# Research on the Influence of Diversified Training Methods on the Physical Fitness of College Students

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***Abstract*—Recent years have witnessed a decline in the physical fitness of Hong Kong college students, attributed to two key factors: Insufficient time for exercise and inadequate PE classes, coupled with outdated teaching methods that render training ineffective and tedious. Consequently, the pass rate of physical fitness tests remains alarmingly low. Drawing inspiration from the "whole-person development" model adopted by Hong Kong universities, this study investigates the physical fitness status of Hong Kong college students and proposes the implementation of diversified training methods, aiming to provide a scientific basis for enhancing their physical fitness.**

***Keywords*—training methods, physical fitness, college students**

## I. Statement of Purpose

Based on a literature review and an electronic questionnaire survey on the current status of sports development among college students in some Hong Kong universities, this study initially clarifies the development status of Physical Education (PE) courses and students' exercise behaviors in these institutions. It focuses on understanding the current situation of PE teachers and students, analyzing the exercise patterns of Hong Kong college students, and identifying the root causes of their suboptimal physical fitness. Practical and constructive suggestions are provided to offer a reliable theoretical reference for improving the physical exercise ability of Hong Kong college students [1]. Survey results indicate that most students prefer to spend time on video games, only a small number adhere to daily exercise, and some are even uninterested in sports. These findings have attracted attention from schools, the government, and relevant stakeholders, prompting the introduction of a series of supporting measures. At the theoretical level: With the continuous advancement of training methods, sports training has become increasingly mature. While all universities provide convenient sports venues for students, the innovation of training methods plays a particularly prominent role in enhancing exercise benefits. Based on an investigation of the duration and frequency of Hong Kong college students' exercise, this study summarizes the reasons for the unsatisfactory exercise effects and puts forward reasonable suggestions, laying a theoretical foundation for the future improvement of college students' physical fitness and exercise outcomes. Diversified training can effectively stimulate students' interest in sports, guide them to start from their own interests, change the habit of being addicted to video games and sedentary behaviors, and thus gradually improve their physical fitness [2]. At the practical level: By researching and analyzing the gap between students' exercise time and actual physical fitness effects, this study aims to propose a series of highly operable training improvement measures. These measures are intended to promote the physical fitness development of Hong Kong college students, comprehensively enhance the level of campus sports in Hong Kong universities, and provide a reference for improving the physical fitness of students in other regions.

## II. Research Question

### 1. Diversity training

Diversified teaching means to carry out targeted and flexible comprehensive teaching method at different stages of teaching level through in-depth and master learning methods combined with a variety of science and education media teaching methods and the integration of individual differences, unified guidance teaching and modern traditional teaching. This teaching method provides effective solutions to solve the problem of lack of interest in sports and improvement of physical fitness of efficient college students in Hong Kong [3]. Diversified training refers to conducting physical and cognitive training in a variety of different forms and ways to comprehensively improve people's quality and ability in different aspects. Effective multi-training requires scientific guidance and planning to ensure that the goals, content, and form of training are tailored to the needs and abilities of the individual. The diversified teaching system is different from the traditional teaching

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method, and the good interaction between students and teachers can effectively improve the class participation rate. Through scientific practical experience and interesting teaching experience, we will continue to expand our knowledge, learn more related sports skills and accumulate learning experience. In high school sports classroom teaching, most of them are competitive sports, and training is carried out on this basis, such as basketball, football, track and field, swimming, etc. Under the in-depth reform of the curriculum, although some schools have made changes to the curriculum content, and have carried out pioneering innovation to a certain extent.

2. Research object, characteristics and age

According to the characteristics of students in Hong Kong Baptist University, the arrangement of physical education courses and the exercise situation of students, this paper selects freshmen to seniors for random sampling investigation and research. Male students and female students are 50 min each and the age difference is within 3 years. Before the experiment, 10 basic physical quality and ability tests are carried out on the testers. It is concluded that the physical quality of all subjects is not very different to ensure the reliability of the experiment [4].

