

# LONG-TERM EFFECTS OF JUMP ROPE TRAINING ON ATHLETES' PHYSICAL HEALTH

REFLEXO À LONGO PRAZO NO TREINO DE SALTAR CORDA SOBRE A APTIDÃO FÍSICA DOS ATLETAS

REFLEJO A LARGO PLAZO DEL ENTRENAMIENTO DE SALTAR CUERDA EN LA APTITUD FÍSICA DE LOS ATLETAS



ORIGINAL ARTICLE  
ARTIGO ORIGINAL  
ARTÍCULO ORIGINAL

Mingzhi Li<sup>1</sup>   
(Physical Education Professional)  
Jucui Wang<sup>1</sup>   
(Physical Education Professional)

1. North China Institute of Science and Technology, Langfang, China.

## Correspondence:

Mingzhi Li  
Langfang, China. 065000.  
MingzhiLi6@126.com

## ABSTRACT

**Introduction:** Jumping rope is an aerobic exercise that requires little time, consumes a high energy level, and does not require sizeable physical space or high investments. Although there are extensive studies in the literature on its short- and medium-term benefits, long-term responses are still inconclusive. **Objective:** Explore the long-term effects of jump rope training on the physical health of athletes. **Methods:** A randomized study was conducted before the protocol of regular physical education activities. The experimental group was differentiated by practicing a specific long-term jump rope protocol. Interferences of external factors were controlled during the 12 weeks of the experiment. Data analysis, observation of changes in fitness indicators, and statistical control were discussed. **Results:** The mean time for a 50-meter run was 8.85s versus 9.63s before the experiment. A gain of 0.78s, representing an 8% increase over the speed. The girls' mean value before the experiment was 9.62s versus 9.18s after the experiment. The gain of 0.44 seconds represented an increase of 4.6%. Well-being perception was improved with injuries reduction over the control group. **Conclusion:** Long-term jump rope training has been shown to improve fitness and reduce injuries in athletes and has the potential to become a viable option for physical education training. **Evidence Level II; Therapeutic Studies - Investigating the result.**

**Keywords:** Sports; Athletes; Physical Fitness.

## RESUMO

**Introdução:** O salto de corda é um exercício aeróbico que exige pouco tempo e consome muita energia, não requerendo grande espaço físico ou altos investimentos. Apesar de numerosos estudos na literatura sobre seus benefícios à curto e médio prazo, as respostas à longo prazo ainda são inconclusivas. **Objetivo:** Explorar os efeitos à longo prazo no treino de saltar corda sobre a saúde física dos atletas. **Métodos:** Foi efetuado um estudo duplo cego randomizando prévio ao protocolo de atividades de educação física regulares. O grupo experimental diferenciou-se por praticar um protocolo específico de salto de corda à longo prazo. Interferências de fatores externos foram controladas durante as 12 semanas do experimento. A análise de dados, observação de alterações nos indicadores de aptidão física e controle estatístico foram discutidos. **Resultados:** O tempo médio para corrida de 50 metros foi de 8,85s contra 9,63s antes do experimento. Um ganho de 0,78s, representando um aumento de 8% sobre a velocidade, o valor médio das meninas antes do experimento era de 9,62s contra 9,18s após o experimento. O ganho de 0,44 segundos, representou um aumento de 4,6%. A percepção de bem estar foi aprimorada e houve uma redução no número de lesões sobre o grupo controle. **Conclusão:** O treino de saltar corda a longo prazo mostrou-se benéfico ao melhorar a aptidão física e reduzir as lesões dos atletas, e tem o potencial de tornar-se uma opção viável para os treinos de educação física. **Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.**

