboptimal levels

of engagement in physical exercise. Many students have yet to establish a consistent regimen of regular physical activity, opting instead to either remain sedentary in their dormitories or sporadically utilize campus sports facilities during leisure time. Despite the availability of well-equipped sports venues provided by numerous universities for students' complimentary use, the demanding schedules characteristic of college life often result in prolonged periods of sedentariness during classes and study sessions, thereby subjecting students to considerable physical strain. While engaging in regular sports activities on a daily or weekly basis can effectively alleviate both mental and physical stress, the fatigue induced by rigorous academic pursuits often deters students from actively participating in sports. Furthermore, some students approach sports endeavours with a superficial mindset, lacking the requisite commitment to sustain long-term engagement, ultimately leading to discontinuation after brief periods of trial. Consequently, these sporadic and superficial engagements with sports fail to yield significant benefits for mental health.

#### **Lack of Rationality of Physical Training Methods**

To incentivize students to engage in physical exercise, numerous colleges and universities have integrated such activities into students' academic assessments, thereby implementing a daily attendance system. This practice has proven beneficial for enhancing the physical fitness of certain students through regular exercise, with some even developing a genuine passion for sports as a result of compulsory daily training. While this approach yields positive outcomes for both physical and mental well-being, it is essential to recognize that not all students are equally inclined towards the same sports activities. Some students may exhibit resistance towards obligatory participation in daily routines such as clocking in or running, finding little enjoyment in such pursuits and potentially risking injury due to inadequate training methods. Moreover, the lack of awareness regarding scientifically sound exercise methods among students poses a significant concern. Prolonged adherence to incorrect exercise techniques may lead to cumulative strain on the body, resulting in long-term physical repercussions. For instance, maintaining an improper running posture can precipitate knee injuries and irreversible damage, undermining the future physical and mental health of students (Haojun, 2022).

#### **Many College Students Have Mental Health Issues**

Presently, psychological challenges pervade numerous colleges and universities, with mental health emerging as a salient concern among young individuals. The rapid societal evolution has engendered heightened pressures for today's youth, characterized by soaring housing costs, congested transportation systems, exacerbated employment prospects

amid the pandemic, and the arduousness of academic pursuits. These myriad stressors often leave college students feeling overwhelmed and adrift. Moreover, the university milieu, while offering relative autonomy, can also present unfamiliar terrain for some students, who may lack the guidance and structure traditionally provided by educators. In the absence of mentorship, students may succumb to temptation, grappling with weakened resolve and emotional turmoil. Furthermore, some parents may fail to grasp the magnitude of challenges facing college students, opting to impose undue pressure rather than offering unconditional support and encouragement, thereby exacerbating the disconnect between parents and their children. Additionally, interpersonal conflicts and dormitory friction can compound psychological distress among students, often without adequate time or avenues for resolution. In the absence of effective coping mechanisms, students may experience self-doubt, disillusionment, and even existential despair, precipitating the onset of psychological disorders (Li et al., 2021).

#### **Positive Effects of Physical Exercise on Mental Health**

Engagement in sports constitutes a proactive and beneficial endeavour wherein participants are required to focus their attention and engage in conscious processes of perception (observation), memory, cognition, and imagination. Consequently, consistent involvement in sports activities can yield enhancements in the central nervous system, augmenting both excitatory and inhibitory functions of the cerebral cortex. This fosters a more efficient interplay between excitatory and inhibitory processes within the nervous system, thereby bolstering the equilibrium and precision of cortical nervous system functions. Moreover, such participation fosters the refinement of human perceptual faculties, enhancing the brain's adaptability, coordination, and reaction times in cognitive processes. Regular engagement in fitness pursuits further refines individuals' proprioception, vestibular sense, tactile acuity, velocity, and altitude perception, consequently fortifying the resilience of brain cells to cognitive demands (Escobar-Roldan et al., 2021).

#### **Proper Physical Exercise Can Help College Students Stabilize Their Mood**

Clinical investigations have substantiated that sustained engagement in regular physical activity over the long term can exert a positive impact on both physical and mental well-being (Mikkelsen et al., 2017). On one hand, physical exercise facilitates enhanced blood circulation throughout the body, fosters brain growth, maintains equilibrium in the development of the nervous system, alleviates internal bodily tension, and promotes detoxification, thereby fostering overall physical health. Presently, numerous college students

contend with various health issues stemming from prolonged periods of sitting and late-night study sessions, including conditions such as cervical spondylosis, headaches, and lower back pain. Engaging in regular physical activity can mitigate the strain on the cervical and lumbar spine induced by prolonged sitting and head-leaning postures, consequently reducing students' discomfort. On the other hand, physical exercise offers avenues for college students to regulate their emotions effectively. For instance, pent-up emotions can find expression through unrestricted running on the track, while boys may find emotional release through perspiration-inducing basketball sessions. Similarly, girls can alleviate fatigue and attain inner calmness by engaging in badminton or volleyball matches.

