

Shen Q. (2024) IMPACT OF BASKETBALL TEACHING IN UNIVERSITIES ON STUDENTS' PHYSICAL HEALTH: ANALYSIS BASED ON PHYSICAL FITNESS, CARDIOPULMONARY FUNCTION, AND SKELETAL HEALTH. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 24 (94) pp. 107-118.

DOI: <https://doi.org/10.15366/rimcafd2024.94.008>

ORIGINAL

IMPACT OF BASKETBALL TEACHING IN UNIVERSITIES ON STUDENTS' PHYSICAL HEALTH: ANALYSIS BASED ON PHYSICAL FITNESS, CARDIOPULMONARY FUNCTION, AND SKELETAL HEALTH

Qingyang Shen¹

¹ College of Physical training, Beijing Sport University, Bei Jing, China.

E-mail: shen372950131@163.com

Recibido 10 de Abril de 2023 **Received** April 10, 2023

Aceptado 17 de Diciembre de 2023 **Accepted** December 17, 2023

ABSTRACT

Purpose: College students are the future of a nation; education community needs to prioritize students' health issues. **Method:** This article compares the measurement data of cardiovascular function, bone density, body composition, and physical fitness between female college students in the exercise group and the control group before and after 12 weeks, in order to explore the impact of basketball on human morphology and physiological function. This can provide more methods and scientific basis for students to enhance their physical fitness and promote physical health. **Results:** The exercise group's lung capacity after the experiment was 2517ml, and the control group's lung capacity after the experiment was 2357ml. **Conclusion:** This article has important practical significance in promoting the improvement of college students' physical fitness, and can also provide reference for ordinary higher education institutions to offer various sports courses.

KEYWORDS: College Basketball Teaching; Student Health; Physical Strength; Cardiopulmonary Function; Bone Health; Vital Capacity

1. INTRODUCTION

With the continuous development of the national economy, the Olympic and Youth Olympic Games have achieved success. People are gradually realizing the importance of health and improving their physical fitness through

various forms of exercise (Zeng, Chao, Liu, & Shangguan, 2021). For this reason, the country has given high attention to the development of school physical education and has implemented corresponding regulations and requirements. The process of physical education refers to the use of sports knowledge and technology by teachers in physical education to cultivate students' interest and ability in sports and improve their physical health (Yingjie, 2020). Currently, "elective courses" are commonly set up in physical education teaching in universities, where students can choose the subjects of their favorite physical education teachers. In a sense, this also reflects the subjectivity of students in classroom teaching. It satisfies students' interest in sports, fully mobilizes their learning enthusiasm, and is more conducive to meeting the school's physical education teaching needs, cultivating high-quality talents. Although China's sports elective courses have been widely promoted nationwide, attention to them has not yet reached the level it should have. In elective courses, students still have a certain degree of blindness, which leads to a situation where they are not satisfied with their own development. Therefore, different choices of physical education courses can have an impact on students' physical fitness (Zhenwen Xu & Zhang, 2022).

2. Materials and Methods

2.1 Subjects

Among the college students who participated in college basketball teaching practice for the first time in university (the age of the exercise group was 20.11 ± 1.22 years old, and the age of the control group was 21.23 ± 1.88 years old), this article randomly selected 30 students to form the exercise group. It then randomly selected 30 college students from the same age group who did not participate in the exercise to form a control group. The basic information is shown in Table 1.

Table 1: The basic information

PROJECT	EXERCISE GROUP	CONTROL GROUP
AGE (YEARS)	20.11 ± 1.22	21.23 ± 1.88
HEIGHT (CM)	155.44 ± 5.33	166.33 ± 2.77
BODY WEIGHT (KG)	54.33 ± 4.23	51.12 ± 6.11

2.2 Methods

2.2.1 Exercise Plan

This article prepares the equipment required for the test. Before conducting the test, the students in both groups are required to record the test results, and then the students in the sports group are trained under the guidance of a dedicated teacher. The course is set to practice basketball on 1,

3, and 5 days a week, scheduled from 5:00 pm to 6:00 pm every day, with a training time of 60 minutes and a day off on Sunday. The students in the control group hardly participated in any physical activities during their normal time, or only participated in the school's unified student physical education classes (other than basketball). This article will be retested after 12 weeks and the test results will be recorded.