**Descritores:** Esportes; Atletas; Aptidão física.

## RESUMEN

**Introducción:** Saltar la cuerda es un ejercicio aeróbico que requiere poco tiempo y consume mucha energía, no necesita un gran espacio físico ni altas inversiones. Aunque existen amplios estudios en la literatura sobre sus beneficios a corto y medio plazo, las respuestas a largo plazo aún no son concluyentes. **Objetivo:** Explorar los efectos a largo plazo del entrenamiento de saltar la cuerda en la salud física de los atletas. **Métodos:** Se realizó un estudio aleatorio previo al protocolo de actividades regulares de educación física. El grupo experimental se diferenció por la práctica de un protocolo específico de equilibrio de cuerda a largo plazo. Las interferencias de los factores externos se controlaron durante las 12 semanas del experimento. Se analizaron los datos, la observación de los cambios en los indicadores de aptitud y el control estadístico. **Resultados:** El tiempo medio para la carrera de 50 metros fue de 8,85s en comparación con los 9,63s antes del experimento. Una ganancia de 0,78s, que representa un aumento del 8% sobre la velocidad, el valor medio de las jóvenes antes del experimento era de 9,62s frente a 9,18s después del experimento. La ganancia de 0,44 segundos, representó un aumento del 4,6%. La percepción de bienestar mejoró y se redujo el número de lesiones con respecto al grupo de control. **Conclusión:** El entrenamiento de salto de cuerda a largo plazo ha demostrado ser beneficioso para mejorar la forma física y reducir las lesiones en los atletas, y tiene el potencial de convertirse en una opción viable para el entrenamiento de la educación física. **Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.**

**Descriptorios:** Deportes; Atletas; Aptitud Física.



## INTRODUCTION

Long-term skipping is an aerobic exercise that uses less time and consumes a lot of energy, it is not restricted by the venue and equipment, and it is not easy to be injured, so many people have liked it since childhood, and it is also one of the more respected fitness methods. If long-term rope skipping can be effectively promoted, then it will be able to effectively improve the strength, flexibility and endurance qualities of the athletes.<sup>1</sup> Long-term rope skipping is one of the emerging sports, which is an innovation in rope skipping, its movements are simple and easy to master, practice is convenient and safe, and its forms are varied, and the effect is obvious and effective, and because of the long-term rope skipping combined with rhythmic music, the current hip-hop movements and the changes in formation, has a strong entertainment and viewing value, attracting more athletes to actively practice, long-term skipping exercises can effectively improve the physical fitness of athletes.<sup>2</sup> In summary, long-term rope skipping has stimulated athletes' enthusiasm for sports, it is helpful to improve the various indicators of physical fitness, but the related experimental research is still in the imperfect stage, this stage is the critical period for athletes' physical growth, therefore, the author conducted a research on the influence of long-term rope skipping on athletes' physical fitness, provide a certain theoretical basis for the development of long-term skipping rope.<sup>3,4</sup>

## METHOD

### Research objects

The author used long-term rope skipping on the physical fitness of athletes in a school, as the research object. (Table 1)

As athletes have already understood and mastered sports knowledge and related skills, their athletic ability is relatively high, the learning action is relatively fast, so it can meet the requirements of long-term rope skipping teaching, at the same time, the novelty of long-term rope skipping, the diversification of jumping methods and shaking methods, in line with their physical and mental characteristics at this age.

### Method

#### Literature data method

The author needs to search a total of 403 documents in the Capital Institute of Physical Education Library, CNKI, Baidu Academic and other databases, the retrieval content includes the effect of skipping rope on physical health, the effect of long-term skipping on physical fitness, and the strategies of long-term skipping in physical education, select the literature that has reference significance for the author's thesis.<sup>5</sup>

#### Experimental Method

In order to ensure the validity and rigor of the experiment, the author adopts an experimental method, design the experiment plan, plan the experiment process, in order to screen out the experimental subjects needed, the athlete group A is the experimental group, athlete group B is the control group. Before the experiment, the athletes will be tested on their physical fitness indicators the experimental group conducted long-term rope skipping teaching, the control group took regular physical education as required by the syllabus, at the same time, try to control the interference of external factors during the experiment, after the 12-week experiment is over, perform the experiment on the back side, ensure the reliability of data, conduct data analysis, observe the changes in physical fitness indicators.

