

# Based on Artificial Intelligence Technology and the "National Physical Fitness Assessment Standard (2023 Revised Edition): Empirical Study on the Impact of Aerobics Dance on the Physical Fitness of College Students

**Xuewei Zhao\***

Department of Physical Education Teaching Research, Xinjiang College of Science & Technology,  
Bayingolin Mongolian Autonomous Prefecture, Xinjiang Uygur Autonomous Region, China

\*Corresponding Author.

## **Abstract**

With the continuous development of artificial intelligence technology, intelligent physical fitness testing equipment is constantly updated and applied in more and more fields. This study employs the latest intelligent fitness testing equipment that conforms to the "National Fitness Assessment Standard (2023 Revised Edition)" to explore the impact of aerobic dance on the physical health of college students. A comprehensive comparative analysis is conducted on the fitness data of aerobics dance majors and non-art students, encompassing a diverse range of indicators such as BMI, body fat percentage, vital capacity, power bike secondary load test, grip strength, vertical jump, push-ups, one-minute sit-ups, sit-and-reach test et al. The results indicate that aerobics dance majors consistently outperform non-art students in comprehensive physical fitness assessment scores. They demonstrate superior physical form, function, and overall fitness, which is likely attributed to the rigorous training requirements of their major. The aerobics dance training emphasizes the development of strength, endurance, flexibility, and balance, contributing to enhanced physical fitness. In conclusion, the physical fitness of aerobics dance majors is superior to that of non-art students, likely due to the specialized training in aerobics dance. The study suggests that aerobics dance training can significantly improve students' physical fitness, better preparing them for professional and career development. It is recommended that schools and educational institutions prioritize the development of students' physical fitness and provide necessary support and guidance to foster comprehensive student development. Non-art students should also pay attention to their physical fitness and make improvements based on the study's recommendations.

**Keywords:** Artificial intelligence technology, aerobics dance, physical fitness, aerobics dance major students, non-art students, physical fitness testing.

## **1. Introduction**

In contemporary society, the heightened awareness of health has led to increased attention being paid to the impact of sports on physical fitness. With the implementation of the "National Physical Fitness Assessment Standard (2023 Revised Edition)," the standards and requirements for physical fitness testing have become more scientific and comprehensive, offering a new perspective on the influence of aerobics dance on physical fitness. Aerobics dance, a sport that combines music, dance, and gymnastics, has been widely recognized for its positive role in enhancing physical fitness<sup>[1-4]</sup>. However, current research on the impact of aerobics dance on the physical fitness of college students is insufficient, particularly in terms of the differences between aerobics dance majors and non-art students.

In recent years, the advancement of artificial intelligence technology has facilitated the widespread application of intelligent physical fitness testing equipment. These devices integrate advanced sensor technology, data processing algorithms, and machine learning models to accurately and efficiently assess an individual's physical fitness. Intelligent devices offer advantages such as real-time monitoring and data analysis, personalized training plans, predictive health analysis, remote health management, and intelligent interaction [5-6]. Despite their numerous benefits, there are still challenges in current research, such as ensuring the accuracy and reliability of the equipment, handling and analyzing large volumes of complex data, and designing interfaces that better meet user needs [5-6]. As technology continues to progress and research deepens, intelligent physical fitness testing equipment will play a greater role in the field of sports and health in the future.

Therefore, the purpose of this study is to explore the impact of aerobics dance on the physical fitness of college students and to evaluate the potential benefits of aerobics dance training in improving college students' physical fitness. This study will utilize the latest intelligent physical fitness testing equipment and adhere to the "National Physical Fitness Assessment Standard (2023 Revised Edition)" to verify the role of aerobics dance in enhancing students' physical fitness.

A prospective cohort study design was employed, selecting aerobics dance majors and non-art students from a university as the research subjects. The latest intelligent physical fitness testing equipment was used to test various indicators such as BMI, body fat percentage, vital capacity, power bike secondary load test, grip strength, vertical jump, push-ups, one-minute sit-ups, sit-and-reach test, one-legged standing with eyes closed, and choice reaction time for both groups of students.

Through comparative analysis, this study explores the impact of aerobics dance training on students' physical fitness. The results indicate that aerobics dance majors generally outperform non-art students in comprehensive physical fitness assessment scores. Aerobics dance majors demonstrate superior physical form, function, and overall fitness, which may be attributed to the requirements of aerobics dance training for physical fitness. The training focuses on the development of strength, endurance, flexibility, and balance, contributing to improved physical fitness levels. Additionally, aerobics dance training helps students achieve a desirable body shape, aligning with the aesthetic standards of artistic professions.

The results of this study suggest that aerobics dance training has a positive impact on improving college students' physical fitness, in accordance with the "National Physical Fitness Assessment Standard (2023 Revised Edition)." Through aerobics dance training, students can enhance their physical fitness levels, better adapting to professional studies and future career development. Schools and educational institutions should pay attention to the development of students' physical fitness and provide necessary support and guidance to promote comprehensive student development. At the same time, non-art students should also pay attention to their physical fitness and make improvements based on the recommendations of this study.

## **2. Study Subjects and Methods**

### **2.1 Experimental subjects and grouping**

The study selected non-art major students as the control group, totaling 50 individuals, with an equal number of 25 males and 25 females, forming the male and female subgroups of the control group, respectively. These students' ages ranged between 20 and 21 years old, and at the time of participation in the study, they did not have any major diseases or other mental or physical health issues that might interfere with the results of the physical fitness test.