2.2.2 Main Instruments and Equipment

Body composition analyzer, sitting flexion tester, electronic Vital capacity meter, poch-100i multi parameter automatic blood cell counter, ultrasonic bone density tester, 839E powered bicycle, MCA-3C heart comprehensive information detector.

2.3 Mathematical Statistics

All data were processed using SPSS 18.0 statistical software package, expressed as mean and standard deviation ($x \pm s$), and independent sample t-tests were conducted, with $P < 0.05$ as the significant difference.

3. Results

3.1 Comparison of Body Composition before and after 12 Weeks between the Exercise Group and the Control Group

The comparison of body composition before and after 12 weeks between the exercise group and the control group is shown in Table 2. The students in the exercise group weighed 54.33 ± 4.23 kg before the experiment, and 50.22 ± 1.24 kg after the experiment. The students in the control group weighed 51.12 ± 6.11 kg before the experiment, and 51.01 ± 1.11 kg after the experiment. Before the exercise group experiment, the student's fat content was 15.43 ± 3.45 kg, and after the experiment, it was 12.11 ± 2.45 kg. The control group had 14.21 ± 1.57 kg of fat before the experiment, and 14.01 ± 1.02 kg after the experiment.

Table 2: (a) Comparison of body composition before and after 12 weeks between the exercise group and the control group

INDEX	BEFORE THE EXERCISE GROUP EXPERIMENT	AFTER THE EXERCISE GROUP EXPERIMENT	BEFORE THE CONTROL GROUP EXPERIMENT	AFTER THE CONTROL GROUP EXPERIMENT
BODY WEIGHT (KG)	54.33 ± 4.23	50.22 ± 1.24	51.12 ± 6.11	51.01 ± 1.11
BODY FAT PERCENTAGE	27.44 ± 1.21	23.11 ± 1.02	24.31 ± 1.33	24.11 ± 1.55
BMI (BODY MASS INDEX)	20.88 ± 1.43	20.18 ± 1.44	22.18 ± 1.32	22.01 ± 1.35

Table 2: (b) Comparison of body composition before and after 12 weeks between the exercise group and the control group

FAT CONTENT (KG)	15.43± 3.45	12.11± 2.45	14.21± 1.57	14.01± 1.02
WAIST–HIP RATIO	0.88± 4.11	0.81± 1.02	0.85± 2.02	0.83± 1.45

3.2 Changes in Bone Mineral Density Index BUA among College Students before and after 12 Weeks

The changes in the bone mineral density index BUA (Broadband Ultrasound Attention) of college students before and after 12 weeks are shown in Table 3. Before the exercise group experiment, BUA was 60.11 ± 2.03db/MHZ, and after the exercise group experiment, BUA was 65.32 ± 2.34db/MHZ. The control group had a BUA of 62.43 ± 1.55db/MHZ before the experiment, while the control group had a BUA of 63.03 ± 1.66db/MHZ after the experiment.

Table 3: Changes in bone mineral density index BUA among college students before and after 12 weeks

INDEX	BUA (DB/MHZ)
BEFORE THE EXERCISE GROUP EXPERIMENT	60.11 ± 2.03
AFTER THE EXERCISE GROUP EXPERIMENT	65.32± 2.34
BEFORE THE CONTROL GROUP EXPERIMENT	62.43 ± 1.55
AFTER THE CONTROL GROUP EXPERIMENT	63.03 ± 1.66

3.3 Changes in Cardiopulmonary Function before and after 12 Weeks

The exercise group's lung capacity after the experiment was 2517ml, and the control group's lung capacity after the experiment was 2357ml. The changes of Vital capacity in the exercise group and the control group before and after the experiment are shown in Figure 1.