**Table 1.** Two groups of participants in the experiment.

Control group			test group		
Boy	Girl	Total	Boy	Girl	Total
15	15	30	15	15	30

## RESULTS

### Comparison results and analysis of the test scores of the two groups of physical fitness before the experiment

In order to ensure the smooth progress of the experimental results, according to the experimental data processing procedure, after sorting and analyzing the measured data of the two groups of athletes. (Table 2)

As can be seen from Table 2, before the experiment, there is no significant difference between the two groups of basic physical conditions and physical fitness test results, whether it is comparison between groups or gender comparison, although there are differences,  $P > 0.05$ , indicating that the experiment can be carried out.

### Comparative results and analysis of physical fitness test scores of the experimental group before and after the experiment

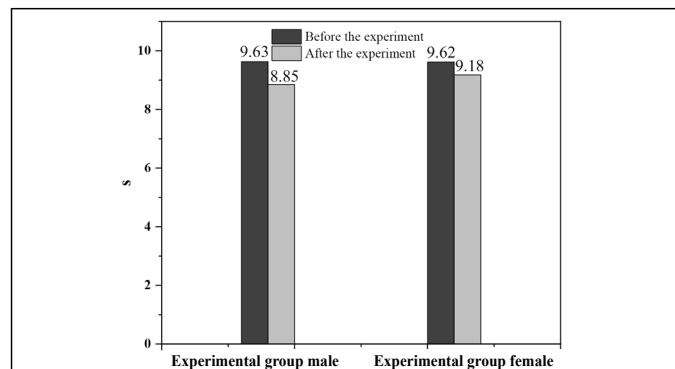
After the athletes in the experimental group passed the intervention teaching of skipping rope at 12 weeks, the experimental group was compared longitudinally within the group, and the statistical results are shown in Figure 1.

#### Before and after the experiment of the experimental group, comparison results and analysis of athletes' speed quality

The statistical test results are shown in Figure 1: Boys and girls in the experimental group, after skipping the rope for 12 weeks, the speed quality index has improved in different ranges, through the 12-week rope skipping teaching, before the 50-meter running performance experiment, the average value of boys was 9.63s, after the experiment, the average value was 8.85s, and the speed increased by 0.78s, an increase of 8%, before the experiment, the average value of girls was 9.62s, after the experiment, the average value of girls was 9.18s, and the speed increased by 0.44 seconds, the increase was 4.6%, after paired test, the P (50-meter run) for boys and girls is 0.000 and 0.003 respectively, indicating that the difference is very significant, after passing the 12-week rope skipping teaching, the speed quality of the athletes in the experimental group improved obviously.

**Table 2.** Comparison of the results of the two groups of physical fitness test scores before the experiment (N=30).

Project indicators	gender	test group Mean + standard deviation	Control group Mean + standard deviation	P value
50m run(s)	man	9.52 ± 0.52	9.17 ± 0.60	0.15
	woman	9.52 ± 0.44	9.73 ± 0.71	0.381
Throw a solid ball (s)	man	5.21 ± 0.48	5.3 ± 0.36	0.625
	woman	4.52 ± 0.61	38.36 ± 4.41	0.253
1 minute sit-ups (pcs)	man	39.82 ± 9.65	38.36 ± 4.41	0.601
	woman	36.5 ± 4.30	37.06 ± 5.48	0.701



**Figure 1.** Comparison of the average value of the 50-meter race before and after the experiment.

## Comparison results and analysis diagrams of athletes' strength before and after the experiment in the experimental group (2), (3)

The statistical test results are shown in Figure 2: After the boys and girls in the experimental group skip rope practice at 12 weeks, the index of the solid ball has been improved in different degrees, the average values of boys throwing solid balls before and after the experiment were 5.31 meters and 5.95 meters, respectively, the distance increased by 0.64 meters, and the increase rate for boys was 4.95%; The mean values of girls throwing solid balls before and after the experiment were 4.63 meters and 5.36 meters, respectively, the average score of girls increased by 0.73 meters, and the increase of girls was 4.36%, after a paired test, the P (throwing a solid ball) for boys and girls are 0.002 and 0.001 respectively, it shows that the long-term rope skipping is rich and diverse, which effectively enhances the athlete's upper limb strength.

