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The Effect of Agility Balance and Coordination Warm-Up on Children's Tennis Performance

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Abstract

Background and Aims: Tennis is also a sophisticated action, intense confrontation, technical and tactical use of complex and varied network antagonistic sport, on physical and mental intelligence aspects of the higher requirements, emphasizing skills and physical dominance. The purpose of this study is to select 40 male children aged 6-10 years old from a tennis club in Xi'an for a group experiment based on the selection conditions of age, height, weight, training time no more than 6 months, and training twice a week, and to find out the theoretical basis of agility, balance, and coordination intervention training on the improvement of children's tennis hitting ability.

Materials and Methods: This study adopts the literature method, expert interview method, experiment method, and mathematical statistics method. Five expert professors were interviewed, and the validity of expert interviews and experimental results was measured by IOC, t-test, and other data. Through 8 weeks of agility, balance, and coordination training in the experimental group and the control group, and 90 minutes of intervention training twice a week, it is concluded that the experimental group and the control group have significant differences, and the experimental group has significantly improved its ability in batting and other aspects.

Results: The results showed that: (1) 8-week agility, balance, and coordination intervention training applied in the warm-up part significantly improved the agility, balance, and coordination ability of children's tennis in the experimental group, and the intervention program was feasible to improve the agility, balance and coordination ability of children's tennis students in the interest class. (2) After 8 weeks of agility, balance, and coordination training, the number of goals scored by the students in the experimental group in the scoring area of 1, 2, and 3 points of forehand stroke showed a significant difference compared with before training, while the difference was only significant in the scoring area of 1 point of the backhand stroke. It shows that 8 weeks of agility, balance, and coordination training can improve the stability and accuracy of forehand strokes more obviously.

Conclusion: (1) Stability and accuracy are based on good agility, balance, and coordination. Agility, balance, and coordination can improve the accuracy and stability of forehand and backhand in tennis training for children. (2) 6-10 years old is the best period for children to conduct agility, balance, and coordination intervention training, so strengthening agility, balance, and coordination training in tennis warm-up training can not only improve the stability and accuracy of children's tennis shots but also increase children's interest and concentration.

Keywords: Ability Training; Children's Tennis; Tennis Training Model

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Introduction

In 2004, China's Li Ting and Sun Tiantian made a historic breakthrough in the Athens Olympic Games by winning the gold medal in women's doubles. This has played an immeasurable role in the development of tennis in China. Then Zheng Jie and Yan Zi of China won the Australian Open and Wimbledon Open in 2006, and Li Na made a historic breakthrough by winning two Grand Slam women's singles championships in the 2011 French Open and the 2014 Australian Open. In 2022, Wu Yibing entered the main event through the U.S. Open qualifying tournament, becoming the first Chinese mainland player to enter the U.S. Open men's singles main event, and reached the round of 32 in this tournament, winning the TOP50 for the first time in his career and becoming the first Chinese mainland player to win the Grand Slam men's singles main event in the Open era. In 2023, Wu Yibing successfully held the ATP 250 championship trophy of the Dallas Station in the United States, which greatly enhanced the influence of tennis in China, so that more Chinese teenagers and children participate in tennis projects.

Tennis is also a sophisticated action, intense confrontation, technical and tactical use of complex and varied network antagonistic sport, on physical and mental intelligence aspects of the higher requirements, emphasizing skills and physical dominance. This requires athletes to pay attention to the coordination of various organ systems and parts of the body in the process of exercise, that is, agility, balance, and coordination. In other words, the mastery of sports technology, the application of skills and tactics, and the improvement of tennis performance are all directly affected by agility balance coordination. Therefore, the necessary agility, balance, and coordination training for tennis players has a vital role. Tennis learners for children (6-10 years old) are the main source of tennis reserve talents in the future, and also the agility period and window period (that is, the rapid growth period) for the development of agility balance coordinate. In this period, cultivating children's long-term interest and personal ability in tennis plays an important role in their future development. Children have a short attention span and are easily attracted to interesting things. Based on the above thinking, this paper puts forward this research topic to explore the influence of agility balance coordination on the accuracy and stability of children's tennis shots for beginners. Based on the research on agility, balance, and coordination training at home and abroad, this study summarizes the theoretical significance of agility, balance, and coordination in children's tennis training by referring to relevant literature on children's and adolescents' tennis technical training and using methods such as logical analysis, expert interviews, and experimental control. The research on children's agility balance and coordination will enrich the means and content of tennis training, which has certain practical significance and guiding significance.