#### **College Students Can Cultivate Perseverance in The Process of Physical Exercise**

In order to attain enduring fulfilment through sports, it is imperative for college students to maintain persistence, as this journey serves as a test of their determination. Initially, students who favour running may find themselves short of breath after completing a kilometre. However, with sustained effort over time, they can effortlessly cover three thousand meters, experiencing a sense of accomplishment that motivates them to pursue loftier objectives. As they progress to completing a 5000-meter run, students discover the resilience and fortitude within themselves. Overcoming each obstacle requires not only courage but also incremental perseverance. This process of fortifying one's willpower enhances students' self-assurance, which can be channelled into their academic and personal pursuits, fostering the ability to persist in endeavours and attain superior scholastic accomplishments (Argao et al., 2021).

#### **Physical Exercise Can Help College Students Better Understand Themselves**

The determination of suitable sports training for students necessitates their continuous exploration through trial and error. This process not only facilitates self-discovery but also self-recognition. While some students may perceive themselves as lacking prowess in running, they might excel in ball games. Conversely, others may derive happiness and exhilaration from the act of running and sprinting, feeling a sense of youthful vigour and vitality. Still, others may engage in jogging as a means to contemplate their daily studies and life. Through the exploration of diverse sporting activities, college students can gain a deeper understanding of their physical capabilities, endurance thresholds, and preferences in sports. Moreover, this exploration enables students to identify effective strategies for mental relaxation and emotional release in times of difficulty, thereby equipping them with invaluable tools for making informed choices in

their future academic and professional endeavours.

### **Physical Exercise Contributes to Good Health**

Ultimately, there is widespread consensus regarding the beneficial effects of physical exercise on the health of college students (Keating et al., 2005). Currently, it is commonplace for young individuals to experience various health issues, ranging from mild to severe conditions such as excessive nutrition, weakened immunity, chronic ailments, and even sudden death due to late-night activities. While societal pressures undoubtedly contribute to these health challenges, it is imperative to also address the vulnerable physical state of the youth population. This imperative extends beyond college students to encompass high school students and recent graduates entering the workforce. Cultivating a habit of engaging in regular physical exercise can serve as a preventive measure against diseases, bolster immune function, and inadvertently facilitate weight management and body shaping among young individuals. A robust physique not only alleviates the burden of stress for students but also augments their prospects for future career endeavours. Therefore, prioritizing physical fitness through regular exercise emerges as a prudent choice for young individuals (Li et al., 2009).

### **A Driving Force Behind the Promotion of Improvement of Psychological Health Being Conflict Between Increasing Demands of Sports and Initial Psychological Level**

Sports entail distinctive components and formats compared to conventional physical activities undertaken outdoors (Kirk, 2009; Schempp, 2003). Consequently, proficiency in sports necessitates more than what the foundational psychological level can furnish. Students must exhibit adeptness in attention allocation and possess commendable moral attributes such as courage, determination, self-discipline, resilience in the face of challenges, as well as fostering positive and constructive sentiments like optimism, camaraderie, joy, and solidarity. For instance, in a game of football, players must discern the positions of their teammates and adversaries, meticulously attend to various aspects, and manoeuvre the ball not only swiftly but also evasively to avoid interception. However, the aforementioned requisites of athletic competition and acquisition transcend the scope of ordinary psychological capacities. Through consistent triumphs in sports competitions, students may gradually elevate their initial psychological thresholds, indicating that the juxtaposition between the newfound demands of sports and the rudimentary psychological level may spur mental development (Jin et al., 2021).

### **Sports Can Enhance the Harmonious Interpersonal Relationship of College Students**

Sports can facilitate the establishment and enhancement of interpersonal relationships. The accelerated pace of urban life

and the expansion of social economies have led many city dwellers to experience a deficiency in meaningful social connections, resulting in mundane interpersonal interactions. Consequently, sports have emerged as an optimal avenue for fostering human connections. Engaging in sports activities fosters a sense of closeness among individuals, catering to the inherent need for social interaction. This involvement in sports not only satisfies individual social needs but also diversifies and enriches one's lifestyle, providing respite from the burdens of work and life and alleviating mental stress and loneliness.