As can be seen from Figure 3, after 12 weeks of rope skipping intervention, after 1 minute sit-ups in the experimental group, the number of boys increased by 4.74, an increase of 11.9%, the 1 minute sit-ups for girls increased from 36.6 before the experiment to 44.87, the difference is 8.27. The number of 1-minute sit-ups for boys and girls has increased, after paired test, the P (1 minute sit-ups) for boys and girls are 0.01 and 0.000, respectively, indicating that the difference is very significant. Indicates that after passing the 12-week rope skipping teaching, the athlete's waist and abdomen strength has been significantly enhanced, and the strength quality has been significantly improved.

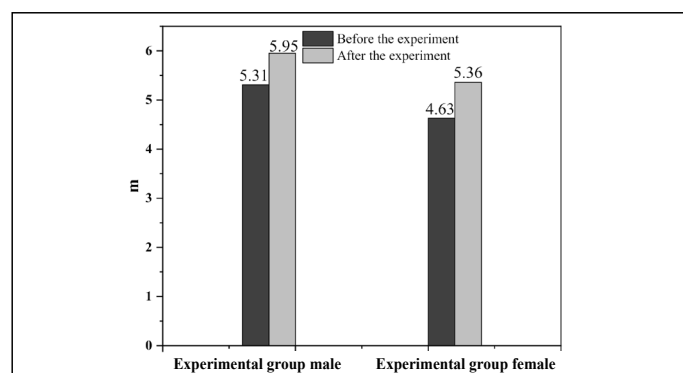


Figure 2. Comparison of the mean value of throwing a solid ball before and after the experiment.

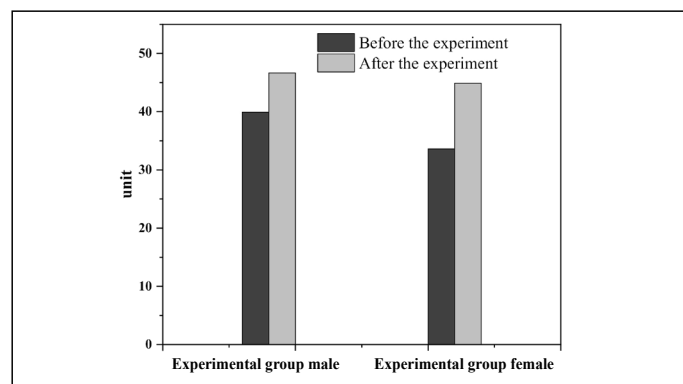


Figure 3. Comparison of the mean values of 1 minute sit-ups before and after the experiment.

## DISCUSSION

### Analysis of the influence of long-term rope skipping on athletes' physical fitness

#### The influence of long-term skipping rope on athletes' 50-meter running index

The 50-meter race reflects the athlete's sprint running, the ability to move quickly. In the long-term rope skipping practice, as the athlete's movement speed increases, the displacement speed also increases.<sup>6</sup> Through long skipping rope, conducive to the development of the jumping power of athletes and keys, the 50-meter race is a speed force type, which requires a strong speed force, long-term rope skipping can effectively improve speed quality. In the process of shaking the rope, through continuous stimulation of key muscle groups such as the wrist, arm, and calf, enhance the explosive power and jumping ability of athletes' lower limbs, improve the completion of the action, and the performance must have a sense of beauty. When the boys and girls in the experimental group performed long-term rope skipping intervention, the completion of each long-term rope skipping action, it's the combination of the continuous jumping of the feet and the continuous shaking of the rope with both hands, every time I jump up and down, make the leg muscles contract and relax rhythmically.<sup>7</sup>

