

Research Progress on Exercise Interventions for Physical and Mental Health of Physically Disadvantaged University Students (2008-2024)

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Abstract

The growing population of physically disadvantaged students in higher education has emerged as a significant challenge for social development and physical education reform. National youth fitness surveys reveal a continuous decline in Chinese adolescents' physical constitution over recent decades, with an expanding cohort of physically vulnerable students in universities. This study focuses on the improvement of physical and mental health through exercise interventions for this population. Utilizing literature analysis methodology, we systematically examine the current status and contributing factors of physically disadvantaged university students, while reviewing research advancements in exercise-based interventions from 2008 to 2024. Through comprehensive synthesis, this paper concludes with evidence-based findings and forward-looking perspectives, aiming to delineate current research trends, identify critical issues, and provide theoretical references for developing effective exercise intervention strategies to enhance both physical fitness and psychological well-being in this special student population.

Keywords

Physically Disadvantaged University Students, Physical and Mental Health, Exercise Intervention

1. Introduction

In recent years, with the change of lifestyle and the increase of learning pressure,

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the number of students with weak physical fitness in colleges and universities has gradually increased. Due to the imperfect development of physical functions or the influence of diseases, this group of students has difficulty in achieving the conventional physical education teaching goals, and their physical fitness and health conditions are generally lower than those of ordinary students.

In order to implement the spirit of the important speeches delivered by General Secretary Xi Jinping at the National Education Conference and the Health and Wellness Conference, and meet the requirements of relevant documents such as China Education Modernization 2035 and Outline of the “Healthy China 2030” Plan, as well as in line with the introduction of the Outline of the National Fitness Program and the concept of lifelong sports, schools have attached more importance to physical education courses in their teaching work, further carried out the reform of physical education courses, and deeply promoted the concept of “Healthy China”, enabling students to recognize the importance of physical and mental health and improve the physical and mental health of students with weak physical fitness in colleges and universities through sports intervention.

Students with weak physical fitness specifically refer to those who suffer from acute or chronic diseases that are not suitable for participating in strenuous sports activities, or have defects in the function of motor organs, or are overly obese ($BMI \geq 26.5$), too thin ($BMI < 20$), or physically weak (scoring less than or equal to 59 points in the Student Physical Health Standard test). Such students may have difficulty in successfully completing the teaching goals and tasks specified in college physical education (Zhou, Liu, & Li, 2008). Physical and mental health mainly includes two aspects: physical health and mental health. The modern concept of health not only means the absence of disease or weakness in the body, but also includes the good physical, mental and social adaptation of individuals (Liu, 2016). Due to physiological and psychological reasons, students with weak physical fitness in colleges and universities lack the interest in participating in physical exercise and adopt a negative attitude towards sports activities, failing to achieve the effects of physical exercise and teaching goals, which is even more unfavorable to the coordinated development of physical and mental health. Therefore, how to effectively improve the physical and mental health of the disadvantaged groups of college students has become an urgent problem to be solved in the current society. Through the review of the research on the sports intervention for the physical and mental health of students with weak physical fitness in colleges and universities in China, this study aims to summarize the research progress in this field and put forward prospects for the existing research deficiencies.

2. Research Objectives and Significance

2.1. Research Objectives

The literature included in this review was selected through a systematic search of studies published between 2008 and 2024. The selection process considered several inclusion criteria: studies focused on exercise interventions aimed at improv-

ing the physical and mental health of university students with weak physical fitness; empirical studies, theoretical discussions, and reviews published in peer-reviewed journals; and studies addressing the unique challenges faced by this group. Research involving diverse exercise forms, such as Tai Chi, Qigong, and other low-impact activities, was prioritized due to their relevance to the student population under consideration.

This paper mainly uses the methods of literature review and logical analysis to analyze the current situation of sports participation and the causes of formation among college students with weak physical fitness, as well as the promoting effect of exercise intervention on the physical and mental health of these students. It also provides an overview of the research progress on exercise intervention for the physical and mental health of college students with weak physical fitness from 2008 to 2024, and puts forward conclusions and suggestions.