The experimental group consisted of 50 students majoring in aerobics, also divided into male and female subgroups with 25 individuals each. These students were also between the ages of 20 and 21, and had received 2 to 3 years of professional aerobics training. All students in the experimental group were required to meet the same criteria of being free from major diseases or other health conditions that might affect the results of the physical fitness test.

Inclusion criteria included: (1) aerobics majors aged between 20 and 21 years; (2) students who had received professional aerobics training for at least 2 to 3 years; (3) officially registered aerobics majors at the university; (4) students who agreed to participate in the study and had signed informed consent forms. Exclusion criteria included: (1) students with major diseases or chronic conditions that might affect the results of the physical fitness test; (2) students with other health issues during the study period, such as pregnancy or recent injuries that might impact the results of the physical fitness test. Through these inclusion and exclusion criteria, the study ensured the homogeneity of the participants and the reliability of the research results, providing a solid foundation for exploring the impact of aerobics dance on the physical fitness of college students.

## 2.2 Experimental method

The study employed an experimental method. During the experiment, professional testers used a series of intelligent physical fitness testing instruments to conduct a comprehensive physical fitness assessment of the experimental group (aerobics majors) and the control group (non-art students). All relevant data was meticulously recorded during the testing to ensure the accuracy and reliability of subsequent analysis. To ensure standardized and comparable test results, researchers followed the "National Physical Fitness Assessment Standard (2023 Revised Edition)" for data collection and recording<sup>[7-9]</sup>. This standard provided a unified reference framework for assessing the results, ensuring the standardization and validity of the research data. By adopting this standardized approach, the study was able to objectively compare the physical fitness differences between aerobics majors and non-art students, thereby providing scientific data support and references for education, teaching, and sports training.

## 2.3 Testing indicators

In determining the testing indicators, the study referred to the "National Physical Fitness Assessment Standard (2023 Revised Edition)" as a reference, taking into account the research objectives and the characteristics of aerobics dance<sup>[7-9]</sup>. The selection of testing indicators should be able to comprehensively reflect students' physical health and fitness, while also considering the impact of aerobics dance training on physical fitness. According to the "National Physical Fitness Assessment Standard (2023 Revised Edition)," relevant testing indicators were chosen that could reflect physical form, function, and overall fitness<sup>[7-9]</sup>. Corresponding intelligent testing equipment was selected based on the testing indicators to ensure the accuracy of the test results. Through these testing indicators, the study aimed to explore the impact of aerobics dance on college students' physical fitness and provide scientific evidence for related education and training. (See Table 1)

Table 1 Testing indicators.

| Test Content      | Test Indicator                         | Test Instrument                                         | Notes                                                                                                                   |
|-------------------|----------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Physical Form     | Height                                 | Height Measurement Device                               | Standard anatomical posture, barefoot, unit: centimeters.                                                               |
|                   | Weight                                 | Weight Measurement Device                               | Standard anatomical posture, barefoot, unit: kilograms.                                                                 |
|                   | Body Fat Percentage                    | Body Fat Measurement Device                             | Barefoot, maintain a fixed posture.                                                                                     |
| Physical Function | Vital Capacity                         | Vital Capacity Measurement Device                       | Continuous measurement twice, automatically taking the maximum value, unit: milliliters.                                |
|                   | Power Bike Secondary Load Test         | Cardiopulmonary Endurance Measurement Device            | Test immediately stopped if the subject experiences any adverse reactions, unit: milliliters/kilogram/minute.           |
| Physical Fitness  | Grip Strength                          | Grip Strength Measurement Device                        | Continuous measurement twice, automatically recording the maximum value, both hands need to be tested, unit: kilograms. |
|                   | Vertical Jump                          | Vertical Jump Measurement Device                        | Vertical Jump Measurement Device<br>Continuous measurement twice to take the maximum value, unit: centimeters.          |
|                   | Push-ups (Male)/Knee Push-ups (Female) | Push-up/Knee Push-up Measurement Device                 | Measurement unit: times.                                                                                                |
|                   | One-minute Sit-ups                     | Sit-up Measurement Device                               | Measurement unit: times.                                                                                                |
|                   | Seated Forward Bend                    | Seated Forward Bend Measurement Device                  | Barefoot, unit: centimeters.                                                                                            |
|                   | Standing on One Leg with Eyes Closed   | Standing on One Leg with Eyes Closed Measurement Device | Barefoot, closed eyes, both legs need to be tested, unit: seconds.                                                      |
|                   | Choice Reaction Time                   | Choice Reaction Time Measurement Device                 | Measurement unit: seconds.                                                                                              |

Note: Indicators selected from the adult section of the "National Physical Fitness Assessment Standard (2023 Revised Edition).

## 2.4 Data processing

In this study, SPSS 26.0 statistical software was utilized to conduct in-depth analysis of the collected data. Descriptive statistical analysis was employed to summarize and describe the basic characteristics of the data. Independent sample t-tests were performed on the experimental group and the control group to investigate whether there were significant differences in the variables between the groups. This step aimed to determine whether the differences in physical fitness between aerobics dance majors and non-art students were statistically significant. During the study, a statistical significance level of  $p < 0.05$  was set to examine changes between the groups.