Learn from the agility, balance, and coordination training of other sports, and improve it according to the actual situation, explore training programs in children's tennis training, to improve the stability and continuity of children's tennis shots, enrich the domestic children's tennis training methods, and provide new training ideas for children's tennis coaches and teachers.

Children aged 6-10 years are in an agility period of physical development such as agility balance and coordination. During this period, targeted sports intervention for children will achieve good control of the development effect of children's tennis. The current research shows that because of the characteristics of children's growth and development, targeted training has become the focus of training and competition. At the beginning of learning tennis, children often experience the phenomenon of

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unstable hitting movement. The training of agility balance and coordination has been proven to play an irreplaceable role in the training mode of other projects in our country and has been continuously developed and recognized.

The survey found that in the warm-up of tennis clubs and schools, children's tennis usually uses traditional warm-up methods, simple warm-up movements such as jogging, rope ladder, freehand exercises, etc., can achieve the purpose of warm-up, but for 6-10 years old children's agile period is too monotonous and lack of professionalism, children's ability can not be effectively improved. By adopting agile, balanced, and coordinated warm-up methods, children aged 6-10 can not only achieve a good warm-up effect but also improve the stability and accuracy of children's forehand and backhand strokes. Based on this, this study conducted a comparative experimental study on the agility, balance, and coordination of children's tennis training content.

In this study, 40 children with no difference samples will be selected by testing method, the experimental group and control group will be conducted, and the results will be compared differently. Through the intervention of children's ability training can effectively improve children's tennis agility balance coordination ability to improve the stability and continuity of hitting is effective. Through the intervention training of children's ability training, we can put forward new ideas for the training mode of Chinese youth tennis, improve children's interest and sports performance, improve the competitive level of Chinese tennis and increase the career time of athletes, and reduce the injuries caused by training competitions.

Objective

2.1 The influence of the tennis training mode focusing on agility, balance, and coordination on the tennis performance of children in Xi 'an is compared, and the experiment shows that the intervention training of agility, balance, and coordination can improve the fore-and-backhand hitting ability of children in Xi 'an.

2.2 Through the training of agility, balance, and coordination, the stability and accuracy of forehand and backhand strokes in children's tennis can be improved.

Literature Review

Based on the research on agility balance coordination training at home and abroad, this study obtained the theoretical significance of children's agility balance coordination in tennis training by referring to the relevant literature on children's and adolescents' tennis training and using methods such as logical analysis, expert interviews, and experimental comparison. This paper summarizes the theoretical significance of agility balance and coordination in children's tennis training. For children, practicing agility balance coordination will enrich the means and content of tennis training, which has certain practical significance and guiding significance. Taking the agility balance, and coordination training of other sports as a reference, it is improved according to the actual situation and applied to children's tennis training, exploring training programs to improve the stability and continuity of children's tennis shots, enrich the domestic children's tennis training methods, and provide new training ideas for children's tennis coaches and teachers.

Mentioned in his research on the influence of coordination ability on the training of tennis special

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movement technology that any technical movement in tennis needs good coordination ability (Xie Yuanbo 2016). Players face different angles to the ball, through the movement of the feet to find a comfortable batting position, in the movement to adjust the body posture to grasp the best time to hit, which requires players to have good reaction ability, balance ability, agility and batting rhythm, etc., these abilities and the coordination of the players are closely related. However, there is not much research on tennis coordination ability, which is not conducive to the study and improvement of tennis players' movement skills and is not conducive to the long-term development of tennis players.

The significance of adding coordination training to the preparation part of tennis class in an article on the experimental study of coordination intervention on the hitting stability of campus short tennis students, to provide a theoretical reference for the coordination training of campus short tennis and lay a practical foundation for training outstanding tennis players (Li Linlin 2020) .The influence of the combination of resistance speed and agility training on the special quality of young tennis players that attention should be paid to the following problems in the process of developing agility quality: It is necessary to cultivate agility quality in children and teenagers (Lu Chongxing 2019).

As mentioned in the good partner of marker bucket - agility training marker bucket training is a training method to develop athletes' ability to start quickly, brake quickly, accelerate and decelerate, and change direction during movement. With the mark bucket as a sign, athletes are required to pass at the fastest speed according to certain rules (Sun Qi 2015).