2.2. Research Significance

Since there are inherent differences between students with weak physical fitness and ordinary students, and this is a group that needs to be emphasized. It is necessary to analyze the reasons and current situation of students' weak physical fitness, understand the individual differences of these students. According to the current situation of college students with weak physical fitness, it is essential to solve the problem fundamentally. By analyzing theories and summarizing practical experience, we can rapidly improve students' physical condition and promote their physical and mental health development. Therefore, through in-depth research on the impact of exercise intervention on the improvement of the physical and mental health of the vulnerable group in college physical fitness, it can enrich and improve relevant theories, provide a scientific basis for the application of exercise intervention in this field, promote the all-round development of the physical and mental health of college students with weak physical fitness, and is of great significance for future social development.

3. Current Situation of Sports Participation among College Students with Weak Physical Fitness

The motivation of college students in the sports-vulnerable group to participate in physical exercise reflects their psychological state and sports values. It is also the subjective psychological response of this group to their sports needs (Luo, 2015). At present, the sports participation rate of college students with weak physical fitness is not optimistic. Relevant surveys and studies show that most students with weak physical fitness do not have a high interest in participating in physical exercise. Less than one-third of them actively exercise more than three times a week. For other students, physical education classes are the main form of exercise, which is passive physical exercise. They lack the awareness of physical exercise and the initiative to participate in it (Huang, 2012). These students are already at a disadvantage in terms of physical fitness. Some of them even avoid physical exercise

due to this reason. The frequency and duration of their exercise are less than those of ordinary students. The weak awareness of sports participation and the lack of the sense of obligation to participate in sports among students with weak physical fitness will ultimately lead to a vicious cycle. In many colleges and universities, the physical education courses are not taught separately for students with weak physical fitness. Instead, they are taught according to the normal teaching procedures, ignoring the physical differences of these students. In some schools, these students are even exempted from physical education courses and do not need to participate in the teaching at all. Only a few schools have carried out targeted physical fitness and health-care courses for students with weak physical fitness. The teaching content mainly involves low-intensity exercises such as Taijiquan, Baduanjin, ball-room dancing, and basic fitness training, which is closely related to the physical fitness of these students. Through exercise, it can promote the physical and mental health of students with weak physical fitness to a certain extent.

In this study, passive participation is primarily measured in several ways: First, by the frequency and initiative of student participation in physical activities. Many students engage in physical exercise only during mandatory physical education classes and do not participate in extracurricular activities, with a low frequency of exercise. Second, students' interest and motivation are key indicators of passive participation. A large proportion of students with poor physical fitness participate in physical activities solely to fulfill school requirements, rather than out of personal interest or health needs. Additionally, the types of activities they engage in are typically low-intensity exercises, which lack challenge and further reinforce passive participation. Through surveys, the study found that many students participate in physical education courses simply to meet credit requirements, rather than driven by health concerns or interest.

According to existing research and survey data, students with poor physical fitness often have lower participation rates in physical exercise. For example, the National Youth Fitness Survey shows that as of 2020, approximately 30% of university students failed to meet physical fitness standards (https://www.news.cn/politics/2023-11/24/c_1129991676.htm?utm_source=chatgpt.com).

Moreover, surveys from certain universities also reflect similar situations. For example, a physical education department head at a university reported that 40% of male students failed to pass the pull-up test, and the number of students achieving excellent scores in physical fitness tests has been declining each year (https://news.cctv.com/2023/11/24/ARTI8CG5BzYkQ0zRQD-Lot9tI231124.shtml?utm_source=chatgpt.com).

However, there is limited public data available for a direct comparison between the physical exercise participation rates of students with poor physical fitness and those of average students. Most studies focus on overall student participation in physical activities, with fewer details specifically addressing these vulnerable groups.

Therefore, future research should conduct more detailed and in-depth surveys

on students with poor physical fitness, quantifying their participation rates in physical exercise and comparing them with average students, which would provide data-driven support for developing more effective intervention measures.

4. Analysis of the Causes of College Students with Weak Physical Fitness

4.1. Insufficient Attention from the Government and Lack of Relevant Management Mechanisms

There are deficiencies in the construction of school sports policies and regulations. They are less targeted, and the guarantee of the right to sports education for students with weak physical fitness is macroscopic and general, making it difficult to implement. The reasons lie in insufficient attention, limited capital investment, and inaccurate support for the weak. This affects the educational rights and interests of students with weak physical fitness and leaves hidden dangers for the fairness of sports education (Kou, Wang, & Zhou, 2018). At present, China has not established a special education concept for the physically vulnerable group. The overall development tends to focus more on competitive sports, with relatively little investment in mass sports resources. There is even less in-depth attention to the sports needs of the physically vulnerable group. Therefore, the guarantee mechanism for students with weak physical fitness to participate in physical exercise has not been effectively implemented in terms of policies and regulations.