## 3. Results

### 3.1 Comparison of physical form test results

Based on the data from Tables 2 and Table 3, we can analyze the physical fitness of aerobics dance majors and non-art students, and separately for males and females. In the male group, the average BMI of the experimental group (aerobics dance majors) is 19.46, with an average body fat percentage of 15.23; while the average BMI of the control group (non-art students) is 22.62, with an average body fat percentage of 19.53. In the female group, the average BMI of the experimental group (aerobics dance majors) is 18.73, with an average body fat percentage of 16.58; and the average BMI of the control group (non-art students) is 21.57, with an average body fat percentage of 23.72.

Table 2 Comparison of physical form test results for male students. (N=50)

| Indicator           | Group                     | MEAN±S     | T     | P     | Score | 100 Points    |
|---------------------|---------------------------|------------|-------|-------|-------|---------------|
| BMI                 | Experimental Group (Male) | 19.46±1.53 | 4.979 | 0.000 | 100   | 18.5≤BMI<24.0 |
|                     | Control Group (Male)      | 22.62±2.78 |       |       | 100   |               |
| Body Fat Percentage | Experimental Group (Male) | 15.23±2.17 | 5.467 | 0.000 | 100   | 10.3-17.2     |
|                     | Control Group (Male)      | 19.53±3.28 |       |       | 60    |               |

Table 3 Comparison of physical form test results for female students. (N=50)

| Indicator           | Group                       | MEAN±S     | T     | P     | Score | 100 Points    |
|---------------------|-----------------------------|------------|-------|-------|-------|---------------|
| BMI                 | Experimental Group (Female) | 18.73±1.92 | 4.350 | 0.000 | 100   | 18.5≤BMI<24.0 |
|                     | Control Group (Female)      | 21.57±2.64 |       |       | 100   |               |
| Body Fat Percentage | Experimental Group (Female) | 16.58±1.86 | 9.296 | 0.000 | 100   | 10.3-17.2     |
|                     | Control Group (Female)      | 23.72±3.36 |       |       | 100   |               |

From the mean values, it is evident that the average BMI and body fat percentage of aerobics dance majors are superior to those of non-art students. This indicates that aerobics dance majors perform better in terms of physical form, which may be related to the requirements of aerobics dance training for physical form. From the p-values, the differences in BMI and body fat percentage between the experimental group and the control group are statistically significant ( $p < 0.001$ ). This further confirms that aerobics dance majors perform better in terms of physical form. From the scores, aerobics dance majors achieve full marks of 100 in both BMI and body fat percentage, reaching the highest standard of the national physical fitness test results. This indicates that aerobics dance majors excel in physical form. According to the highest standards, the national physical fitness test results set the highest standard for BMI within the range of  $18.5 \leq \text{BMI} < 24.0$ , and for body fat percentage within the range of 10.3-17.2% or 14.3-23.9%. Aerobics dance majors meet the highest standards in both BMI and body fat percentage, further confirming their excellent performance in physical form.

The study reveals that aerobics dance training has the following main effects on physical form indicators: first, aerobics dance training can increase students' BMI values to better conform to healthy weight standards; second, aerobics dance training can reduce students' body fat percentage to better conform to healthy body fat standards; third, aerobics dance training can improve students' physical form to better conform to the aesthetic requirements of artistic professions<sup>[10-12]</sup>. For non-art students, they should also pay attention to their physical form, maintain a good body shape and healthy body fat percentage.

In summary, aerobics dance majors perform better in terms of physical form, which may be related to the

requirements of aerobics dance training for physical form. Schools and educational institutions should pay attention to the physical fitness development of aerobics dance majors and provide necessary support and guidance to promote the comprehensive development of students. At the same time, non-art students should also pay attention to their physical fitness development and receive necessary support and guidance to promote their comprehensive development.

### 3.2 Comparison of physical function test results

Based on the data from Tables 4 and Table 5, we can analyze the physical function of aerobics dance majors and non-art students, and separately for males and females. In the male group, the average value of the power bike secondary load test for the experimental group (aerobics dance majors) is 48.79, with an average vital capacity of 4284.75; while the average value of the power bike secondary load test for the control group (non-art students) is 38.73, with an average vital capacity of 3567.48. In the female group, the average value of the power bike secondary load test for the experimental group (aerobics dance majors) is 45.58, with an average vital capacity of 3073.25; and the average value of the power bike secondary load test for the control group (non-art students) is 36.60, with an average vital capacity of 2658.61.

Table 4 Comparison of physical function test results for male students. (N=50)

| Indicator                      | Group                     | MEAN±S         | T     | P     | Score | 100 Points |
|--------------------------------|---------------------------|----------------|-------|-------|-------|------------|
| Power Bike Secondary Load Test | Experimental Group (Male) | 48.79±3.26     | 9.363 | 0.000 | 80    | ≥63.9      |
|                                | Control Group (Male)      | 38.73±4.27     |       |       | 60    |            |
| Vital Capacity                 | Experimental Group (Male) | 4284.75±386.62 | 6.294 | 0.000 | 85    | ≥5127      |
|                                | Control Group (Male)      | 3567.48±418.59 |       |       | 65    |            |

Table 5 Comparison of physical function test results for female students. (N=50)

| Indicator                      | Group                       | MEAN±S         | T     | P     | Score | 100 Points |
|--------------------------------|-----------------------------|----------------|-------|-------|-------|------------|
| Power Bike Secondary Load Test | Experimental Group (Female) | 45.58±3.83     | 8.744 | 0.000 | 75    | ≥58.8      |
|                                | Control Group (Female)      | 36.60±3.42     |       |       | 55    |            |
| Vital Capacity                 | Experimental Group (Female) | 3073.25±342.54 | 3.963 | 0.000 | 85    | ≥3559      |
|                                | Control Group (Female)      | 2658.61±395.46 |       |       | 75    |            |