### **Sports Can Promote the Intellectual Development of College Students**

Sports constitute a vigorous and dynamic pursuit, demanding adept management of cognitive faculties such as focus, conscious perception (observation), recollection, thought, and imagination. Consistent engagement in sports activities may foster the alternation between excitability and inhibition of the nervous system, augment the excitability and inhibition of the cerebral cortex, and refine the balance and precision of the cerebral cortex nervous system. Moreover, it can stimulate the development of bodily perception, thereby enhancing flexibility, coordination, and reaction time. Regular physical exercise further heightens an individual's proprioception, neutral sensation, tactile acuity, speed, and spatial accuracy, consequently bolstering their capacity to withstand mental exertion.

## **Methodology**

### **Research Object**

A total of 730 undergraduates from the 2021 cohort across eight conventional universities within a province were enlisted for participation in a comprehensive questionnaire survey, comprising 400 male and 330 female respondents aged between 19 to 23 years old. Regular engagement in physical exercise was operationally defined as involvement in physical activities exceeding three sessions per week, with a subset of 380 individuals (212 men and 168 women) adhering to this criterion by dedicating over 40 minutes per session. Furthermore, as part of the investigation into the impact of physical exercise on college students' mental health, a cohort of 50 students exhibiting discernible psychological impediments was selected to partake in an 8-week exercise intervention. The author employed a multifaceted approach encompassing literature review, questionnaire administration, experimental inquiry, and statistical analysis to scrutinize the nexus between mental health status and physical exercise participation among college students within the province.

### **Research Methods**

1 Comprehensive Review of Literature: The author conducted an exhaustive examination of over 30 domestic and

international sports and psychological journals, thereby sourcing intricate and precise data essential for the research endeavour.

2 Questionnaire Administration: The mental health status and attributes of the participants were evaluated utilizing the Symptom Checklist-90 (SCL-90) scale, a widely employed mental health assessment tool utilized both domestically and abroad. This scale comprises 80 inquiries spanning nine distinct symptom categories encompassing somatization, obsessive-compulsive tendencies, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Each item is rated on a five-point scale ranging from 0 to 4, signifying varying degrees of symptom severity, ranging from none to severe. With validity coefficients falling between 0.77 and 0.90, the scale demonstrates high reliability and validity in its evaluation. Furthermore, the author also implemented the Physical Activity Rating Scale-3 (PARS-3), originally developed by Japanese psychologist Takeo Hashimoto and subsequently revised by the Department of Sports Psychology at the Institute of Physical Education. The PARS-3 was utilized to assess and classify the participants' level and extent of physical activity engagement over the course of one year, with intensity, duration, and frequency of participation forming the basis for the assessment. The total exercise amount is computed as the product of intensity, time, and frequency, with scores ranging from 0 to 100 (Dolynniy, 2021).

Simultaneously, a comprehensive examination of students was conducted using conventional physical exercise methodologies. A total of 760 questionnaire sets were disseminated, resulting in the retention of 730 sets post-elimination of erroneous submissions, achieving an effective recovery rate of 94%.

3 Experiment: Fifty students across three distinct cohorts

exhibiting symptoms of depression, anxiety, and interpersonal sensitivity as identified by the SCL-90 were selected. They were subsequently randomly allocated to four separate physical training groups, with each group engaging in daily exercise sessions lasting 40-50 minutes over an 8-week period. Prior to the commencement of the experiment, a questionnaire was administered to assess six self-evaluation metrics encompassing adaptability, tolerance, control, attention, social communication proficiency, and resilience among the 50 participants, serving as evaluation criteria. Subsequently, following the 8-week intervention, participants underwent psychological assessments and completed additional questionnaires.

4 Mathematical Statistics: The entirety of the data underwent processing utilizing SPSS 10.0 software, followed by the application of analysis of variance (ANOVA) for statistical analysis.

## Results and Discussion

Table 1 presents a comparison of the mental health levels among individuals who frequently engage in physical exercise with national norms, typical colleges, and those with irregular physical activity. Among the 380 college students who engage in physical exercise regularly (defined as  $\geq 30$ min,  $\geq 3$  times/week), their "somatization" scores exceed national and college norms, suggesting enhanced somatization capacity due to physical exercise. While "anxiety and hostility" scores surpass the national norm, other factors fall below comparable indicators, particularly in contrast to typical colleges, indicating overall mental health improvement facilitated by physical exercise. Notably, the mental health levels of the 350 subjects with irregular physical exercise participation were notably inferior to their regularly active counterparts.