The purpose of the warm-up exercise is to enable the athlete to fully mobilize the vitality of all parts of the body and prepare for the intensity of the upcoming exercise. The training of each event also varies with its own sports characteristics and age differences in warm-up. Through searching the literature, it is found that the tennis warm-up training in China is still in the basic and simple warm-up mode, so tennis should strengthen the agility, balanced and coordinated warm-up training mode according to its characteristics to improve its training effect.

Conceptual Framework

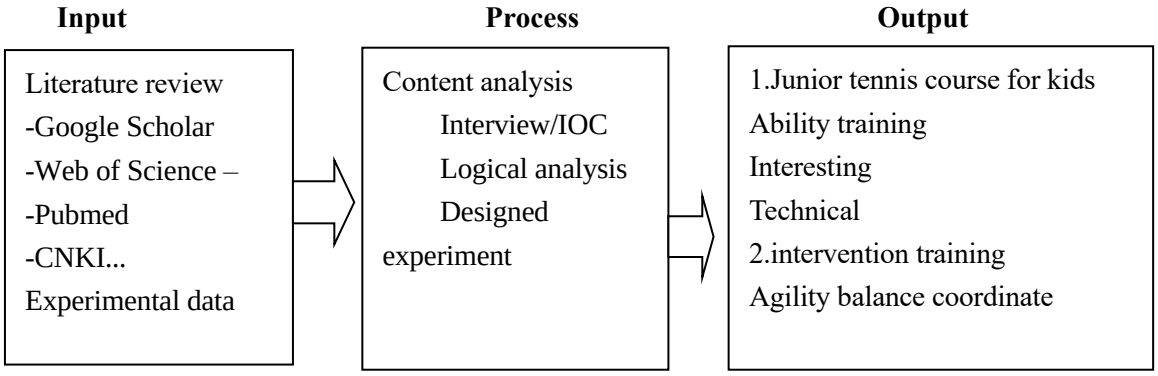

Figure 1 Conceptual Framework

Methodology

Population and sample

100 children aged 6-10 from a tennis club in Xi'an were selected, all of whom were boys. Subject screening criteria :(1) No more than 6 months of training in the club; (2) Ensure training twice a week; (3) 8 children between the ages of 6 and 10, to ensure the same number of age groups; (4) Through testing the height and weight of the samples, the top 8 children of different ages were selected from low to high according to the test results; (5) Confirmed by the doctor, the body is healthy and can withstand a certain amount of exercise load intensity. After screening, 40 subjects were pretested, and the results

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were sorted and divided into an experimental group (N = 20) and a control group (N = 20) according to the sequencing.

Forty beginners who trained twice a week in the club for less than 6 months were randomly divided into two groups according to height and weight, and there was no significant difference between the two groups. Initially, G-power, the statistical tool used to calculate the sample size, determined that the sample size was 40 people. Considering the 30% sample loss, the sample size was calculated based on a statistical test of the moderate-strength effect size, Cohen's d=0.25.

Research Tools

1. 70% standard air pressure (by the International Tennis Federation junior and children's standard ball)

2. Tianlong 23-25 "tennis racket (compliant with International Tennis Federation standards for children)

3. Tape, sign bucket, balance mat, balloon, sensitive light, etc.

Training locations and training program

Experimental site: the second tennis court of Xi'an Institute of Physical Education. The trial lasted for 8 weeks. The experimental group received warm-up intervention training for the first 20 minutes every Wednesday and Friday from 18:00-19:30; The control group received the traditional warm-up training for the first 20 minutes at 19:30-21:00 every Wednesday and Friday.

Data Analysis

SPSS 26.0 was used for statistics, sorting, and analysis of the collected data.

Based on the results of a questionnaire survey, IOC statistics were used to analyze the feasibility of sensitive, balanced, and coordinated warm-up intervention for children's tennis on the accuracy and stability of hitting

The paired sample t-test is used to compare pre - and post-experimental data within the same group to assess differences within the group. $p < 0.05$ indicates a statistically significant difference within a group.

The independent sample T-test is used to compare the differences between two groups of data, that is, to assess the differences between groups. $p < 0.05$ indicates a statistically significant difference between the two groups.