From the mean values, it is evident that the average values of the power bike secondary load test and vital capacity for aerobics dance majors are superior to those of non-art students. This indicates that aerobics dance majors perform better in terms of physical function, which may be related to the requirements of aerobics dance training for physical function. From the p-values, the differences in the power bike secondary load test and vital capacity between the experimental group and the control group are statistically significant ( $p < 0.001$ ). This further confirms that aerobics dance majors perform better in terms of physical function. From the scores, aerobics dance majors achieve scores of 80 and 85 in the power bike secondary load test and vital capacity, respectively, reaching a higher standard of the national physical fitness test results. This indicates that aerobics dance majors excel in physical function. According to the highest standards, the national physical fitness test results set the highest standard for the power bike secondary load test at  $\geq 63.9$ , and for vital capacity at  $\geq 5127$  or  $\geq 3559$ . Aerobics dance majors meet the higher standards in both the power bike secondary load test and vital capacity, further confirming their excellent performance in physical function.

The study reveals that aerobics dance training has the following main effects on physical function indicators: first, aerobics dance training can improve students' aerobic endurance, making them perform better in the power bike secondary load test; second, aerobics dance training can increase students' vital capacity, making them perform better in the vital capacity test; third, aerobics dance training can improve students' physical function, including cardiopulmonary function, muscle strength, and endurance [13-16]. For non-art students, they should also pay attention to their physical function, maintain good cardiopulmonary function and muscle strength.

In summary, aerobics dance majors perform better in terms of physical function, which may be related to the requirements of aerobics dance training for physical function. Schools and educational institutions should pay attention to the physical fitness development of aerobics dance majors and provide necessary support and guidance

to promote the comprehensive development of students. At the same time, non-art students should also pay attention to their physical fitness development and receive necessary support and guidance to promote their comprehensive development.

### 3.3 Comparison of physical fitness test results

Based on the data from Tables 6 and 7, we can analyze the physical fitness of aerobics dance majors and non-art students, and separately for males and females. In the male group, the average grip strength of the experimental group (aerobics dance majors) is 46.86, with an average vertical jump of 42.73, a push-up average of 30.12, a one-minute sit-up average of 38.26, a sit-and-reach average of 20.63, a one-legged standing with eyes closed average of 50.65, and a choice reaction time average of 0.46; while the average grip strength of the control group (non-art students) is 40.37, with an average vertical jump of 33.83, a push-up average of 25.34, a one-minute sit-up average of 29.37, a sit-and-reach average of 12.39, a one-legged standing with eyes closed average of 31.48, and a choice reaction time average of 0.51. In the female group, the average grip strength of the experimental group (aerobics dance majors) is 30.74, with an average vertical jump of 27.65, a kneeling push-up average of 27.50, a one-minute sit-up average of 31.22, a sit-and-reach average of 21.89, a one-legged standing with eyes closed average of 56.73, and a choice reaction time average of 0.45; and the average grip strength of the control group (non-art students) is 23.58, with an average vertical jump of 23.56, a kneeling push-up average of 20.47, a one-minute sit-up average of 24.66, a sit-and-reach average of 15.18, a one-legged standing with eyes closed average of 32.75, and a choice reaction time average of 0.50.

From the mean values, it is evident that the average physical fitness indicators of aerobics dance majors are superior to those of non-art students. This indicates that aerobics dance majors perform better in terms of physical fitness, which may be related to the requirements of aerobics dance training for physical fitness. From the *p*-values, the differences in grip strength, vertical jump, push-ups, one-minute sit-ups, sit-and-reach, one-legged standing with eyes closed, and choice reaction time between the experimental group and the control group are statistically significant ( $p < 0.001$ ). This further confirms that aerobics dance majors perform better in terms of physical fitness. From the scores, aerobics dance majors achieve scores of 80 and 90 in physical fitness indicators, respectively, reaching a higher standard of the national physical fitness test results. This indicates that aerobics dance majors excel in physical fitness. According to the highest standards, the national physical fitness test results set the highest standard for grip strength at  $\geq 56.7$ , vertical jump at  $\geq 52.9$ , push-ups at  $\geq 45$ , one-minute sit-ups at  $\geq 43$ , sit-and-reach at  $\geq 21.3$ , one-legged standing with eyes closed at  $\geq 86$ , and choice reaction time at  $\geq 0.42$ . Aerobics dance majors meet the higher standards in all physical fitness indicators, further confirming their excellent performance in physical fitness.

The study indicates that aerobics dance training has the following main effects on physical fitness indicators: first, aerobics dance training can enhance students' grip strength, leading to better performance in grip strength tests; second, aerobics dance training can improve students' vertical jumping ability, resulting in better performance in vertical jump tests; third, aerobics dance training can increase students' push-up capacity, leading to better performance in push-up tests; fourth, aerobics dance training can enhance students' one-minute sit-up ability, resulting in better performance in one-minute sit-up tests; fifth, aerobics dance training can improve students' sit-and-reach ability, leading to better performance in sit-and-reach tests; sixth, aerobics dance training can enhance students' one-legged standing with eyes closed ability, resulting in better performance in one-legged standing with eyes closed tests; seventh, aerobics dance training can improve students' choice reaction time, leading to better performance in choice reaction time tests<sup>[17-22]</sup>. For non-art students, they should also pay attention to their physical fitness, maintaining good muscle strength and endurance.