3. Physical quality assessment of college students

The proportion of college students with normal weight is less than half, 38.60% for boys and 45.01% for girls. Girls did slightly better than boys. There was no significant difference in malnutrition between boys and girls. The number of underweight girls was significantly higher than that of boys (44.58%). Boys have much higher rates of overweight and obesity than girls. The body shape of college students shows certain gender characteristics. The proportion of overweight and obese boys is higher, and the proportion of underweight girls is higher. (See Table I)

TABLE I. BMI ANALYSIS RESULTS OF COLLEGE STUDENTS

| Body Mass Index (BMI) Category | Male (Percentage) | Female (Percentage) |
|---|---|---|
| Underweight | 27.46% | 44.58% |
| Normal weight | 38.60% | 45.01% |
| Overweight | 8.26% | 2.28% |
| Obesity | 19.34% | 2.28% |

In the test results, the proportion of speed, strength, endurance failure should be said to be not a few, of which 10 only in the strength test results failed more people, accounting for an astonishing 78%. According to the author's subjective judgment, it is mainly due to the failure to carry out necessary exercises, which is related to the strength training of pull-ups containing coordination skills, and fails to truly reflect the true strength level of students. In the future, the test will be conducted again with the test of throwing solid balls or shot put. In the other two tests, the percentage of students who failed was 26% for speed and 34% for endurance. (See Table II)

TABLE II. PHYSICAL FITNESS TEST RESULTS OF COLLEGE STUDENTS

| Performance Level | Speed (Percentage) | Strength (Percentage) | Endurance (Percentage) |
|---|---|---|---|
| Outstanding | 9% | 1% | 8% |
| Good | 22% | 1% | 19% |
| Pass | 43% | 20% | 39% |
| Fail | 26% | 78% | 34% |

4. The effectiveness of diversified training on physical fitness of college students

Enhance the awareness of physical training and innovate physical training methods.

This passage emphasizes reforming university physical training through diversified methods to effectively enhance students' fitness.

Key recommendations include:

- Moving away from monotonous, repetitive exercises.
- Implementing varied training content (e.g., using equipment, game scenarios) tailored to students' characteristics.
- Focusing on foundational training for all major muscle groups with scientific plans.
- Enriching teaching models beyond traditional methods by using heuristic, situational, and small-group approaches to boost engagement and personality development.

The study investigates physical health management in Hong Kong universities to propose systematic improvements, aiming to counter the common decline in student fitness caused by lifestyle issues and a lack of exercise initiative after entering university [5].

## III. OVERVIEW OF DIVERSITY TRAINING

Diversified Training's Effectiveness: Evidence from various sports (track and field, gymnastics, dance) shows diversified methods boost athlete interest, improve training outcomes, and prevent monotony. It is also considered a foundation for specialized skill development. Poor Student Fitness Status: Studies indicate college students often neglect physical fitness, have unhealthy lifestyles, insufficient exercise time, and consequently, declining physical conditions [6]. Early Multi-Sport Participation: Research suggests that early participation in multiple sports, rather than early specialization, is linked to greater athletic potential and long-term success. Research Objective: This study will randomly sample students to explore how diversified training can improve overall physical fitness and reform traditional training environments and methods.

## IV. RESEARCH METHODOLOGY

1. Sample survey

In order to explore the impact of diversified training on the overall physical fitness of college students, this topic consulted expert opinions, read and referred to relevant literature, and designed sampling survey methods. To ensure the reliability of the experiment, a random sample of students from Hong Kong Baptist

University was selected and students with no significant difference in physical fitness were selected [7].

2. Experimental methods

(1) Experimental schedule: A random sampling survey was conducted on first-year to fourth-year college students in Hong Kong Baptist University, and the experimenter was divided into an experimental group and a control group with 50 participants each.

(2) The physical quality of the subjects is not very different according to the 11 basic quality tests. Through the analysis of statistical variance test, the results showed that the original data of the two groups were $p$ > 0.05, the results showed that there was no statistical difference between the two groups in general physique and physical fitness, the experimental group conducted diversified training, and the control group conducted other training methods in addition to diversified training.

(3) The coach of the experimental group: The coach of the experimental group and the control group was led by the author.

(4) Stage division of experimental content: The main training content of the first stage is aerobic training, with strong purpose.

The degree of exercise is mainly medium and low intensity, and the second stage is mainly anaerobic training, which is maintained.

Aerobic capacity, the third stage is mainly speed training. Before experiment and experiment.

Each player in both groups was then given a general fitness test to spot him After 8 weeks of training, the movement ability has changed [8].

(5) Experimental site layout: The experimental site and the test site are respectively the sports venues of each school.

(6) Experimental principle: According to the physical and mental characteristics of college students, find out the development law of general physical fitness projects.