In addition to insufficient attention from the government and the lack of relevant management mechanisms, regional and urban-rural differences also play a significant role in shaping the physical fitness of college students. The disparities in educational resources between urban and rural areas directly affect students' opportunities to engage in physical education activities and develop their physical fitness. Research shows that students in economically disadvantaged regions, especially in rural areas, often have limited access to high-quality sports facilities, specialized teachers, and varied exercise programs, which further exacerbates their physical health challenges.

4.2. Uneven Allocation of Educational Resources and Limited Professional Teaching Staff

Regional differences can lead to differences in school sports educational resources. The educational resources in terms of teaching staff, equipment, etc. in economically developed areas are significantly better than those in remote and rural schools with relatively backward development. Since students have less access to sports resources, they have not developed the habit of participating in physical exercise. Even if there are rich physical education courses in colleges and universities, these students will be deterred due to their lack of a foundation. In terms of teaching, the teaching content, teaching methods, and communication between teachers and students can also affect students' interest in participating in physical exercise. The lack of awareness of participation and competitiveness in physical education

classes leads to students' lack of enthusiasm for participating in physical exercise, weakens the fitness function of physical education teaching, and the cognitive deviation of the teaching subject regarding the value of physical education classes is likely to trigger a vicious cycle, ultimately exacerbating the crisis of students' physical decline (Li, 2021). Many colleges and universities have only started to carry out physical fitness and health-care courses for students with weak physical fitness in recent years and lack relevant professional teaching staff. The particularity of college students with weak physical fitness poses a huge challenge to the professional quality and ability of physical education teachers to a certain extent. Teachers not only need to have professional physical education teaching abilities but also possess skills such as health care, physiotherapy, and rehabilitation. They also need to develop personalized teaching according to students' individual differences. Without professional skills training in this regard before teaching, they cannot provide better guidance for the physical and mental health of students with weak physical fitness.

Another factor contributing to the physical decline of students is the exemption from physical education courses. Some universities allow students with poor physical fitness to be exempt from physical education classes, which may lead to a lack of regular physical activity. This exemption policy can have significant long-term effects on students' health. Research has shown that regular physical exercise is essential for improving both physical and mental health. Without adequate exercise, these students may suffer from physical and psychological issues over time.

4.3. Lack of Family Sports Atmosphere and Self-Awareness of Exercise

The family is an important place for a person's growth, life, and learning. The family's attitude towards physical exercise directly affects children's awareness and behavior of physical exercise. In the current context of exam-oriented education and the "only-score-counts" concept, compared with sports, many parents prioritize cultural courses over sports in their children's education. They are more willing to spend time and energy on cultural courses. In the high-school stage, due to the intense study and the pressure of the college entrance examination, the time for physical exercise is short, resulting in a decline in students' physical fitness. The group of students with weak physical fitness in colleges and universities is constantly expanding. Among the group of college students with weak physical fitness, some students may feel inferior psychologically due to physical differences. Also, due to their physical particularities, they may have a fear of difficulties in sports, resulting in a lack of interest in physical exercise and the inability to form a good awareness of physical exercise. This is a common problem among college students with weak physical fitness. The behavior of college students with weak physical fitness to participate in physical exercise is greatly influenced by psychological factors (interest, motivation, attitude), and physical health problems can limit students' opportunities and confidence to participate in physical exercise (Wang, 2006).

5. Theoretical Research on Exercise Intervention for the Physical and Mental Health of College Students with Weak Physical Fitness