In summary, aerobics dance majors perform better in terms of physical fitness, which may be related to the requirements of aerobics dance training for physical fitness. Schools and educational institutions should pay attention to the physical fitness development of aerobics dance majors and provide necessary support and guidance to promote the comprehensive development of students. At the same time, non-art students should also pay attention to their physical fitness development and receive necessary support and guidance to promote their comprehensive development.

Table 6 Comparison of physical fitness test results for male students. (N=50)

| Indicator                              | Group                     | MEAN±S     | T     | P     | Score | 100 Points |
|----------------------------------------|---------------------------|------------|-------|-------|-------|------------|
| Grip Strength                          | Experimental Group (Male) | 46.86±3.48 | 5.924 | 0.000 | 80    | ≥56.7      |
|                                        | Control Group (Male)      | 40.37±4.23 |       |       | 65    |            |
| Vertical Jump                          | Experimental Group (Male) | 42.73±4.16 | 6.956 | 0.000 | 80    | ≥52.9      |
|                                        | Control Group (Male)      | 33.83±4.86 |       |       | 65    |            |
| Push-ups (Male)/Knee Push-ups (Female) | Experimental Group (Male) | 30.12±3.28 | 5.168 | 0.000 | 85    | ≥45        |
|                                        | Control Group (Male)      | 25.34±3.26 |       |       | 75    |            |
| One-minute Sit-ups                     | Experimental Group (Male) | 38.26±3.24 | 8.727 | 0.000 | 90    | ≥43        |
|                                        | Control Group (Male)      | 29.37±3.93 |       |       | 75    |            |
| Seated Forward Bend                    | Experimental Group (Male) | 20.63±2.36 | 9.722 | 0.000 | 95    | ≥21.3      |
|                                        | Control Group (Male)      | 12.39±3.52 |       |       | 80    |            |
| Standing on One Leg with Eyes Closed   | Experimental Group (Male) | 50.65±7.33 | 9.770 | 0.000 | 90    | ≥86        |
|                                        | Control Group (Male)      | 31.48±6.52 |       |       | 80    |            |
| Choice Reaction Time                   | Experimental Group (Male) | 0.46±0.06  | 3.201 | 0.002 | 90    | ≥0.42      |
|                                        | Control Group (Male)      | 0.51±0.05  |       |       | 75    |            |

Table 7 Comparison of physical fitness test results for female students. (N=50)

| Indicator                              | Group                       | MEAN±S     | T      | P     | Score | 100 Points |
|----------------------------------------|-----------------------------|------------|--------|-------|-------|------------|
| Grip Strength                          | Experimental Group (Female) | 30.74±3.58 | 7.435  | 0.000 | 85    | ≥35.8      |
|                                        | Control Group (Female)      | 23.58±3.22 |        |       | 60    |            |
| Vertical Jump                          | Experimental Group (Female) | 27.65±3.66 | 3.540  | 0.001 | 80    | ≥35.5      |
|                                        | Control Group (Female)      | 23.56±4.47 |        |       | 65    |            |
| Push-ups (Male)/Knee Push-ups (Female) | Experimental Group (Female) | 27.50±4.62 | 4.967  | 0.000 | 85    | ≥38        |
|                                        | Control Group (Female)      | 20.47±5.36 |        |       | 75    |            |
| One-minute Sit-ups                     | Experimental Group (Female) | 31.22±3.85 | 5.406  | 0.000 | 90    | ≥37        |
|                                        | Control Group (Female)      | 24.66±4.69 |        |       | 80    |            |
| Seated Forward Bend                    | Experimental Group (Female) | 21.89±2.25 | 9.422  | 0.000 | 95    | ≥24.5      |
|                                        | Control Group (Female)      | 15.18±2.76 |        |       | 80    |            |
| Standing on One Leg with Eyes Closed   | Experimental Group (Female) | 56.73±6.64 | 14.000 | 0.000 | 90    | ≥90        |
|                                        | Control Group (Female)      | 32.75±5.41 |        |       | 80    |            |
| Choice Reaction Time                   | Experimental Group (Female) | 0.45±0.04  | 3.467  | 0.001 | 90    | ≥0.45      |
|                                        | Control Group (Female)      | 0.51±0.05  |        |       | 75    |            |

### 3.4 Comparison of comprehensive physical fitness assessment scores

According to the data from Table 8, we can analyze the physical fitness of aerobics dance majors and non-art students, and separately for males and females. In the male group, the comprehensive physical fitness assessment score of the experimental group (aerobics dance majors) is 87.75, reaching the excellent level; while the comprehensive physical fitness assessment score of the control group (non-art students) is 70.5, reaching the qualified level. In the female group, the comprehensive physical fitness assessment score of the experimental group (aerobics dance majors) is 87.5, reaching the excellent level; and the comprehensive physical fitness assessment score of the control group (non-art students) is 75, reaching the good level [7-9].