Training according to the law of physical development conforms to the training plan of college students.

(7) Experimental control: In order to ensure the reliability and effectiveness of the experimental results, the experiment was strictly controlled during the experiment.

Conditions for improving experimental accuracy. Before the experiment began, the subjects' parents and themselves were informed of the purpose of the experiment.

Introduce and ask for their cooperation and support. Control and ActiGraph body movement recorder control the intensity of aerobic training through heart rate and RPE, control the test environment and other test conditions, to ensure that the two groups of tested people can carry out the experiment normally and effectively during the experiment [9].

3. General physical fitness

(1) Seated forward bend. Test the extension of the muscles and ligaments of the hip and posterior thigh.

Ability is flexibility.

Test method: During the test, the athlete sits on the mat, legs straight, heels together, toes naturally separated.

Open, heel at the tape measure 25 cm, then palm down, arms together reach forward, upper body flexion, with both hands.

Move the tip of your middle finger forward until it can't move forward. Test twice, take the maximum value, record in cm alone.

Place, keep one decimal place.

(2) Stand with one foot closed. Test an athlete's balance.

Test method: Standing on one foot with the non-dominant foot bent about 90 degrees. This test is hard in bedding.

Do it on the ground. For each position, stand with your hands at your waist and eyes closed for as long as possible. Research object.

They were told to stay as steady as possible, and if out of balance, to get back to the beginning as quickly as possible.

The posture.

(3) 40 m sprint. The speed ability of the athlete can be measured.

Test method: Before the test, the athletes warmed up and stretched dynamically for 10–15 min, and were given at least twice in the test.

Practice running at less than maximum speed. Athletes need to stand behind the starting point, and use such as half squat start, 3 o'clock start.

Run or start at 4:00. Athletes are ready to start when the command is given. Repeat 3 times.

Test, take the best value, time unit 0.01 s.

(4) T-sensitivity test. The test evaluates the athlete's acceleration, speed maintenance, deceleration and balance [10].

And coordination ability.

Test method: Before the test, have each athlete warm up and stretch. Athletes should use less than maximum effort.

The speed of running in the field as practice. The athlete stands at point A at the beginning of the test. Make a sound at the beginning point.

After that, the player moves to point B and touches the base of the cone with his right hand. Then, the athlete's face is facing forward and double [11].

With your feet uncrossed, sprint to the left and touch the bottom of the C cone with your left hand. The athlete then skidded to the right.

Move and touch the bottom of the D cone point with your right hand.

(5) Sitting position push solid ball. Test your upper body explosive power.

Test method: The athlete sits up against a wall with legs straight and the back, hips and shoulders close to the wall.

Hold the solid ball in both hands, tuck it in front of your chest, and throw it as quickly and as quickly as you can.

Perform 3 tests with at least 1 minute of rest between each test. Record the maximum value. The solid ball weighs 4 BL.

(6) Standing long jump. Test athletes lower extremity explosive power, is the Shanghai ten series first.

The important project of the two stations swimming land test.

Standing long jump test method: On a flat field, indoor field, plastic track can be drawn.

The jump line. After familiarizing themselves with the test procedure, the athletes performed a 5 min warm-up, which was performed on the lower extremity muscles.

Flesh and joints are demanding, so a good warm-up is crucial. After that, the athletes can try out the jumps.

Time. At the beginning of the test, the athlete's toes stand behind the starting line, first perform a pre-swing squat and then try their best to jump.

Mark the position of the athlete's nearest heel [12]. Record the best result of the three times, accurate to cm.

The standing long jump is equal to the straight line distance from the mark line to the nearest heel.

(7) 1RM(5RM) split squat. Test the muscle strength of the athlete's lower limb push. 1RM(5RM).

The split leg squat measures the maximum muscle strength of the lower limbs (the ability to push the lower limbs) of young athletes [13].

Test method:

1. Athletes perform 5–10 weight-bearing warm-up exercises.
2. Rest for 1 minute.
3. Increase the weight of the warm-up stage by about 14–18 kg or on the basis of the warm-up weight 10–20% and repeat 3–5 times.
4. Rest for 2 minutes.
5. Estimated near the maximum weight on the basis of 14–18 kg, so that athletes can complete 2–3 times.
6. Rest for 2–4 minutes. The athlete attempts to perform 1RM, adding 14–18 kg or more to the weight in Step 5 Increase by 10–20%.
7. Rest for 2–4 minutes.
8. If the athlete attempts to fail, should reduce the weight 7–9 kg or 5–10%, and re-test.