#### The effect of long-term skipping rope on athletes' throwing solid ball index

Throwing a solid ball can reflect the strength of the athlete's upper limbs and waist and abdominal muscles. When throwing a solid ball with both hands, from bottom to top, from the lower limbs to the waist and abdomen, the force is transmitted to the upper limbs and throws forward, generally, the farther you throw, the stronger the force. After activation and balanced development of the muscles of each part of the trunk and upper limbs, and interactive rope, wheel jumping and transposition, and long rope rocking action require greater wrist and upper arm strength, when rocking the wave rope, two people need to swing the rope with their big arms, promote the growth circle of upper arm strength.<sup>8</sup> During long-term skipping training, while the athlete keeps the rope swaying, it requires constant force exerted by the arm to control the rope, there are strict standards for the movement of holding the rope and the distance between the rope and the waist, iumping up saves time and effort, such as double rocking jump, side throwing, weaving flowers, and interactive rope exercise the arm strength very well.<sup>9,10</sup>

## CONCLUSION

Experiments show that, long-term skipping rope can effectively improve the strength and endurance of athletes. Skipping rope can also enhance the functions of the human body's cardiovascular, respiratory and nervous systems, and skipping rope also has a positive effect of relaxing emotions, at the same time, it can improve the flexibility and agility of the human body, keep your physical and mental health alive, reduce the potential risk factor of sports injuries. This is useful for promoting the mental health of athletes, improving the overall quality of athletes plays a very important role.

All authors declare no potential conflict of interest related to this article

**AUTHORS' CONTRIBUTIONS:** Each author made significant individual contributions to this manuscript. ML: writing and performing surgeries; JW: data analysis and performing surgeries, article review and intellectual concept of the article.

## REFERENCES

1. Zhao L, Zhao Y, Wang X. Athletes Physical Fitness Prediction Model Algorithm and Index Optimization Analysis under the Environment of AI. *Mathematical Problems in Engineering*. 2021;2021(1):1-10.
2. Jeon Y, Eom K. Role of physique and physical fitness in the balance of Korean national snowboard athletes - ScienceDirect. *Journal of Exercise Science & Fitness*. 2021;19(1):1-7.
3. Yuasa Y, Kurihara T, Tsumiyama M, Ozawa S, Aruga S, Koyama T et al. The relationship between jump performances and toe muscular strengths focus on the angles of metatarsophalangeal joint in athletes.

4. Guilherme FR, Nascimento M, Fiorillo RG, Da Silva MC, Amadeu GDS, Graça A et al. Perceptive Changes in Endurance Athletes During Social Isolation Due to Covid-19. *Revista Brasileira de Medicina do Esporte*. 2020;26(6):473-7.
5. Bednarczuk G, Wiszomirska J, Rutkowska I, Skowronski W. Effects of sport on static balance in athletes with visual impairments. *The Journal of Sports Medicine and Physical Fitness*. 2019;59(8):1319-27.
6. Kim JT, Shin YA, Lee KH, Rhyu HS. Comparison of performance-related physical fitness and anaerobic power between Korean wheelchair badminton national and backup players. *Journal of Exercise Rehabilitation*. 2019;15(5):663-6.
7. Penichet-Tomás A, Pueo B, Jimenez-Olmedo JM. Physical performance indicators in traditional rowing championships. *The Journal of sports medicine and physical fitness*. 2019;59(5):767-73.
8. Cavedon V, Rosponi A, Alvitì F, De Angelis M, Guerra E, Rodio A, Di Giacinto B et al. Comparison between the 10- and the 30-s-long Wingate Anaerobic Test in summer Paralympic athletes with a lower limb impairment. *Sport Sciences for Health*. 2021;17(2):1-12.
9. Helmich I, Von Götz D, Emsermann C, Xuanjin F, Griesse A, Lauterbach I et al. Not just contact sports: significant numbers of sports-related concussions in cycling. *The Journal of sports medicine and physical fitness*. 2019;59(3):496-501.
10. Wessner B, Ploder M, Tschan H, Ferunaj P, Erindi A, Strasser EM et al. Effects of acute resistance exercise on proteolytic and myogenic markers in skeletal muscles of former weightlifters and age-matched sedentary controls. *The Journal of sports medicine and physical fitness*. 2019;59(11):1915-24.