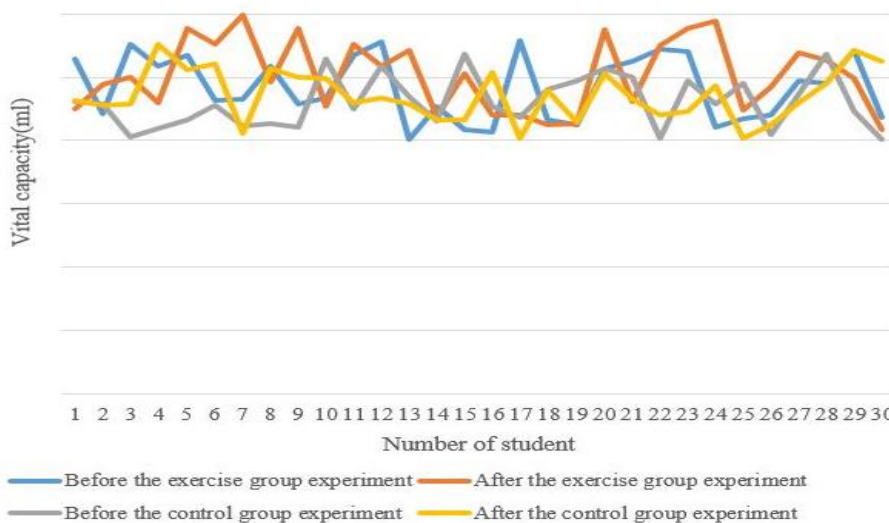


Figure 1: Changes of Vital capacity in the exercise group and the control group before and after the experiment

The heart rate of the exercise group before the experiment was 63.8 beats/minute, and the heart rate of the exercise group after the experiment was 61.7 beats/minute. The control group had a heart rate of 63.4 beats/minute before the experiment, while the control group had a heart rate of 63.0 beats/minute after the experiment. The comparison of heart rate changes is shown in Figure 2.

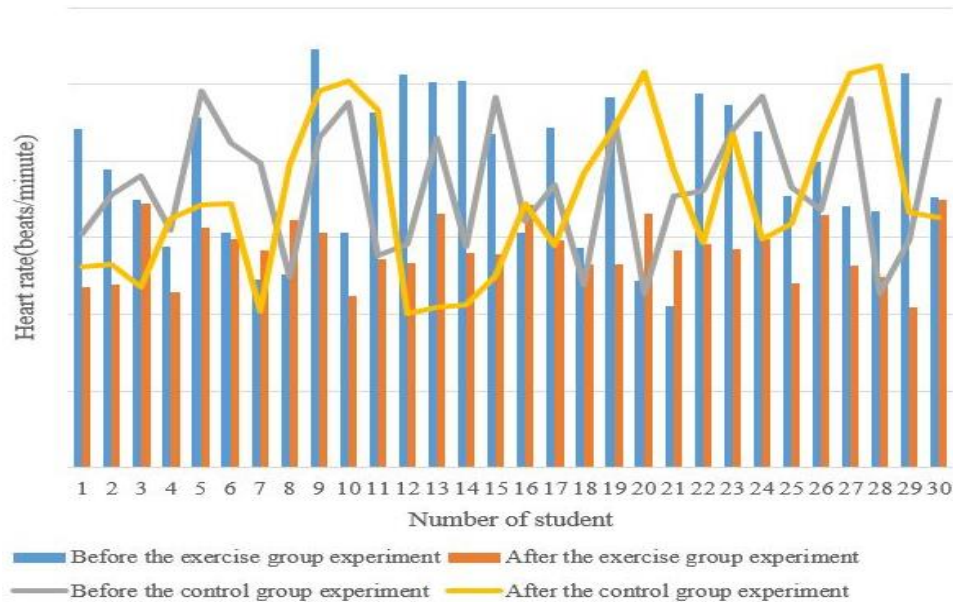


Figure 2: The comparison of heart rate changes

3.4 Changes in Physical Fitness before and after 12 Weeks

The changes in students' physical fitness in this article are represented by the number of times they pull up. Before the exercise group experiment, 26 pull-ups were allowed, and after the experiment, 31 pull-ups were allowed. The comparison of changes in the number of pull-ups students can do is shown in Figure 3.