(8) 1RM(5RM) hard pull test. Can measure the maximum strength of the athlete's lower extremities (lower extremities Ability to pull) [14].

Test method:

1. Athletes perform 5–10 weight-bearing warm-up exercises.
2. Rest for 1 minute.
3. Increase the weight of the warm-up stage by about 14–18 kg or on the basis of the warm-up weight 10–20%, repeat 3–5 times, then rest for 2 minutes.
4. Estimated near the maximum weight on the basis of 14–18 kg, so that athletes can complete 2–3 times.
5. Rest for 2–4 minutes. The athlete attempts to perform 1RM, adding 14–18 kg or more to the weight in Step 5 Increase by 10–20%.
6. Rest for 2–4 minutes.
7. If the athlete attempts to fail, should reduce the weight 7–9 kg or 5–10%, and re-test.

(9) Push-ups to test the athlete's upper body muscle strength and endurance level. (Upper limb horizontal push.

Test method: Start in a push-up starting position with your legs straight, toes touching the ground and your back flat.

Keep your arms straight and place your hands shoulder-width apart on the floor. Keep your back and abdomen tight and your body tight and straight.

Keep your chest close to the ground. Repeat as many times as possible while maintaining the quality of the movement [15].

## V. Statement of Significant

At present, there are many problems in the physical fitness of college students. Some colleges and universities have not established an efficient physical health management system for students, the core role of health-related organizations has not been fully exerted, and the cooperation level between health management departments is low. In terms of management, there are issues such as weak health awareness among students, instrumentalization of guiding concepts, over-emphasis on terminal test results, fragmented health management, and single management methods. Against the background of Hong Kong's "whole-person development" philosophy [16], college PE health management should focus on the characteristics of contemporary students and establish a new "four-dimensional linkage" management model. Specifically, it is necessary to change guiding concepts, formulate policies based on actual conditions, truly care for students' physical and mental health, optimize PE curricula, and strengthen the construction of sports culture. Additionally, through measures such as building intelligent gymnasiums, establishing incentive mechanisms, developing an integration of sports and medicine mechanism, and constructing a physical health management platform, multi-linkage management can be realized to improve the physical health level of college students [17].

Diversified training can enhance college students' comprehensive physical fitness and is an important training method for improving physical quality. Reasonable additional training sessions can positively promote overall physical fitness. Moreover, diversified training enables students to choose non-professional sports activities, which alleviates venue congestion. By increasing the interest and enriching the content of physical training, diversified methods attract more college students to participate in exercise, thereby expanding their range of sports choices. Therefore, systematic improvements must be proposed to address the existing problems in college students' physical fitness, with solutions starting from stimulating students' interest in sports.

In Hong Kong, many leaders and professionals have recognized the importance of students' physical condition and emphasized the value of education, teaching, and outdoor activities. Many health education activities are designed to support students' basic learning needs while

improving their physical quality and physiological functions. Through diversified training and school teachers' guidance, good health awareness can be implanted in students' minds, helping them recognize the harms caused by bad habits and insufficient physical exercise, and thus laying the foundation for lifelong sports habits.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

Hongzheng Tang designed the research framework, conducted the questionnaire survey and experimental research, and drafted the manuscript; Xinwen Ma collected and analyzed the research data, and reviewed the literature; Zhen Zhang revised the manuscript and verified the experimental results; all authors discussed the research results, revised the manuscript together, and had approved the final version.

## REFERENCES


[1] G. B. Zhang, "A comparative study on cultivating high-level athletes in colleges and universities in mainland China, the United States and Hong Kong Special Administrative Region," *Journal of Changde Normal University (Natural Science Edition)*, no. 4, pp. 87–89, 2001.