**Table 1**

Comparison between the test results of the regular physical exercisers and the non-regular physical exercisers in the national normal universities

Divisor	Take Regular Physical Exercise X SD		Take Part in Physical Exercise Infrequently X SD		National Norm X SD		Ordinary Colleges and Universities X SD	
	Somatization	1.25	0.51	1.36	0.48	1.12	0.47	1.13
Force	1.56	0.58	1.57	0.23	1.36	0.11	1.25	0.23
Interpersonal Relationship	1.70	0.70	1.71	0.24	1.25	0.44	1.36	0.41
Depressed	1.52	0.65	1.54	0.75	1.63	0.77	1.72	0.78
Anxious	1.24	0.36	1.23	0.39	1.61	0.32	1.53	0.96
Hostile	1.36	0.60	1.42	0.61	1.45	0.23	1.54	0.53
Terror	1.34	0.53	1.36	0.58	1.62	0.42	1.26	0.12
Paranoia	1.50	0.50	1.58	0.52	1.54	0.12	1.16	0.18
Psychopathic	1.38	0.53	1.25	0.36	1.69	0.38	1.26	0.42

The results depicted in Table 1 demonstrate significant disparities in the psychological status among college students who frequently engage in physical exercise compared to those who do not engage regularly ( $P=0.05$ ), as determined through

the F-test method. This underscores the substantial impact of regular physical exercise on enhancing the psychological well-being of college students.

### Comparison of Main 5 Symptoms of SCL-90 Scale Between Regular and Infrequent Physical Exercisers

**Table 2**

*Comparison of Main Symptoms of SCL-90 Scale Between Regular and Non-Regular Physical Exercisers*

Divisor	Regular physical exercise N=198 Factor $\geq 2$ points%		People who do not take part in physical exercise regularly N=180 Factor $\geq 2$ points%		Improvement degree R (%)
Interpersonal Relationship	19	9.0	48	26	65
Depressed	12	5.5	38	20	72
Anxious	13	6.0	40	22	72
Paranoia	14	6.5	45	24	73
Psychopathic	9	4.2	20	12	65

As illustrated in Table 2, in accordance with the design criteria of the SCL-90 scale, a score of  $\geq 2$  indicates a moderate level of adverse psychological reactions within the respective factor. Examination of Table 2 reveals that across the five primary symptoms of "interpersonal relationships, depression, anxiety, paranoia, and psychosis," the proportion of individuals scoring  $\geq 2$  points is notably lower among those who engage regularly in physical exercise compared to their inactive

counterparts. This observation indicates a significant enhancement rate exceeding 60% among regular physical exercise participants, underscoring their substantial role in fostering and regulating mental health. Moreover, this observation highlights the imperative for heightened attention to the prevailing mental health issues among college students (Chu, 2021).

### Comparison Between Physical Exercise and Mental Health of College Students

**Table 3**

*List of one-Way Anova of SCL-90 Test Results of Male College Students*

Divisor	Large Exercise Group (N=114)	Medium Exercise Group (N=83)	Small Exercise Group (N=12)	F	P
Somatization	1.36 $\pm$ 0.46	1.25 $\pm$ 0.42	1.41 $\pm$ 0.71	2.48	
Force	1.78 $\pm$ 0.58	1.56 $\pm$ 0.56	1.80 $\pm$ 0.49	1.83	
Interpersonal Relationship	1.67 $\pm$ 0.63	1.64 $\pm$ 0.36	1.78 $\pm$ 0.26	20.36	<0.05
Depressed	1.50 $\pm$ 0.62	1.35 $\pm$ 0.35	1.39 $\pm$ 0.38	16.03	<0.05
Anxious	1.60 $\pm$ 0.56	1.45 $\pm$ 0.45	1.46 $\pm$ 0.25	14.26	<0.05
Hostile	1.38 $\pm$ 0.36	1.28 $\pm$ 0.35	1.39 $\pm$ 0.37	2.36	
Terror	1.53 $\pm$ 0.42	1.54 $\pm$ 0.12	1.25 $\pm$ 0.36	38.96	<0.05
Paranoia	1.25 $\pm$ 0.36	1.36 $\pm$ 0.54	1.38 $\pm$ 0.82	5.36	<0.05
Psychopathic	1.48 $\pm$ 0.63	1.52 $\pm$ 0.26	1.56 $\pm$ 0.43	3	