Results

1. Comparative analysis of test results before the experiment

Table 1 Score areas of the control group and the experimental group before and after baseline batting training

Quantitative comparison	Score	Control group (N20)		Experimental group (N20)	
		pre-training	post-training	pre-training	post-training
Forehand	1 partition	3.42±1.08	2.75±1.14	3.50±1.57	1.83±0.72*

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Quantitative comparison	Score	Control group (N20)		Experimental group (N20)	
		pre-training	post-training	pre-training	post-training
	2 partition	0.75±0.87	0.92±1.00	0.33±0.49	1.42±0.79*
	3 partition	0.50±0.80	1.42±0.52**	0.67±0.65	1.75±0.62**
Backhand	1 partition	2.17±1.03	2.67±1.07	1.92±0.67	3.42±0.80**
	2 partition	0.25±0.45	0.33±0.65	0.08±0.29	0.33±0.49
	3 partition	0.08±0.29	0.17±0.39	0.08±0.29	0.25±0.45

*p < 0.05, **p < 0.01

According to Table 1, there was no significant difference in the number of goals in each score area between the experimental group and the control group before the experiment. After the experiment, the number of goals scored in each score area of forehand stroke in the control group showed no significant difference compared with before the experiment. The number of goals scored in the first sub-area decreased significantly, and the number of goals scored in the second sub-area showed a trend of increase, but there was no significant difference. In the control group, the number of backhand shots in the first, second, and third sub-areas showed a trend of improvement compared with before training, but there was no significant difference. In the experimental group, the number of goals scored in forehand 1, 2, and 3 subareas after agility, balanced and coordinated training plus technical training showed significant differences compared with before training, among which the number of goals scored in the 1 score area was significantly less, the number of goals scored in the 2 score area was significantly increased, showing a significant difference compared with before training ($p < 0.05$), and the number of goals scored in the 3 score area was significantly increased. Compared with before training, the difference was very significant ($p < 0.01$). The number of goals in the 1 score area of backhand stroke in the experimental group increased significantly compared with that before training, showing a significant difference ($p < 0.05$). The number of goals in the 2 and 3 score areas showed an increasing trend compared with that before training, but there was no significant change.

1.1. Comparative analysis of agility, balanced and coordinated test results before experimenting between an experimental group and control group

Before the experiment, agility, balance, and coordination tests were carried out on the experimental group and control group, and the test results were input into SPSS26.0 and EXCEL software for analysis. An Independent sample t-test was adopted, and the results are shown in Table 2. The initial agility, balance, and coordination of the experimental group and control group before the experiment can be seen in Table 2.

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Table 2 Comparison of agility, balance, and coordination test results between the experimental group and control group before the experiment

	Experimental group	Control group	t	P-value
Agility balanced coordinated	5.83±0.25	5.75±0.27	0.74	0.469

*p < 0.05, **p < 0.01

It can be seen from Table 2 that there is no significant difference between the students in the experimental group and the control group in terms of agility, balance, and coordination ability, indicating that there is no statistically significant difference between the students in the experimental group and the control group in terms of agility, balance and coordination ability before the experiment. The data are comparable, which provides a basic theoretical guarantee for the later experiment.

1.2 Comparison and analysis of the test results of successful batting and batting scores before the experiment between the experimental group and the control group

Before the experiment, the experimental group and the control group were tested on baseline fore-and-backhand strokes, and the test results were input into SPSS26.0 and EXCEL software for analysis. An Independent sample t-test was adopted, and the results are shown in Table 3. The initial stability and accuracy of baseline strokes of the experimental group and the control group before the experiment can be seen in Table 3.

Table 3 Comparison of baseline batting test results before the experiment between the experimental group and control group

	Experimental group	Control group	t	P-value
Number of hits	6.50±0.80	7.17±0.94	1.88	0.074
score	8.25±1.49	9.00±1.91	1.08	0.294

*p < 0.05, **p < 0.01

The baseline fore-and-backhand stroke is the most frequently used technique in all tennis techniques. Because students in this age group cannot reach the level of adults in terms of strength and speed, the accuracy and stability of fore-and-backhand strokes are the focus of training and the key factors for winning matches. As can be seen from Table 5, there was no significant difference between the experimental group and the control group in the number of successful hits and the scores of the baseline fore-and-backhand hits before the experiment, and the stability and accuracy of the tennis hits of students in the two groups were similar.