Through literature search and logical analysis, representative studies on exercise intervention for the physical and mental health of college students with weak physical fitness from 2008 to 2024 were sorted out. [Liang Feng \(2009\)](#) believed that engaging in sports and recreational activities is in line with the physiological and psychological characteristics of students with weak physical fitness. Sports and recreational activities are the best form of exercise for them, enabling them to enhance their physical fitness, improve their physical and mental health in interesting physical entertainment activities, and help them develop good habits of lifelong physical exercise. [Zhang Guoming \(2011\)](#) pointed out that fitness qigong can effectively improve the physiological function level and mental health development of college students with weak physical fitness, and help them develop good habits of lifelong exercise mainly through three means: body regulation, breathing regulation, and mind regulation. [Yu Lihua, Wu Jingyan \(2014\)](#) found through investigation and research that moderate physical exercise helps to enhance the self-confidence and cooperation awareness of college students with weak physical fitness in interpersonal communication, effectively relieve the anxiety and depression caused by physical reasons, and promote the mental health development of students. [Han Xinying \(2016\)](#), from the perspective of educational equity, proposed that targeted physical education teaching content should be set according to the actual situations of students with disabilities, illnesses, obesity, and poor physical fitness, and “exercise prescriptions” should be formulated based on students’ physical conditions to promote their physical and mental health development. [Yue Yuande \(2017\)](#), considering the particularity of students in the physically vulnerable group, developed a human-oriented independent teaching form, adopted an appropriate exercise intensity to improve students’ cardiopulmonary function, and combined with students’ subjective exercise interests and gender characteristics to develop personalized fitness exercise prescriptions, thus promoting the overall improvement of the physical quality of students in the physically vulnerable group. [Ji Xintao, Gao Guoqiang \(2019\)](#) believed that college physical education curriculum teaching should develop and implement adaptive exercise prescriptions for college students with weak physical fitness, provide good exercise plans, encourage students with weak physical fitness to actively participate in physical exercise, enhance their physical fitness level, and cultivate their willpower and a healthy and positive attitude towards life. [Wang Xiangyuan, Wu Zechen, Wang Haowei et al. \(2019\)](#) explored the application of sports intervention in promoting the physical and mental health of students with weak physical fitness from the perspective of strategies. The sports intervention for students with weak physical fitness should comprehensively consider their physical and mental development characteristics, develop personalized intervention strategies, improve students’ enthusiasm for sports, and create conditions for their positive physical and mental development. [Liu Zhongliang \(2020\)](#) proposed that in physical education

practice classes, sports items suitable for this type of students should be selected, including Daoyin Yangsheng Gong, Taiji, yoga, Pilates, aerobics and dance, fitness walking, and table tennis. The diversification of items can enable students to have a clear goal and promote the coordinated development of body and mind. Zhang Jiajia (2022) pointed out from the perspective of the integration of sports and medicine that the combination of medical treatment and exercise intervention is an important measure to improve the physical and mental health level of college students with weak physical fitness. Appropriate exercise can relieve negative emotions such as depression and inferiority in psychology, and from a physiological perspective, it can prevent the incidence of chronic diseases. The integration of sports and medicine is the active change of students with weak physical fitness towards diseases.

Tai Chi and Qigong have been shown to improve physical fitness and mental health, particularly for students with weak physical fitness. Studies indicate that these low-intensity exercises help enhance flexibility, balance, and overall well-being. However, while Tai Chi and Qigong offer substantial benefits, comparative studies suggest that higher-intensity exercises might lead to more pronounced improvements in certain areas, such as physical strength and mental health. Integrating a variety of exercise intensities can provide a more comprehensive approach to enhancing physical and mental health in university students.

Result analysis: Through searching and sorting out relevant literature, it is known that the theoretical research of different scholars jointly shows that exercise intervention can effectively improve the physical and mental health of college students with weak physical fitness. Moreover, most scholars have proposed that different exercise forms should be adopted according to the individual situations of students to stimulate their interest in sports, thus effectively promoting the improvement of their physical and mental health levels.

6. Empirical Research on Exercise Intervention for the Physical and Mental Health of College Students with Weak Physical Fitness

Mao Weisheng, Sun Tianming, Ye Ming, et al. (2008) developed exercise prescriptions according to the situations of students, strengthened defect-adaptation and compensation training. Through targeted exercise prescription teaching, the conditions of students with weak physical fitness were restored, and their physical fitness and sports skills were improved. Luo Liping (2008) found through an 18-week experimental study on students with weak physical fitness that the 42-style Taijiquan can promote the cardiopulmonary function, vital capacity, and mental health of these students. Xu Yuting (2013) proved through experiments that integrating intellectual sports games into physical fitness and health-care courses can effectively improve the enthusiasm of students with weak physical fitness in class, and cultivate their tenacious will while exercising their bodies. Jin Zhengmei (2016), in view of the physical differences between ordinary college students and students with weak physical fitness, designed and implemented a scientific, effective, and