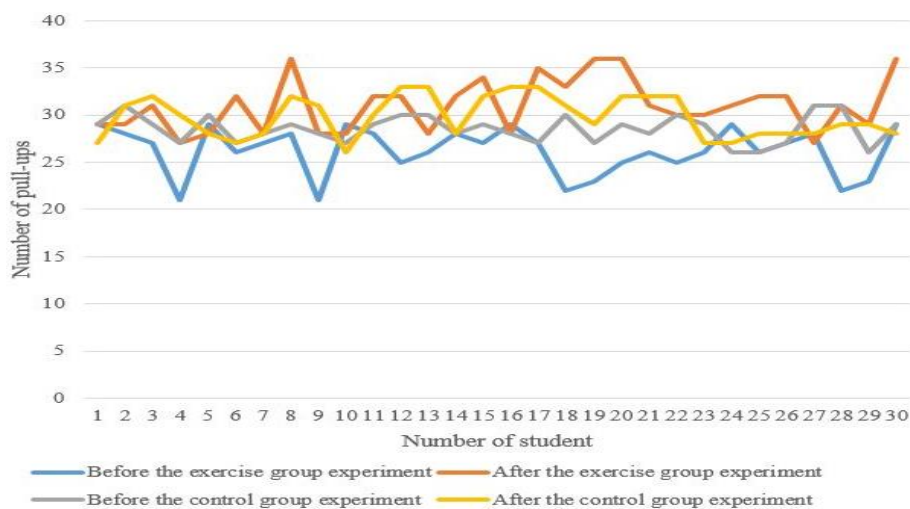


Figure 3: The comparison of changes in the number of pull-ups students

4. Discussions

In recent years, physical exercises such as aerobics and yoga have been widely used worldwide and have gradually become the favorite fitness methods for college students. It not only changes the monotonous exercise style before, but also follows the rhythm of music. It practices with vivid, lively, or gentle, slow movements to enhance people's enthusiasm for sports, through slow, relaxed, and soft movements. It is possible to achieve maximum stretching and harvesting with minimal energy, thereby preventing sports injuries. At the same time, basketball can also improve the function of the cardiovascular system, enhance cardiovascular function, and enhance physical fitness and body shape, thereby promoting physical health (Cohen & Panebianco, 2022). According to the requirements of the new curriculum standards, under the guidance of "health first", the physical fitness of students has been improved (Arumugam, Rajasri, & Rajathi, 2021). Sports and education are inseparable, and in the development process of education, sports are a part of education that cannot be ignored (Doaa, Abeer, & Manal, 2019). The above educational policies reflect the country's great concern for the physical and mental development of students. However, with the increasing pressure for further education, students' physical activities are becoming fewer and fewer. Therefore, after entering university, college students lack awareness of sports and physical activity, resulting in a significant decline in their physical fitness (Daudel, Mary, & Epaulard, 2020).

Currently, in the implementation process of physical education elective courses in Chinese universities, due to the influence of teachers, the content of elective courses is single, making students choose too few projects and unable to adapt to the needs of society. The problems of insufficient sports facilities in universities, a large number of elective classes, and low teaching quality. In addition, due to the inadequate facilities and facilities in the school, the teaching quality of physical education elective courses is also low. In addition, there are also certain issues with the professional level of the teachers of physical education elective courses. In the classroom, their teaching methods and forms have varying degrees of irrationality. In the process of carrying out physical education curriculum reform in ordinary higher education institutions in China, physical education elective courses gradually occupy a dominant position. This is closely related to the content of the course and the characteristics of sports. Therefore, in order to ensure the comprehensive development of the physical fitness of every college student, it is necessary to choose the teaching content and methods of elective courses according to the purpose of physical education teaching while retaining the characteristics of sports events. At the same time, it can also encourage college students to actively participate in sports activities, thereby promoting the development of elective courses for physical education majors in universities (Korzniikova, Korneva, & Korzniikova, 2020). Based on the patterns of changes in students' physical function activities, a reasonable