2. Comparative analysis of test results after the experiment

2.1 Comparative analysis of agility, balanced and coordinated test results between the experimental group and the control group

At the end of the experiment, agility, balanced, and coordinated tests were carried out on the experimental group and the control group, and the test results were input into Excel and SPSS26.0 for statistics and analysis. The statistical method was an independent sample t-test. The results are shown in Table 4. It can be seen from the test results that there are significant differences in agility, balance,

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and coordination between the experimental group and the control group after the experiment, and the experimental group shows smaller agility, balance, and coordination errors.

Table 4 Comparison of agility, balance, and coordination test results between experimental group and control group

	Experimental group	Control group	t	P-value
Agility, balanced, and coordinated	4.98±0.13	5.62±0.21	9.15	0.00**

*p < 0.05, **p < 0.01

2.2 Comparison and analysis of the number of successful shots and scoring test results between the experimental group and the control group

After the experiment, the experimental group and the control group were tested for the accuracy of baseline strokes, and the test results were input into Excel and SPSS26.0 for statistics and analysis, and the statistical method was an independent sample t-test. The results are shown in Table 7. As can be seen from the test results, there were significant differences between the experimental group and the control group in the number of successful shots and the score of shots after the experiment (P < 0.05).

Table 5 Comparison of baseline batting test results between the experimental group and control group

	Experimental group	Control group	t	P-value
Number of hits	8.75±0.75	8.08±0.67	2.29	0.03*
Score	14.08±1.24	12.42±1.68	2.77	0.01*

*p < 0.05, **p < 0.01

3. Comparative analysis of test results before and after the experiment

3.1 Comparative analysis of agility, balanced and coordinated test results before and after the experiment between the experimental group and the control group

Table 6 Comparison of agility, balance, and coordination test results between the experimental group and the control group before and after the experiment

	Control group (N20)			Experimental Group (N20)		
	Before the experiment	post-test	p-value	Before the experiment	post-test	p-value
Agility, balanced, and coordinated	5.75±0.27	5.62±0.21	0.09	5.83±0.25	4.98±0.13	0.002**

*p < 0.05, **p < 0.01

After 8 weeks of the experiment, agility, balanced, and coordinated tests were carried out on the experimental group and the control group, and the test data were input into SPSS26.0 software for analysis using paired sample t-test. It can be seen from Table 8 that the agility, balance, and coordination

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errors of the experimental group showed significant changes before and after the experiment ($p < 0.01$), while the control group showed improvement but no significant changes. It can be seen from Table 8 that the variation amplitude of agility, balance, and coordination error values of the experimental group and the control group before and after the experiment was reduced from 5.83cm before the experiment to 4.98cm after the experiment, and error was reduced by about 1cm. The control group was reduced from 5.75cm before the experiment to 5.62cm, and the error was reduced to 0.13cm, which was improved but not statistically significant. The experimental results show that the training scheme can effectively improve the agility, balance, and coordination ability of 6-10-year-old tennis students.

3.2 Comparison and analysis of the number of successful shots and scoring results before and after the in among the experimental group and the control group

Table 7 Comparison of successful batting numbers and batting scores among the two groups before and after the experiment

	Control group (N20)			Experimental Group (N20)		
	Before the experiment	**post-test**	**p-value**	**Before the experiment**	**post-test**	**p-value**
Number of hits	7.17±0.94	8.08±0.67	0.036*	6.50±0.80	8.75±0.75	0.005**
Score	9.00±1.91	12.42±1.68	0.003**	8.25±1.49	14.08±1.24	0.002**

*p < 0.05, **p < 0.01

After 8 weeks of experiment, a batting accuracy test was carried out for the experimental group and the control group, the number of successful batting and the score obtained were recorded, and the data were input into SPSS26.0 statistical software, and the data before and after the group were analyzed by using paired sample t-test. As can be seen from Table 7, there were significant differences between the experimental group and the control group in the number of successful shots and the score of shots ($p < 0.05$) compared with that before the experiment, and the score of shots in the experimental group showed extremely significant differences compared with that before the experiment ($p < 0.01$), indicating that 8 weeks of training greatly improved the accuracy of shots in both the experimental group and the control group.