From the scores, it is evident that aerobics dance majors perform better than non-art students in comprehensive physical fitness assessment scores. This indicates that aerobics dance majors perform better in terms of physical fitness, which may be related to the requirements of aerobics dance training for physical fitness. From the levels, aerobics dance majors achieve excellent levels in comprehensive physical fitness assessment scores, while non-art students achieve qualified or good levels. This further confirms that aerobics dance majors perform better in terms of physical fitness. According to the national physical fitness test calculation standard, the comprehensive physical fitness assessment score for adults aged 20-49 is considered excellent when  $a \geq 83$ , good when  $75 \leq a < 83$ , qualified when  $60 \leq a < 75$ , and unqualified when  $a < 60$  [7-9]. Aerobics dance majors achieve excellent levels in comprehensive physical fitness assessment scores, indicating their excellent performance in physical fitness.

In summary, aerobics dance majors perform better in comprehensive physical fitness assessment scores, which may be related to the requirements of aerobics dance training for physical fitness. Schools and educational institutions should pay attention to the physical fitness development of aerobics dance majors and provide necessary support and guidance to promote the comprehensive development of students. At the same time, non-art students should also pay attention to their physical fitness development and receive necessary support and guidance to promote their comprehensive development.

Table 8 Comparison of comprehensive physical fitness assessment scores.

| Group                       | Score | Level     |
|-----------------------------|-------|-----------|
| Experimental Group (Male)   | 87.75 | Excellent |
| Control Group (Male)        | 70.50 | Qualified |
| Experimental Group (Female) | 87.50 | Excellent |
| Control Group (Female)      | 75.00 | Good      |

Note: The comprehensive physical fitness assessment score  $a$  for adults aged 20-49 is calculated as  $a = \text{weight index (BMI)} \times 0.05 + \text{body fat percentage} \times 0.10 + \text{vital capacity} \times 0.10 + \text{power bike secondary load test} \times 0.15 + \text{grip strength} \times 0.1 + \text{vertical jump} \times 0.10 + \text{push-ups (male) or kneeling push-ups (female)} \times 0.05 + \text{one-minute sit-ups} \times 0.05 + \text{sit-and-reach} \times 0.10 + \text{one-legged standing with eyes closed} \times 0.10 + \text{choice reaction time} \times 0.10$ ; adults aged 20-49 are considered excellent when  $a \geq 83$ , good when  $75 \leq a < 83$ , qualified when  $60 \leq a < 75$ , and unqualified when  $a < 60$ .

#### 4. Results

In-depth analysis of the physical fitness status of aerobics dance majors. This study not only focuses on the current national physical fitness testing standards but also conducts a comprehensive comparative analysis of historical standards. Previous physical fitness testing standards may have placed more emphasis on traditional indicators such as body mass index (BMI), body fat percentage, and vital capacity, which although provide some degree of physical fitness information, often fail to fully reveal students' physical fitness levels [7-9, 23-24]. In contrast, the current physical fitness testing standards are more comprehensive, covering key indicators such as power bike secondary load test, grip strength, and vertical jump. This shift reflects the continuous improvement and updating of physical fitness testing standards with social progress and increased health awareness [7-9, 23-24].

Previous physical fitness testing standards have limitations in assessing students' physical fitness comprehensively. For example, relying solely on BMI and body fat percentage, we can only understand students' weight and body fat ratio but not their muscle strength, endurance, flexibility, and other qualities. In contrast, the current standards are more comprehensive and can more accurately assess students' physical fitness levels, helping them to better understand their own physical fitness levels and make more targeted training and adjustments. The role of improving physical fitness testing standards is to better assess students' physical fitness, help them understand their physical fitness more comprehensively, and make more targeted training and adjustments. Additionally, improving physical fitness testing standards also helps to improve students' physical fitness levels and promote their overall development. This means that through more scientific physical fitness testing, we can more effectively guide students to conduct targeted exercise and nutrition intake to improve their physical fitness levels. The results of this study reveal that aerobics dance majors generally outperform non-art students in comprehensive physical fitness assessment scores, which is closely related to the strict requirements of aerobics dance training for physical fitness. Aerobics dance training not only emphasizes the development of strength, endurance, flexibility, and balance, but also effectively improves students' physical fitness levels [25-29]. In addition, the significant effect of aerobics dance training in shaping students' good body shape also meets the aesthetic requirements of artistic professions.

From existing literature data, the effectiveness of aerobics dance training in improving students' physical fitness levels has been widely recognized [23-27]. Studies have shown that aerobics dance training can effectively improve students' muscle strength, endurance, flexibility, and balance, thereby comprehensively improving their physical fitness levels [25-29]. Additionally, aerobics dance training can help students shape a good body shape, meeting the aesthetic requirements of artistic professions. These studies indicate that aerobics dance training has significant advantages in improving students' physical fitness levels.

Based on the results of this study and existing literature data, we can conclude that the physical fitness status of aerobics dance majors is superior to that of non-art students, which may be related to the strict requirements of

aerobics dance training for physical fitness<sup>[25-29]</sup>. Aerobics dance training focuses on the development of strength, endurance, flexibility, and balance, which helps to improve students' physical fitness levels. Additionally, aerobics dance training can help students shape a good body shape, meeting the aesthetic requirements of artistic professions.

