

Action Research on the Improvement of Junior High School Boys' Pull-up Ability Based on Circuit Training--Taking Dinghu Yishe as an Example

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Abstract: This study examines circuit training for improving pull-up abilities in middle school boys at Dinghu Yishe. It finds that while circuit training moderately enhances pull-up performance, effective, scientifically designed methods are essential for fully developing students' abilities. Emphasis is on group-based, progressive training to optimize achievement and overall physical fitness.

Keywords: Dinghu Yishe; Cyclic psychology; Pull-ups

1. Purpose of the study

To address concerns over high failure rates in secondary school pull-up tests, our school implements circuit training in PE. This method organizes varied, station-based exercises to boost pull-up performance. Through a semester-long study comparing experimental and control groups, we aim to validate the effectiveness of circuit training in enhancing pull-up abilities, guiding future PE strategies and research.

2. Research Methods

2.1 Literature method

Based on the dissertation's focus on enhancing junior high school boys' pull-up ability through cycle training, extensive literature review on platforms like China Knowledge Network and Academic Network was conducted. This process aimed to gather and analyze relevant articles and journals to inform the dissertation's methodology and provide valuable reference material.

2.2 Questionnaire Survey Method

2.2.1 Questionnaire design

Based on the research objectives and content of this thesis, we developed and refined questionnaires for students and teachers following expert guidance. These surveys yielded crucial data that forms the foundation of our study.

2.2.2 Reliability test of the questionnaire

The reliability of the questionnaire was confirmed through re-testing with 40 students, showing a correlation coefficient (R) of 0.84 between the initial and subsequent test results, validating its credibility.

2.2.3 Questionnaire Implementation

For 420 students of Dinghu Yishe Junior High School boys, the questionnaire survey was conducted on teachers and students using the time of physical education classes, the number of copies issued was 420, the number of copies recovered was 420, the recovery rate was 100%, and the valid questionnaires were 418 copies.

2.3 Experimental method

2.3.1 Experimental subjects

420 male students of Dinghu Yishe Junior High School were selected as experimental intervention subjects, aged 12-15 years old, 210 in classes 1, 2 and 3 of the first, second and third year as the experimental group, and 210 in classes 4, 5 and 6 of the first, second and third year as the control group.

2.3.2 Type of experiment

Double-blind experiment.

2.3.3 Experimental content

Control Group: Standard PE curriculum with radio exercises, running, ball games, and strength training. Weekly pull-up sessions included.

Experimental Group: Enhanced PE classes with circuit training. Focused on finger, upper limb, core, and back strength, emphasizing key

muscle groups.

Experimental Procedure: Initial assessments in week 2. Maintained three sessions weekly over 17 weeks with controlled intensity (130-180 bpm). Analyzed pull-up performance in mid and end-term national fitness tests.

2.4 Mathematical statistics

All pre- and post-experiment data were analyzed using Excel software. Statistical analysis of questionnaire and interview data assessed changes and compared outcomes between experimental and control groups, evaluating the effects of cyclic training on junior high school students' pull-up abilities.

2.5 Field observation method

Through direct participation or observation of the teaching process of physical education majors, in-depth cycle training method in improving the specific performance and role of junior high school male pull-ups.

3. Results and Analyses

3.1 Analysis of students' body morphology and function before the experiment

The normal rate of BMI of the students in the experimental and control groups was 80% and 77.4% respectively, the rate of low body weight was 14.3% and 11.4% respectively, and the number of overweight and obesity was 24. Controlling for the two groups, there was no significant difference in body morphology between the two groups of students by T-test.

The students' pull-up performance is more related to the students' grip strength, and the size of the grip strength has a direct effect on the pull-up performance. Before the experiment, the grip strength of the students in the experimental group and the control group was measured, and the data showed that most of the students showed that their right hands were slightly stronger than their left hands, but the grip strength of the two groups of students was close to the same level, and there was no significant difference between the two groups.

3.2 Survey on Students' Exercise Habits

Through the distribution of questionnaires and interviews with students, we learnt about the situation of the first year male students in our school who participate in physical exercise after school. Restricted by the small amount of time for after-school exercise and the greater academic pressure, the situation of students' participation in physical exercise after school is not optimistic. In the experimental group and the control group, the number of students who actively participate in physical exercise after school is not large, the majority of occasional exercise and exercise 2-3 times a week, and most of the exercise programmes are ball-related content, and there are few cases of pull-ups after school.

3.3 Content of Circuit Exercise

Teaching pull-ups to first-year junior high school students presents challenges due to their limited upper body strength. Many can only manage 1-2 repetitions, with some unable to complete even one. Grip discomfort and pain further discourage students, undermining their confidence and interest. Unlike ball games or athletics, designing engaging pull-up exercises is complex, making it harder for teachers to motivate students to learn and practice effectively.

Table 1. Arrangement of Circular Exercise Method

Parts	Exercise Method
Finger Strength	grip, finger push-ups, double wrestling, vertical suspension, solid ball throw
Upper body strength	push-ups, burpees, parallel bars arm flexion, push car, double tug-of-war
Abdominal and Back Strength	wide distance hanging, prone birds, lying on both ends, prone to pull forward

To boost student enthusiasm, the experimental group minimized bar exercises and integrated cyclic training focusing on finger, upper limb, abdominal, and back strength. This approach increased exercise density and intensity within regular classes, enhancing workout engagement. Group competitions created a fun, relaxed atmosphere, alleviating monotony and motivating students to participate actively in physical activities.

3.4 Comparison of students' pull-up ability before, during and after the experiment

In the first, eighth, and seventeenth weeks of the experiment, students' pull-up ability was assessed following national standards: hands shoulder-width apart, straight arms hanging, legs relaxed, pulling up until the lower jaw cleared the bar. Initial tests showed comparable performance between experimental and control groups. By the third test, both groups improved, with the experimental group showing significantly greater improvement, indicating the effectiveness of cyclic training in enhancing pull-up ability compared to traditional methods.

Table 2. Comparison of students' pull-up completion before, during and after the experiment

Group	Completion number	Previous population	Mid-term population	Late population
Experimental group	0 (no score)	108	72	24
	1~3 (Failing)	84	96	96
	4~8 (pass)	18	36	72
	More than 8 (good)	0	6	18
Control group	0 (no score)	102	84	60
	1~3 (Failing)	78	84	96
	4~8 (pass)	24	36	42
	More than 8 (good)	6	6	12
P		>0.05	>0.05	<0.05

4. Conclusion and Recommendation

4.1 Reasonable choice of content can increase the interest of training, can quickly and comprehensively exercise the ability of the muscle groups required for the project, and improve the physical quality. It is recommended that teachers use more circuit training methods to develop students' strength qualities, reduce bar exercises in case of insufficient strength, and improve students' pull-up related muscle strength.

4.2 Arranging the difficulty of the exercises, following the principle of gradual progress, can put forward different requirements for students with different abilities, and can achieve better training effects. Teachers design the content of the appropriate circuit training method. The content of each exercise should be based on the teaching task and teaching conditions, students' athletic ability and the actual situation of the field equipment.

4.3 Use the circuit training method interspersed in the beginning or middle part of the lesson, so as to facilitate the teacher to adjust the teaching content according to the actual situation. According to the principle of easy to difficult movements, the body functions are warmed up slowly, so as to reduce the physical injuries brought about by insufficient warm-up of students.

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