arrangement should be made for the physiological load of physical education elective courses. The load should gradually increase from small to large, and only gradually reduce the exercise load after class to restore students' physical function to the quiet state before class (Hammad, Mousa, Hammad, & Al-Qudah, 2020). Due to differences in elective courses, teaching methods and nature, as well as differences in classroom sports characteristics, as well as differences between men and women, a reasonable arrangement of workload is relevant. It is a major mission of colleges and universities in the 21st century to cultivate innovative and compound talents with innovative spirit, competitive consciousness and all-round development ability. College sports is an important part of college education. It not only teaches college students sports knowledge, technology and skills, but also adheres to the concept of "health first", the concept of lifelong sports, and strives to improve college students' sports quality and promote their physical and mental health development (Brook, Rayment, Bryar, & Olander, 2018). H Wang (Wang, Wang, Li, Mi, & Shi, 2021) believes that lack of exercise time, students' physical fitness generally decreases. Liu Yang (Liu & Huang, 2020) applied physical exercise function training in physical education classroom teaching based on the actual physical fitness of vocational college students, and applied it to the teaching practice of improving the physical health of vocational college students. With people's love for basketball, the demand for relevant knowledge in this field has become increasingly widespread.

Most of the literature has only conducted a simple study on which aspects of basketball have an impact on the human body, but combining these two forms of movement, dynamic and static, there is also a lack of research on the human body's morphological structure and physiological functions. Psychological quality and social adaptability are mainly manifested in interpersonal relationships, willpower and judgment, adaptability to the social environment, and resistance to diseases (Fernando et al., 2018). At the same time, the focus is also on cultivating students' interests, hobbies, strengths, and the ability to acquire and apply knowledge. By analyzing the content of physical education teaching, this article elaborates on several issues that should be paid attention to in cultivating students' physical health in physical education teaching, and explores the issues that should be paid attention to in physical education teaching. Therefore, in school physical education teaching, to fully leverage students' subjectivity, it is necessary to fully leverage students' subjectivity. In this process, it is necessary to strengthen students' subjectivity, so that they can play their own subjectivity role in the process of understanding themselves, developing themselves, and improving themselves. In specific implementation measures, attention should be paid to the new development and requirements of students' sport's needs, creating a good environment for their sports activities, and thus promoting their active participation in sports. Only in this way can their subjectivity be fully utilized. They should continue to conduct investigations, summarize, broaden their thinking, and deepen reforms,

in order to strengthen their lifelong sports philosophy and cultivate students' ability and habits to spontaneously and independently engage in sports activities. It is possible to establish a positive attitude towards sports life, allowing students to understand the necessity of exercise, feel the joy of exercise, and experience good emotions during the process of learning sports. This can thus meet their desire and requirements for sports, laying a solid foundation for cultivating a group of qualified talents capable of comprehensive development in the new century. In the process of physical education teaching and exercise in universities, it is necessary to have a targeted approach, allowing students to have a comprehensive understanding of their physical condition and characteristics, and based on this, choose the most suitable sports according to their actual situation. In the teaching process, innovative and diverse teaching methods should be adopted to enhance students' interest in practice. The training content, especially those that require high technical content and low exercise intensity, should strengthen the training of physical fitness to make up for the lack of various course choices for the development of students' physical fitness.

In physical education teaching, appropriate teaching methods should be adopted to reasonably adjust the load of physical education teaching, in order to promote the healthy development of students in all aspects (Huang, 2021). It is necessary to fully leverage the role of campus resources and promote the construction of campus culture. Extracurricular physical exercise can be strengthened to create a favorable external environment and provide students with more opportunities for exercise (Mahihu, 2020). A healthy body is the capital for learning well, the foundation for a good future work, and the prerequisite for a happy life (Yang, 2019). In China, the main task of sports is to teach students the knowledge and skills of fitness, so as to develop their physical fitness, so that they can better unleash their potential and provide a builder and successor with comprehensive moral, intellectual, and physical development for the development of the country (H. Li, 2022).