The advantage of aerobics dance training lies in its ability to comprehensively improve students' physical fitness levels, including muscle strength, endurance, flexibility, and balance. Additionally, aerobics dance training can help students shape a good body shape, meeting the aesthetic requirements of artistic professions. Through aerobics dance training, students can improve their physical fitness levels and better adapt to professional studies and future career development. Therefore, schools and educational institutions should pay attention to the physical fitness development of aerobics dance majors and provide necessary support and guidance to promote the comprehensive development of students. At the same time, non-art students should also pay attention to their physical fitness status and make improvements based on the recommendations of this study. (See Table 9)

Table 9 Improvement plan for the physical fitness development of non-art students.

| Classification    | Specific Content                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical Form     | Develop a scientific diet plan to ensure students consume adequate nutrition, especially protein and carbohydrates, to support muscle growth and energy supply;<br>Strengthen flexibility training, such as yoga and Pilates, conducted 2-3 times a week, each session lasting 30-45 minutes;<br>Regularly assess body proportions and muscle lines, and adjust training plans based on the assessment results to achieve optimal body form.     |
| Physical Function | Increase aerobic endurance training, such as jogging and jumping rope, conducted 3-4 times a week, each session lasting 30-45 minutes;<br>Strengthen strength training, such as weightlifting and push-ups, conducted 2-3 times a week, each session lasting 30-45 minutes;<br>Regularly assess cardiopulmonary function and balance ability, and adjust training plans based on the assessment results to achieve optimal physical function.    |
| Physical Fitness  | Integrate aerobics dance training, such as aerobic exercises and dance movements, conducted 2-3 times a week, each session lasting 30-45 minutes;<br>Strengthen reaction speed training, such as quick reaction games and agility training, conducted 1-2 times a week, each session lasting 15-20 minutes;<br>Regularly assess physical fitness, and adjust training plans based on the assessment results to achieve optimal physical fitness. |

## 5. Conclusion

This study comprehensively assesses the physical fitness of aerobics dance majors and non-art students, finding that aerobics dance majors generally outperform non-art students in comprehensive physical fitness assessment scores. This may be related to the requirements of aerobics dance training for physical fitness, which emphasizes the development of strength, endurance, flexibility, and balance, contributing to the improvement of students' physical fitness levels. Moreover, aerobics dance training helps students shape a good body shape, meeting the aesthetic requirements of artistic professions.

In terms of physical form, the average BMI and body fat percentage of aerobics dance majors are superior to those of non-art students, indicating better performance in physical form. In terms of physical function, the average vital capacity and power bike secondary load test results of aerobics dance majors are also superior to those of non-art students, indicating better performance in physical function. In terms of physical fitness, the average grip strength, vertical jump, push-ups, one-minute sit-ups, sit-and-reach, one-legged standing with eyes closed, and choice reaction time of aerobics dance majors are all superior to those of non-art students, indicating better performance in physical fitness.

This study designs a physical fitness improvement plan for non-art students, including training content for physical form, physical function, and physical fitness. The specific training content and planning are as follows: develop a scientific diet plan, strengthen flexibility training, integrate aerobics dance training, and enhance reaction speed training. By implementing the above training content and planning, non-art students can achieve comprehensive

improvement in physical form, physical function, and physical fitness, meeting professional requirements and laying a solid foundation for future career development.

In summary, the physical fitness status of aerobics dance majors is superior to that of non-art students, which may be related to the requirements of aerobics dance training for physical fitness. Through aerobics dance training, students can improve their physical fitness levels and better adapt to professional studies and future career development. Schools and educational institutions should pay attention to students' physical fitness development and provide necessary support and guidance to promote comprehensive student development. At the same time, non-art students should also pay attention to their physical fitness status and make improvements based on the recommendations of this study.