[2] A. C. Z. Robles, C. M. T. Gonzalez, D. P. Saenz, *et al.*, "Relationships between physical capacities, body composition and posture in university students," *Medicine & Science in Sports & Exercise*, vol. 57, suppl. 1, 1763, 2015. https://doi.org/10.1249/01.mss.0000477739.85688.38

[3] T. R. Snedden, J. Scerpella, S. A. Kliethermes, *et al.*, "Sport and physical activity level impacts health-related quality of life among collegiate students," *American Journal of Health Promotion*, vol. 33, no. 5, pp. 675–682, 2019. https://doi.org/10.1177/0890117118817715

[4] B. R. Hamilton, M. J. Martinez-Patiño, J. Barrett, *et al.*, "Response to the United Nations Human Rights Council's report on race and gender discrimination in sport: An expression of concern and a call to prioritise research," *Sports Medicine*, vol. 51, no. 4, pp. 839–842, 2021. https://doi.org/10.1007/s40279-020-01380-y

[5] J. Lin, Y. F. Gao, Y. Guo, *et al.*, "Effects of qigong exercise on the physical and mental health of college students: A systematic review and meta-analysis," *BMC Complementary Medicine and Therapies*, vol. 22, no. 1, 287, 2022. https://doi.org/10.1186/s12906-022-03760-5

[6] Y. Sang and L. Wang, "Physical fitness data monitoring of college students based on the internet of things and blockchain," *Frontiers in Public Health*, vol. 10, 940451, 2022. https://doi.org/10.3389/fpubh.2022.940451

[7] R. Ma, T. Liu, K. W. R. Sum, *et al.*, "Relationship among physical literacy, mental health, and resilience in college students," *Frontiers in Psychiatry*, vol. 12, 767804, 2021. https://doi.org/10.3389/fpsyt.2021.767804

[8] H. Zhang and X. Zhang, "Analysis of the characteristics of student work in Hong Kong universities under the "whole-person development" education concept and its enlightenment," *Journal of North China Electric Power University (Social Sciences Edition)*, no. 6, pp. 128–131, 2011.

[9] C. Chan, A. Ha, and J. Y. Ng, "Improving fundamental movement skills in Hong Kong students through an assessment for learning intervention that emphasizes fun, mastery, and support: The A + FMS randomized controlled trial study protocol," *Springer Plus*, vol. 5, no. 1, 724, 2016. https://doi.org/10.1186/s40064-016-2517-6

[10] A. Anisha, L. Chun-Hong, W. Lillia, and H. K. Jean, "Health risk screening practices by providers and associated factors among university students in Hong Kong," *Journal of Adolescent Health*, vol. 63, suppl. 1, S52, 2013. https://doi.org/10.1016/j.jadohealth.2012.10.109

[11] Y. P. Duan, J. Wienert, C. Hu, G. Y. Si, and S. Lippke, "Web-based intervention for physical activity and fruit and vegetable intake among Chinese university students: A randomized controlled trial," *Journal of Medical Internet Research*, vol. 19, no. 4, e106, 2017. https://doi.org/10.2196/jmir.7152

[12] C. B. Thomas, "Stamina: The thread of human life," *Journal of Chronic Diseases*, vol. 34, no. 2–3, pp. 41–44, 1981. https://doi.org/10.1016/0021-9681(81)90049-7

[13] S. So, M. Evans, L. A. Jason, and A. Brown, "Are stamina and fatigue polar opposites? A case study," *Journal of Prevention & Intervention in the Community*, vol. 43, no. 1, pp. 32–41, 2015. https://doi.org/10.1080/10852352.2014.973235

[14] L. M. Page and S. A. Nor, "Preface and constitution of the Asian Society of Ichthyologists," *Zootaxa*, vol. 3962, pp. 5–9, 2015. https://doi.org/10.11646/zootaxa.3962.1.3

[15] D. J. Wiebe, A. C. Bretzin, B. A. D'Alonzo, and The Ivy League–Big Ten Epidemiology of Concussion Study Investigators, "Progression through return-to-sport and return-to-academics guidelines for concussion management and recovery in collegiate student athletes: Findings from the Ivy League-Big Ten Epidemiology of Concussion Study," *British Journal of Sports Medicine*, vol. 56, no. 14, pp. 801–811, 2022. https://doi.org/10.1136/bjsports-2021-104451

[16] Y. H. Jiang, Z. H. Liu, K. K. Zhang, *et al.*, "The influence of muscle simulation of rebound jumps from different heights on lower limb muscle endurance training," in *Proc. the 21st National Academic Conference on Sports Biomechanics*, 2021, p. 205.

[17] T. M. El-Gohary, "Exploring the impact of physical factors on the overweight and obese physical therapy students," *Journal of Taibah University Medical Sciences*, vol. 15, no. 6, pp. 479–485, 2020. https://doi.org/10.1016/j.jtumed.2020.09.004