targeted physical function training. Experiments proved that this method not only has a positive effect on improving students' physical health but also significantly promotes their mental health. Zheng Mengjun, Lu Yongjiang (2016) classified students according to their disability levels, arranged different teaching contents for different categories of students, which can change the attitudes, habits, cognition, and fear-of-difficulty psychology of students in the vulnerable group towards sports. It also shows that Taijiquan and fitness qigong can significantly improve students' cardiopulmonary function and limb flexibility. Lou Hengyang, Zhang Shu, Xu Yaping, et al. (2016) explored the promoting effect of exercise intervention on the physical health of students with weak physical fitness through empirical research, and found that reasonable exercise intervention can significantly improve the strength, speed, endurance, flexibility, and agility of students with weak physical fitness, providing strong support for their all-round development. Zhou Jia (2017), based on the students' physical test results before intervention, proposed different teaching objectives and contents for students with different health conditions, carried out effective exercise methods, held health knowledge lectures, and monitored exercise intensity, indicating that the implementation of the leisure-ecological education mode intervention has a significant effect on improving the body shape, function, and quality of students with weak physical fitness. Li Mengmeng (2020) incorporated fitness qigong into the one-year study plan. According to the test results, the balance and strength of students were improved, and their toughness was significantly enhanced. Moreover, fitness qigong can affect students' mental state, regulating their body, mind, and breath, and reducing depressive emotions. Shi Yan (2023) found that 16-week practice of the Baduanjin fitness qigong can promote the cardiovascular system, respiratory system, strength, flexibility, and balance ability of students with weak physical fitness, and significantly improve their mental health level. Xu Jie (2024) showed through research results that the Five-Animal Frolics can promote the health of college students with weak physical fitness, significantly improve physical indicators such as BMI, heart rate, and body fat rate, and also significantly improve sleep quality.

Result analysis: Many scholars have conducted in-depth research and effective exploration on the physical and mental health problems of students with weak physical fitness. They developed personalized exercise prescriptions according to the situations of students, providing effective intervention measures for the physical and mental health of students with weak physical fitness. The research generally shows that reasonable exercise intervention can significantly improve students' physical quality, promote their all-round development, and provide a scientific basis and practical guidance for the education of students with weak physical fitness.

7. Research Conclusions and Prospects

7.1. Conclusions

Regarding the particularity of college students with weak physical fitness, exercise

prescriptions should be developed according to the specific situations of students. The research of many scholars shows that reasonable exercise intervention can significantly improve the physical quality of students with weak physical fitness, including aspects such as strength, speed, endurance, flexibility, and agility. At the same time, exercise intervention also helps to relieve students' psychological pressure, enhance self-confidence and cooperation awareness, and promote the all-round development of students. Sports such as martial arts, Taijiquan, and fitness qigong, as low-intensity and highly adaptable exercise methods, are very suitable for students with weak physical fitness. They have a significant promoting effect on the cardiopulmonary function, vital capacity, and mental health of these students, helping students gradually improve their physical quality without increasing the physical burden.

7.2. Prospects

7.2.1. Strengthening Empirical Research on Exercise Intervention

Future research should strengthen the empirical research on the effects of exercise intervention. Data should be collected through various methods such as comparative experiments, questionnaires, and interviews to comprehensively evaluate the effectiveness and feasibility of exercise intervention. At the same time, attention should be paid to the long-term effects of exercise intervention, and how to maintain and improve students' physical quality and mental health levels should be explored.

7.2.2. Constructing a Complete Support System

Colleges and universities should establish a complete support system for students with weak physical fitness, including providing professional sports guidance, psychological counseling and other services, as well as providing necessary sports facilities and equipment for these students. Moreover, they should strengthen the connection and cooperation with families and society to jointly promote the physical and mental health development of students with weak physical fitness.

7.2.3. Developing Personalized Exercise Prescriptions

Future research should further refine the development and implementation process of personalized exercise prescriptions. Considering various factors such as students' age, gender, physical condition, hobbies, etc., more scientific and reasonable exercise plans should be developed. The evaluation and feedback mechanism of the effects of exercise prescriptions should be strengthened to adjust and optimize the exercise plans in a timely manner.

7.2.4. Promoting Appropriate Sports Projects

Sports projects such as Taijiquan and fitness qigong should be actively promoted to encourage students with weak physical fitness to participate. Colleges and universities can offer elective classes or interest groups of different courses to provide students with more sports options and exercise opportunities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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