## References

- [1] Zhang Qiangfeng, Tang Changfa, Yin Lijin, et al. Implementation and Effect of the "National Student Physical Health Standard" Policy from the Perspective of Audience Response - Empirical Analysis Based on 40 Ordinary Universities in 10 Provinces. *Chinese Journal of Sports Science and Technology*, 2020, 56(10): 89-97.
- [2] Maldari MM, Garcia JM, Rice DJ. The impact of health education on physical activity correlates in college students. *J Am Coll Health*. 2023 Jan; 71(1): 111-116.
- [3] Ness KK, DeLany JP, Kaste SC, et al. Energy balance and fitness in adult survivors of childhood acute lymphoblastic leukemia. *Blood*. 2015; 125 (22): 3411-9.
- [4] Wang L. The role of dance in promoting health and well-being. New York: Nova Science Publishers. 2020: 25-38.
- [5] Deng C, Yu Q, Luo G, et al. Big data-driven intelligent governance of college students' physical health: System and strategy. *Front Public Health*. 2022; 10: 924025.
- [6] Suyao Wei, Zhihui Wu. The Application of Wearable Sensors and Machine Learning Algorithms in Rehabilitation Training: A Systematic Review. *Sensors*. 2023; 23 (18): 7667-7667.
- [7] Wang Bihang, Tang Changfa, Zhang Qiangfeng. Main Changes, Objectives and Practice Direction of the "National Physical Fitness Assessment Standard (2023 Revised Edition)". *Journal of Physical Education*, 2024, 31(03): 147-152.
- [8] Yang Jie, Wu Hua, Zhou Wenhong. Innovation, Examination and Application Thinking of the "National Physical Fitness Assessment Standard (2023 Revised Edition)" for Preschool Children. *Bulletin of Sports Science and Technology*, 2024, 32(05): 260-264.
- [9] Yu Xiaodan, Chen Rong. Interpretation and Evaluation of the "National Physical Fitness Assessment Standard (2023 Revised Edition)". Jiangxi Sports Science Association, Jiangxi School Sports Alliance, Jiangxi Sports Discipline Alliance, East China Jiaotong University School of Physical Education and Health. Proceedings of the Fourth "National Fitness Scientific Sports" Academic Exchange Conference and International Sports and Health Academic Forum. East China Jiaotong University School of Physical Education and Health; East China Jiaotong University Sports Fitness Research Center, 2023: 2.
- [10] Merchant RA, Seetharaman S, Au L, et al. Relationship of Fat Mass Index and Fat Free Mass Index With Body Mass Index and Association With Function, Cognition and Sarcopenia in Pre-Frail Older Adults. *Front Endocrinol (Lausanne)*. 2021 Dec 24; 12: 765415.
- [11] Luo X, Cai B, Jin W. The Prevalence Rate of Adult Sarcopenic Obesity and Correlation of Appendicular Skeletal Muscle Mass Index with Body Mass Index, Percent Body Fat, Waist-Hip Ratio, Basal Metabolic Rate, and Visceral Fat Area. *Metab Syndr Relat Disord*. 2023 Feb; 21(1): 48-56.
- [12] Gažarová M, Bihari M, Šoltís J. Fat and fat-free mass as important determinants of body composition assessment in relation to sarcopenic obesity. *Rocz Panstw Zakl Hig*. 2023; 74(1): 59-69.
- [13] Mao Yunmei. A Study on the Effectiveness of Two Indirect Methods for Determining Maximum Oxygen Uptake. Shandong Sports University, 2020.
- [14] Cid-Juárez S, Thirión-Romero I, Torre-Bouscoulet L, et al. Inspiratory Capacity and Vital Capacity of Healthy Subjects 9-81 Years of Age at Moderate-High Altitude. *Respir Care*. 2019 Feb; 64(2): 153-160.
- [15] Jackson CE. Vital capacity as an efficacy measure: con. *Amyotroph Lateral Scler Other Motor Neuron Disord*. 2002; 3 Suppl 1: S59-60.
- [16] Chhabra SK. Forced vital capacity, slow vital capacity, or inspiratory vital capacity: which is the best measure of vital capacity? *J Asthma*. 1998; 35(4): 361-5.
- [17] Martínez Muñoz IY, Camarillo Romero EDS, Correa Padilla T, et al. Association of Irisin Serum Concentration and Muscle Strength in Normal-Weight and Overweight Young Women. *Front Endocrinol (Lausanne)*. 2019; 10: 621.
- [18] Kovacs MS, Pritchett R, Wickwire PJ, et al. Physical performance changes after unsupervised training during the autumn/spring semester break in competitive tennis players. *Br J Sports Med*. 2007; 41 (11):705-10; discussion 710.

- [19] Vaara JP, Vasankari T, Koski HJ, et al. Awareness and Knowledge of Physical Activity Recommendations in Young Adult Men. *Front Public Health*. 2019 Oct 30; 7: 310.
- [20] Kavalakatt S, Khadir A, Madhu D, et al. Urocortin 3 Levels Are Impaired in Overweight Humans With and Without Type 2 Diabetes and Modulated by Exercise. *Front Endocrinol (Lausanne)*. 2019; 10: 762.
- [21] Đurić S, Bogataj Š, Zovko V, et al. Associations between Physical Fitness, Objectively Measured Physical Activity and Academic Performance. *Front Public Health*. 2021; 9: 778837.
- [22] Tomás CC, Oliveira E, Sousa D, et al. Proceedings of the 3rd IPLeiria's International Health Congress: Leiria, Portugal. 6-7 May 2016. *BMC Health Serv Res*. 2016 Jul 6; 16 Suppl 3 (Suppl 3): 200.
- [23] Sun Tinghan, Sun Xia. Impact of the "National Student Physical Health Standard" on College Physical Education Teaching. *Journal of Shanxi Finance and Economics University*, 2022, 44(S1): 140-142.
- [24] Chen Liping. Physical Education Teaching Reform Based on Promoting Students' Physical Health - Review of "Investigation and Exploration of Physical Education Teaching Development and Reform in Ordinary Colleges and Universities". *Journal of China Education*, 2020, (05): 126.
- [25] Xu J, Li X. Impact of Dance Sport on General Fitness from the Perspective of Chinese Athletes. *J Healthc Eng*. 2021 Nov 11; 2021: 4294710.
- [26] Huang SY, Hogg J, Zandieh S, et al. A ballroom dance classroom program promotes moderate to vigorous physical activity in elementary school children. *Am J Health Promot*. 2012 Jan-Feb; 26(3): 160-5.
- [27] Li Z, Ding T, Gao Y, Han X, et al. A comparison of the effects of two protocols of concurrent resistance and aerobic training on physical fitness in middle school students. *PeerJ*. 2024 Apr 23; 12: e17294.
- [28] Aparecido JML, Marquezi ML, Couto HLO, et al. Six HIT Sessions Improve Cardiorespiratory Fitness and Metabolic Flexibility in Insulin Resistant and Insulin Sensitive Adolescents with Obesity. *Int J Environ Res Public Health*. 2022 Aug 25; 19(17): 10568.
- [29] Rezende Barbosa MP, Vanderlei LC, Neves LM, et al. Functional training in post menopause: Cardiac autonomic modulation and cardiorespiratory parameters, a randomized trial. *Geriatr Gerontol Int*. 2019 Aug; 19(8):823-828.