On the other hand, it can be seen from Figure 9 that the average number of successful shots in the control group increased from 7.17 before the experiment to 8.08 after the experiment, with an average increase of about one. The batting score has increased from 9 to 12.42, an average increase of about 3 runs. At the same time, the number of successful shots in the experimental group increased from 6.5 before the experiment to 8.75 after the experiment, an average increase of about 2; Batting scores increased from 8.25 to 14.08, an average increase of about six runs. It can be seen from the range of changes in the number of successful shots and batting scores between the experimental group and the control group that the experimental group made more obvious progress and improved the accuracy of batting more significantly. The results show that under the same technical training conditions, the agility, balanced, and coordinated warm-up training in the experimental group has a better effect on improving the accuracy of the baseline stroke than the traditional warm-up scheme in the control group.

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3.3 Comparison and analysis of the number of successful shots and the improvement range of shots scored before and after the in among the experimental group and the control group.

Table 10 Comparison of the difference between the number of runs scored and the number of hits made among the two groups

Factors	Experimental group	Control group	t	P-value
Success number difference	2.25±1.06	0.92±0.67	3.70	0.001**
Score spread	5.75±1.66	3.42±2.15	2.98	0.007**

*p < 0.05, **p < 0.01

The number of successful batting and the difference in batting scores of students in the control group and the experimental group before and after the experiment were calculated, and the data were input into SPSS26.0 for independent sample t-test, and the results were shown in Table 8. As can be seen from Table 10, the difference in the number of successful shots and the difference in scores between the control group and the experimental group showed a significance of 0.001 and 0.007 respectively, both of which were less than 0.05 and had statistical significance. That is, the difference in the number of successful shots and the difference in the score of shots were different in the experimental group and the control group. The mean ± standard deviation of the difference of hit numbers in the control group was 0.92±0.67, which was less than that in the experimental group, 2.25±1.06. The mean ± standard deviation of the batting score difference was 3.42±2.15 in the control group and 5.75±1.66 in the experimental group. Therefore, although both the experimental group and the control group had significant improvement in the number of successful hits and the score of hits before and after the experiment, the difference between the number of successful hits and the score of hits before and after the experiment group had increased compared with the control group, indicating that the progress of the experimental group in the number of successful hits and the score of hits was greater than that of the control group.

3.4 Comparative analysis of goals scored in different score areas of the experimental group and the control group before and after the experiment

The above experimental results show the overall situation of the number of successful shots and the score of shots before and after the experiment of the experimental group and the control group. From the above experimental results, it can be seen that the agility, balance, and coordination of the experimental group were significantly improved after the experiment, and had a significant difference compared with before the experiment ($p < 0.05$). The agility, balance, and coordination errors of the control group showed a trend of improvement before and after the experiment, but there was no significant difference. In terms of batting success and batting score, both the experimental group and the control group had a certain degree of improvement, but the improvement of the experimental group was more significant than that of the control group, indicating that depth perception training had a better effect on improving the accuracy of batting. To find out the difference in scoring in different scoring areas before and after the experiment, the number of successful shots in different scoring areas before and after the experiment was compared.

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4. Score data analysis

4.1 Influence of training program on young people's tennis hitting ability

After 8 weeks of agility, balance, and coordination intervention training, the agility, balance, and coordination test results of the experimental group were compared with the paired sample t-test before and after the training, and the error value was significantly reduced and showed a very significant difference ($p < 0.01$). Although the agility, balance, and coordination error values of the control group showed a decreasing trend before and after the traditional warm-up training, there was no significant difference, indicating that the intervention program of this study can effectively improve the agility, balance, and coordination ability of students at this age. The agility, balance, and coordination error values of the control group also tended to decrease, which may be related to the participation in physical exercise. Some literature pointed out that even if the agility, balance, and coordination training were not deliberately carried out, the agility, balance, and coordination ability would still improve with participation in sports, especially in non-periodic sports dominated by open skills such as tennis, badminton, and baseball.

4.2 Effects of training programs on agility, balance, and coordination

After 8 weeks of agility, balance, and coordination intervention training, the batting test results of the experimental group were compared with those before training by paired sample t-test. The error value was significantly reduced and showed a very significant difference ($p < 0.01$). Although the error value of the hitting test in the control group showed a decreasing trend before and after the traditional warm-up training, there was no significant difference, indicating that the intervention scheme in this study can effectively improve the stability and accuracy of the hitting ability of students at this age. The agility, balance, and coordination error values of the control group also tended to decrease, which may be related to the participation in physical exercise. Some literature pointed out that even if the agility, balance, and coordination training were not deliberately carried out, the agility, balance, and coordination ability would still improve with participation in sports, especially in non-periodic sports dominated by open skills such as tennis, badminton, and baseball

SPSS software was used to analyze the age, height, weight, and other basic information of 40 tennis children, as well as the data of fore-and-backhand scores and hitting success rate before and after training. The data difference between the experimental group and the control group was analyzed by an independent sample t-test before the experiment, the data difference between the experimental group and the control group was analyzed by an independent sample t-test after the experiment, and the data of the experimental group before and after the test was analyzed by paired sample t-test. Before and after the control group test, through the use of matching sample t-test statistics (dependent on t-test), it was found that there was a significant difference between the experimental group and the control group, and the batting stability and accuracy of the experimental group were higher than that of the control group.