Basketball is an important part of school physical education. The basic skills of running, jumping, and throwing in basketball technical movements play a very good role in promoting the overall development of Physical strength, speed, endurance, agility, and other physical qualities (Lin, 2020). Basketball is a competition centered on technology, intelligence, physical fitness, and psychology. At the same time, it is also an activity of comparing ideas and styles. Through such exercise, it can cultivate a good and healthy mentality, enable students to have better self-adjustment ability, and thus improve their psychological quality. The essence of basketball physical education teaching is a people-oriented physical education teaching activity. It is not only an important way to cultivate the comprehensive quality of college students, but also an effective way to improve their physical fitness. In the education process, basic basketball techniques and simple tactical methods are taught, and the main

rules and game knowledge are introduced (Lu, 2021). In the course of learning, we focus on the combination of Ideology #Political ideologies education, moral quality education and collectivism education, which promotes the formation of students' correct world outlook and outlook on life. In physical education classes, basketball teaching enables students to have sufficient physical and mental activity, thereby enabling their bodies to develop normally and improving their physical fitness. At the same time, it has also cultivated their excellent style of not being arrogant in victory and not discouraged in defeat.

A healthy psychological state is an important guarantee for students' growth and success (Ma, Liu, Gao, Chen, & Niu, 2018). With the diversification of society, the acceleration of life rhythm, and the fierce competition, the negative effects generated by college students in their growth process are constantly affecting their mental health. During college, the psychological development of college students has approached maturity, but it is not yet mature enough, with significant physiological precocity and psychological lag. During this period, it is easy to cause physical and psychological imbalance. If the psychological problems related to it cannot be handled properly and in a timely manner, it will lead to psychological distortion, leading to certain unreasonable behaviors and even extreme events. College students are high-level talents in the future society, and their mental health status has a significant impact on the quality of national talents. Universities are the cradle of cultivating high-level talents, which puts forward higher requirements for university education. It not only needs to be able to cultivate professional talents with high cultural levels, but also needs to create a high-quality new generation with healthy backgrounds, vitality, and ability to adapt to social development (Y. Li, 2018).

College physical education is an important component of university education, which shoulders the mission of promoting students' physical and mental health, as well as the heavy responsibility of promoting students' physical and mental health. This article mainly discusses two aspects of issues and explores them. In modern health concepts, mental health is a very important aspect, and the goal of university physical education is to put the concept of "health first" into practice. Due to the unique nature of physical education itself, it contains many advantages that are beneficial for mental health education. It plays a role that cannot be replaced by other disciplines in mental health education. So, only by using physical education teaching in universities as an effective means of psychological health intervention can it better meet the needs of college students' healthy development and also meet the needs of modern education in China.

From the professional characteristics of physical education curriculum itself, physical education curriculum has greater openness and more teacher-student interaction, which brings greater professional advantages to

Cooperative learning. Basketball is one of the most popular group sports on campus and one of the important contents of college physical education. In order to better meet the requirements of educational reform and enable the comprehensive development of college students' physical and mental health, Cooperative learning teaching must be integrated into college basketball teaching (Zhijia Xu, 2020). At the same time, due to the rich content of basketball teaching, there are many changes and combinations of movements, and the difficulty of movements also varies greatly. In many teaching contents, they show the characteristics of collectivity and cooperation. This provides a good basis and conditions for the teaching model of Cooperative learning in basketball teaching.

5. Conclusion

At present, the types of PE optional courses in ordinary colleges and universities are not rich enough. In the teaching process, students often focus on improving their physical quality, ignoring the teaching of sports awareness, sports knowledge and fitness methods, which results in the weak adaptability of students after entering the society. On this basis, the author believes that it is necessary to strengthen the cultivation of public sports teachers, pay attention to the combination of subject construction and teaching, and pay attention to finding a combination point that is suitable for society in university sports.

At present, there is a widespread disconnect between physical education in most universities and society. This article provides an in-depth analysis of the implementation of basketball physical education courses and explores the physical health status of students. This has played a positive role in the further reform of public physical education elective courses in universities. In the future, the impact of other sports activities on students' physical health can be further considered.