Table 3 reveals notable distinctions in the SCL-90 test outcomes among male college students in the province categorized by varying levels of exercise intensity, particularly in dimensions related to interpersonal relations, depression, anxiety, phobia, and paranoia ( $P<0.05$ ). Specifically, significant disparities were observed between the high exercise and low exercise groups across interpersonal relations, depression, anxiety, and phobia, as well as paranoia ( $P<0.05$ ). Furthermore, a noteworthy contrast was evident between the moderate exercise and low exercise groups concerning interpersonal phobia and paranoia ( $P<0.05$ ).

Conversely, no significant discrepancies were observed across the nine factors between the moderate exercise and high exercise groups ( $P>0.05$ ). These findings underscore the beneficial impact of moderate to vigorous exercise regimens on the mental well-being of male college students.

Table 4 delineates the SCL-90 test outcomes among female college students categorized by varying levels of exercise volume within Zhejiang Province, as determined by one-way ANOVA. Notably, significant disparities were observed in body image, compulsive behaviour, interpersonal relationships, anxiety, and paranoia

( $P < 0.05$ ). Specifically, marked discrepancies were evident in body image, compulsive behaviour, interpersonal relationships, and anxiety between the high exercise group and both the low and moderate exercise groups ( $P < 0.05$ ). Additionally, a significant contrast was identified between the high exercise group and the low exercise group in terms

of paranoia ( $P < 0.05$ ). Conversely, no significant differences were detected across the nine factors between the moderate exercise group and the low exercise group ( $P > 0.05$ ). These findings underscore the favourable mental health impact associated with moderate to lower levels of exercise among female college students.

**Table 4**

List of one-Way Anova of SCL-90 Test Results of Female College Students

Divisor	Large Exercise Group (N=20)	Medium Exercise Group (N=58)	Small Exercise Group (N=98)	F	P
Somatization	1.25 0.45	1.25 0.42	1.42 0.73	8.47	<0.05
Force	1.43 0.37	1.56 0.56	1.70 0.42	12.25	<0.05
Interpersonal Relationship	1.36 0.25	1.64 0.36	1.73 0.23	18.38	<0.05
Depressed	1.55 0.69	1.38 0.38	1.25 0.24		1.05
Anxious	1.62 0.57	1.21 0.23	1.25 0.16	1.25	<0.05
Hostile	1.45 0.42	1.34 0.38	1.33 0.31		2.37
Terror	1.28 0.48	1.45 0.06	1.27 0.22		36.97
Paranoia	1.36 0.35	1.34 0.85	1.37 0.74	6.31	<0.05
Psychopathic	1.45 0.55	1.56 0.12	1.54 0.33		0.88

**Comparison of the Six Indicators of College Students Before and After the Experiment**

Preceding and subsequent to the experiment, a cohort comprising 60 college students exhibiting prominent

symptoms of depression, anxiety, and interpersonal sensitivity underwent assessments utilizing six indicators encompassing adaptability, tolerance, self-control, attentional capacity, social interaction proficiency, and resilience, as detailed in Table 5 (Luo et al., 2021).

**Table 5**

Comparison of the general evaluation of 6 indicators of 50 college students before and after the experiment

	Before Experiment Good,			After The Experiment Good,			Improvement Degree (%)
	Generally Bad			Generally Bad			
Adaptability	5	13	45	35	36	4	95
Tolerance	4	10	44	30	31	6	88
Control Force	3	11	46	31	30	7	81
Who is the main	1	14	44	26	30	4	94
Level Social Communication Ability	4	12	41	25	36	7	87
Comfrey	5	8	40	20	30	9	83

As depicted in Table 5, the enhancement rate among college students exhibiting deficient psychological capacities across the six categories surpasses 90% following engagement in physical exercise. This underscores the substantial impact of physical exercise in ameliorating the mental health status of college students contending with evident psychological impediments. From a theoretical perspective, individuals experiencing depression and anxiety often manifest reduced self-control, diminished concentration, and compromised work performance. Additionally, such individuals exhibit diminished adaptability and an inability to cope with heightened stress levels. Interpersonal sensitivity is marked by an aversion to social interaction and a decline in social adeptness. Furthermore, individuals grappling with

psychological issues typically experience a decline in immune function, increased susceptibility to fatigue, and diminished recuperative capabilities. The author conducted a self-assessment of 50 subjects afflicted by psychological challenges across these six dimensions and juxtaposed their assessments before and after the experiment. As illustrated in Table 5, engagement in sporting activities yields significant enhancements in self-assessment across these six dimensions. These findings underscore the pivotal role of physical exercise in enhancing mental health (El-Monshed et al., 2021). Hence, physical activity emerges as an efficacious method for enhancing the mental health of college students, playing a significant role in its management (Dishman et al., 2021; Kilpatrick et al., 2005; Maugeri et al., 2020).