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Discussion

Researchers often engage in tennis training for children and have participated in tennis coach training related to children many times. In years of training, learning, and literature review, researchers have found that agility, balance, and coordination training have a good effect on children's physical exercise, and found that 6-10 years old is the best period for children to train in agility, balance, and coordination. More than this period can also be agility, balanced, coordinated training, but compared to young children will develop slowly.

In Wang Tao's thesis, the influence of different kinds of Latin dance training on the agility quality and balance ability of primary school students Agility quality has its development stage characteristics, the speed of the development of agility quality of children and teenagers at different ages is different from 5 years old to 11 years old is the key period for the development of agility quality, there is little difference between male and female students in addition to strength quality and endurance quality of other physical qualities The agility period of the development of speed quality balance ability flexibility agility quality is in the primary school age stage.

On the training methods and means of children's table tennis players' agility quality development, the sports career of professional table tennis players in China begins at the age of 6-7 and enters the best competitive stage after 3-4 years of basic training and 2-3 years of special improvement (Shao Ying 2018). Therefore, childhood is the basic training period for table tennis players. During this period, scientific and systematic training methods and means can lay a solid foundation for the overall sports career of table tennis players, and seize the agility period of quality development to carry out agility quality training, which can significantly improve the agility quality of table tennis players. Finally, through the experimental method, the conclusion is drawn that table tennis coaches in amateur sports schools and clubs should grasp the agility physical quality of children table tennis players and other sports quality in the agility period, targeted design interesting, competitive, and scientific training implementation plans, select appropriate training methods and means, and strengthen the on-the-job training of coaches. Improve the coaching ability of coaches.

On the influence of core strength training on the basic skills of young tennis players according to the theory of sports training, the composition of athletes' competitive ability includes five aspects, such as physical strength, skills, tactics, psychology, and intelligence. Among them, physical fitness is the first factor. According to the characteristics of tennis sports, athletes must give full play to skills and tactics in the game if they want to achieve good sports results, and if they want to give full play to good skills and tactics, they must have good physical fitness as a guarantee. (Yuan Xiaotang. 2020. Therefore, athletes must have good strength, speed, endurance, agility, coordination flexibility, and other physical qualities.

6-13 years old are in the critical period of the development of agility quality, and scientific and reasonable training for agility quality at this stage can achieve twice the result with half the effort. Similarly (Fa Qiqi. 2022). Children and teenagers at different ages have different development speeds of agility. The key period of agility development is from 5 to 11 years old, and there is little difference between male and female students. In addition to strength quality and endurance quality, the agility period of the development of the rest of the physical quality (speed quality, balance ability, flexibility, agility quality) is at the age of primary school.

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The influence of different kinds of Latin dance training on pupils' agility and balance ability and cited relevant literature to put forward the research on children's physical fitness growth and development in the field of sports training and pointed out: The development of children's physical form, physical function, and sports quality is not gradual, but there is an agility period of physical quality, which is also called the "window period" of physical quality development in some studies. (Wang Tao 2018). Therefore, it is feasible to conduct agility, balanced, and coordinated intervention training for children aged 6-10

Tennis is an open sport, which requires high stability and accuracy of hitting, which requires us to find out the factors affecting its ability while studying stability and accuracy.

good balance control ability is the basis for maintaining body stability, ensuring movement quality, and preventing falls during the completion of complex movements.

Players will inevitably lose their balance during the constant rapid movement of the race, which will lead to mistakes and lost points because balance affects the stability of the stroke. If you can handle the ball in place in an unstable state, you can occupy the initiative of the game, to win the winning points and win the game. (Wang Lisong 2021). Therefore, improving the stability of tennis players in unstable conditions becomes the key to winning the match.