Reference

- Arumugam, R., Rajasri, K., & Rajathi, M. (2021). STUDENTS HEALTH BASED ON BODY MASS INDEX OF THE HIGH SCHOOL STUDENTS DURING THE ACADEMIC YEARS 2017 -2020. *Compliance Engineering*, 12(1), 285-296.
- Brook, J., Rayment, J., Bryar, R. M., & Olander, E. (2018). Midwifery students' experiences in a health visiting placement: An interview study. *Journal of Health Visiting*, 6(11), 552-559.
- Cohen, S., & Panebianco, C. (2022). The role of personality and self-efficacy in music students' health-promoting behaviours. *Musicae Scientiae*, 26(2), 426-449.
- Daudel, L., Mary, J., & Epaulard, O. (2020). Perception of mandatory infant

- vaccines and trust in vaccination among first-year healthcare students: An opportunity window for the training of future healthcare workers. *Vaccine*, 38(4), 794-799.
- Doaa, M., Abeer, M., & Manal, S. (2019). A Proposed Model for Monitoring Students Health based on Internet of Things. *International Journal of Computer Applications*, 181(46), 8-12.
- Fernando, G. P., Rubén, R. C., Alberto, M.-P., Rocio, M.-P. V., Teresa, H. C., & Rocio, L. R. (2018). Endovascular Rescue of Simultaneous Renal Stent Thrombosis: Case Report. *Vascular & Endovascular Review*, 1(1).
- Hammad, E. A., Mousa, R., Hammad, A. A., & Al-Qudah, M. (2020). Awareness, knowledge, and attitudes of health professions students toward health economics and pharmacoeconomics education in Jordan. *Currents in Pharmacy Teaching and Learning*, 12(9), 1072-1080.
- Huang, J. (2021). Analysis of the current situation of junior high school students' morphology, function and physical health characteristics—Taking Zhongshan Experimental Middle School as an example. *Chengcai*, 000(011), 48-49.
- Korznikova, G., Korneva, A., & Korznikova, E. (2020). Application of combined load for obtaining ultra-fine grained structure in magnetic alloys of the Fe-Cr-Co system. *Reports in Mechanical Engineering*, 1(1), 1-9.
- Li, H. (2022). Research on strategies for improving the physical health of college students. *Contemporary Teaching and Research Forum*, 8(9), 110-112.
- Li, Y. (2018). Theoretical Discussion on Constructing College Students' Mental Health Education Model. *Science and Education Wenhui (Mid-day Journal)*, 428(07), 176-177.
- Lin, B. (2020). Analysis of Physical Training Strategies for Students in High School Physical Education and Health Classes. *Sports Illustrated*, 000(007), 14-15.
- Liu, Y., & Huang, X. (2020). Experimental Research on the Effects of Physical Function Training on the Physical Health of Students in Higher Vocational Colleges. *Chinese and Foreign Exchange*, 000(012), 24-25.
- Lu, J. (2021). How to improve the physical fitness of primary school students in combination with physical education. *Sports Illustrated*, 000(014), 27-28.
- Ma, H., Liu, X., Gao, Y., Chen, X., & Niu, C. (2018). The Reform and Practice of the "Trinity" Teaching Mode of College Students' Mental Health Education—Taking Stress Management and Frustration Coping as Examples. *Journal of Hebei United University (Social Science Edition)*, 018(001), 86-89,104.
- Mahihu, C. (2020). Prevalence of Depression, Anxiety among International Students in the Health Professions at Southern Medical University, PR China. *Open Journal of Social Sciences*, 8(12), 161.
- Wang, H., Wang, N., Li, M., Mi, S., & Shi, Y. (2021). Student physical health information management model under big data environment. *Scientific*

Programming, 2021, 1-10.

- Xu, Z. (2020). Cultivation of Basketball Sports Innovation Ability in Physical Education Teaching in Secondary Vocational Colleges. *Encyclopedia Forum Electronic Magazine*, 000(016), 48-49.
- Xu, Z., & Zhang, Y. (2022). Analysis of physical health test results of college students using fuzzy logic as an evaluation method. *Revista Brasileira de Medicina do Esporte*, 28, 378-381.
- Yang, P. (2019). Research on the Influence of Physical Function Training on the Physical Health Level of College Students. *Fighting Martial Arts Science*, 004(009), 124-126.
- Yingjie, X. (2020). On the innovation of basketball physical education classroom teaching in secondary vocational schools. *Development of Educational Science*, 2(1), 70-71.
- Zeng, Y., Chao, X., Liu, Y., & Shangguan, R. (2021). Research progress on the impact of small basketball games on the health of primary school students. *Slam Dunk*, 000(022), 11-12.