## Conclusion

Through the utilization of the SCL-90 scale to assess the mental health status of college students, it was observed that 21% of participants exhibited psychological issues, notably including depression, anxiety, interpersonal sensitivity, compulsion, paranoia, among others. This underscores the potential of physical activity to positively impact mental health, as evidenced by comparing the SCL-90 scores of regularly physically active college students with national norms and those of non-participating students.

Further analysis, contrasting the five principal psychological conditions of college students engaged in regular physical training with those who are not, as indicated by an average score  $\geq 2$  on the SCL-90 scale, confirms the substantial role of physical training in ameliorating the mental health status of contemporary college students. The beneficial impact of physical exercise on mental health primarily lies in enhancing six indicators: adaptability, tolerance, control, attention level, social interaction ability, and resilience. Overall, physical activity exerts favourable psychological effects on college students by promoting non-cognitive factors associated with enhanced self-worth, responsibility, honour, and collectivism. Additionally, it fosters traits such as perseverance, determination, patience, independence, and elicits positive emotions. Engaging in physical activity also facilitates emotional well-being and stress reduction, offering avenues for self-expression and emotional release. Moreover, it nurtures positive interpersonal interactions and fosters feelings of contentment and fulfilment through skill development and achievement in sports.

In light of the preceding discussion, it is evident that sports play a pivotal role in promoting the physical and mental health of college students, aiding in stress relief, anxiety mitigation, and the cultivation of positive psychological attitudes. Thus, educational institutions can leverage sports for mental health education, encouraging active participation in sports activities and competitions to foster a healthy and uplifting campus culture and enhance students' mental well-being. Moreover, colleges and universities should intensify efforts in promoting mental health awareness and improving the environment for student engagement in physical exercise. Concurrently, further research is warranted to explore the influence of various factors such as exercise type, intensity, and duration on college students' physical and mental health. Different forms of physical exercise may exert distinct effects on psychological well-being, thus necessitating tailored approaches to promote mental health and

physical activity engagement among college students.

## Contribution and Future Directions

The study offers multifaceted contributions based on its research findings. The findings assert that regular engagement in physical activity can yield favourable outcomes for the mental health of college students. Physical exercise has been shown to mitigate stress, depression, and anxiety, enhance mood, bolster self-esteem, and improve cognitive function. By integrating physical activity into their daily routines, college students stand to benefit from enhanced overall well-being, increased resilience to stressors, and improved academic performance. Furthermore, the promotion of physical activity behaviours on college campuses can cultivate a supportive and inclusive atmosphere, fostering camaraderie and social cohesion among students. Recognizing the significance of physical exercise and its impact on mental health can spur the development of targeted interventions and initiatives aimed at promoting and facilitating regular physical activity among college students, thereby enhancing their mental well-being overall. Additionally, physical exercise may serve as a constructive outlet for managing and coping with academic and personal stressors, promoting greater flexibility and adaptability. By incorporating physical exercise into their lifestyles, college students can realize substantial enhancements in their mental health, ultimately leading to improved academic achievement, heightened productivity, and an enhanced quality of life throughout their university tenure. The study has the potential to stimulate further research in new areas, given its significant and impactful findings.

However, the study's scope is constrained by several limitations. For instance, it employed a restricted experimental research design, overlooking alternative designs such as longitudinal or cross-sectional studies that could enhance the generalizability of the research. Additionally, the study focused solely on direct influences, neglecting potential moderating, mediating, or control variables that could elucidate the relationship further. Hence, future research endeavours could explore the moderating or mediating effects to better comprehend variations in the findings. Moreover, the study utilized SPSS for data analysis, suggesting avenues for future exploration employing PLS-SEM to test complex models. Furthermore, the research was conducted in China, a developing nation with unique dynamics distinct from those of other developed nations. Therefore, future research initiatives could investigate other developed nations to discern potential disparities in the results.

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