That coordination ability is an indispensable physical quality in tennis training. Coordination is the basic ability that the human body should possess in sports, and it is the premise and basis for learning and using sports technology, which directly affects the mastery of sports technology. The use of techniques and tactics and the improvement of sports performance, so the coordination training plays an important role in tennis players. (Liu Feng 2014). According to the conclusions of this paper and a large number of literature, agility, balance, and coordination can affect stability and accuracy. The 8-week fast stretching compound training is helpful to improve the forehand hitting speed of college students specialized in tennis, and the forehand hitting speed index of the experimental group is significantly different from that of the control group (Meng Qingyu. 2022). SAQ training is more efficient than traditional agility training. If it is used to develop the agility of young tennis beginners, it is recommended to choose more efficient and interesting SAQ training (Wu Yunguang and Guan Fuyu 2023).

From the point of view of the increase, the effect of ultra-length training was more obvious, indicating that compared with resistance strength training, ultra-length training can better improve the lower extremity explosive power, speed quality, and agility quality of tennis elective class students. (Li Mingzhe 2021).

The introduction of the HIIT training method into the training of college tennis teams as a training means of speed endurance can effectively improve the speed endurance level of college male high-level tennis players, enrich the training means of speed endurance of college tennis teams, and play an important role in the improvement of sports performance (He Lingqian. 2023).

The researchers found that most of the literature only focused on one or two studies on agility, balance, coordination, and core training, and most of them were studies on the training methods of agility, balance, and coordination, and studies on the stability and accuracy of a certain ability. The literature on the simultaneous study of the three abilities of agility, balance, and coordination was not

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found. Although the three abilities of agility, balance, and coordination have not been studied at the same time, in the research process and results of this article, most of the articles mentioned that a single training study of agility, balance, and coordination is related to the research results of improving the stability and accuracy of tennis strokes, and the research results show that ability training can improve the stability and accuracy of tennis strokes.

This shows that after reading a lot of literature, agility, balance, and coordination are effective in improving the stability and accuracy of tennis shots. Through reading literature, researchers found that most of the training interventions in children's tennis training are only aimed at a certain ability. However, in the research process and my training in children's tennis training, it was found that the training process, agility balance, and coordination training can be interfered with at the same time, which has reached the maximum improvement of children's training performance.

The research plan formulated in this paper is to conduct professional and interesting training interventions for children's agility balance and coordination in the warm-up process. The ice cream bucket movement training is added to the agility, balance, and coordination training in the warm-up part. Changing the ball with both hands during running to improve the coordination ability of children; Using the characteristics of the short falling time of the balloon to improve the coordination ability, reaction speed, and thinking ability of children; And increasing the use of more agility lights in physical training for agility training intervention, etc. These training methods can not only improve children's agility, balance, and coordination ability, but also increase the interest of children's training, so that children can maintain a longer period of attention in training, and can maintain the stability of children's training for a longer period. The researchers not only intervened in the training of agility, balance, and coordination in the warm-up part but also combined the training of the warm-up part with the technical training in the basic technical part so that the improvement of the tennis hitting skills of children would get twice the result with half the effort. Compared with the stereotypical training mode, most children have a weak sense of participation due to the monotonous training mode and lack of interest in training, which makes it difficult to warm up their bodies well, which not only fails to achieve the warm-up effect but also loses the best period for children to improve training in agility, balance, and coordination. It can be seen that the intervention of agility, and balanced and coordinated training proposed by the researchers is effective for the stability and accuracy of the fore-and-backhand stroke in children's tennis.

Through the data calculation after the test, it can be concluded that there is a statistically significant difference between the experimental group and the control group. The research shows that tennis is a sport with high requirements in all aspects of physical fitness and ability, and agility, balance, and coordination are only a few of the tennis abilities. It is suggested that other tennis special ability training can be integrated into future training and teaching. It can improve the tennis performance better.

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Conclusion

The power chain refers to the interconnection and coordination between various parts of the body and movements, and the fluency and force of the movements depend on whether the movements of the joints and muscles in the power chain are complete. The more complete the power chain, the smoother the batting action, and the better the batting effect.

Children due to physical development are not sound, so not suitable for high-intensity strength training, but children's agility, balance, and coordination training is needed at each stage, these abilities are the basic elements of the batting power chain. Therefore, in the 6-10-year-old children's tennis training stage need to improve agility, balance, and coordination can improve the accuracy and stability of children's tennis shots.

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