International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players

Cui Jinzhong[1] and Phichayavee Panurushthanon[2]
Faculty of Physical Education, Srinakharinwirot University, Thailand
[1]E-mail: 402325606@qq.com, ORCID ID: https://orcid.org/0009-0002-5852-2904
[2]E-mail: Nantanak@g.swu.ac.th, ORCID ID: https://orcid.org/0009-0008-4072-7091
Received 19/05/2025 Revised 27/05/2025 Accepted 05/07/2025

Abstract

Background and Aims: Functional strength training, as a new training method, has now been widely applied in professional sports and competitive sports, and other fields. Changing the traditional basketball strength training methods has become an urgent task at present. However, in the field of basketball sports training, there are relatively few related training applications to improve the jumping quality of basketball players. Therefore, in this study, adolescent basketball players with a certain competitive level were selected as the research subjects. By applying functional strength training methods, the influence of functional strength training on jumping quality was explored. Theoretical analysis and experimental verification were conducted on the application of functional strength training in basketball practice for the reference of coaches and athletes. In the hope of contributing a little to the process of promoting the scientific training of basketball players.

Methodology: Thirty male athletes from the men's basketball team at China Jiuquan Vocational and Technical College were recruited and divided into three groups: weight training, functional strength training, and a control group (n=10 per group). Leg muscle strength was measured using high jump tests at baseline, after 4 weeks, and after 8 weeks of training. Data were analyzed using SPSS software to calculate the mean differences and standard deviations across groups.

Results: These findings indicate that weight training and functional strength training play essential roles in enhancing jumping performance by improving take-off speed, endurance, and whole-body coordination.

Conclusion: These findings indicate that weight training and functional strength training play essential roles in enhancing jumping performance by improving take-off speed, endurance, and whole-body coordination. Comprehensive training programs should integrate strength, speed, and coordination exercises alongside technical skill development to optimize performance.

Keywords: Weight Training; Functional Strength Training; Jumping Performance; Adolescent Basketball Players

Introduction

The modern game of basketball was invented in 1891 by James Naismith, a physical education teacher at the YMCA Cadet Training School in Springfield, Massachusetts (USA), and was invented because it was a source of enlightenment and inspiration for children's games (Li, 1991). James Naismith was inspired by the Canadian children's game of "DUCK-ON-A-ROCK", in which a ball is thrown into a peach box, during his tenure as a teacher, and completed the conception of the game of basketball on 15 November 1981. In 1892, the YMCA of Springfield, Massachusetts, USA, established the YMCA Rules of Basketball. The YMCA Basketball Rules were established with 13 rules (Sun, 2020).

Basketball is a physically demanding sport that has developed a great competitive nature (Bach & Ransone, 2017). In basketball, competing teams score points by shooting the ball into each other's baskets (Siddell, 2014). Two teams consisting of five players each play a game, each game is divided into four quarters of 10 minutes each for a total of 40 minutes, when the game is tied after the four quarters the game is played, at that point an extra five minutes is added, and if there is still no winner after five minutes of extra time, a second extra five minutes is required until one side scores more than the opponent before the game can end and the one who scores more points wins the game (Zhong, 2011).

Functional training is a new type of competitive sports training that is often used to improve spinal stability in the field of fitness and rehabilitation. Some of the training methods and means used in the training process of athletes play a pivotal role in improving the level of athletes' competitive ability, preventing injuries, and accelerating the fatigue recovery process. This plays a pivotal role in improving athletic performance, preventing injuries, and speeding up the recovery process from fatigue. He considers

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

the human body as a whole and focuses on the overall functioning of the body, requiring the different parts of the movement chain to achieve the overall movement accuracy, thus preventing the interference of one part of the chain with the overall functioning of the body as a whole in a practical way (Gary, 1997).

Weight training is a type of training carried out by increasing the load when the body is in a stable state, mainly targeting the large muscle groups of the body, including the upper and lower limbs, and the waist and abdomen. Through the stimulation of suitable loads, thus increasing the number of muscle fibers and the cross-sectional area of muscles, so that the muscle strength, speed, endurance, and so on are improved through exercise (Zhou, 2018).

"Jumping performance" is also known as "Jumping ability" or "Jumping power", and all three of these terms indicate the same concept, unless otherwise specified. Jumping power refers to the lower limbs and the whole body through the coordination of force, so that the human body can quickly jump into the air. Jumping performance is a comprehensive quality; training must grasp the power, speed, and coordination of these important factors, but also the combination of technical training (Sun, 2004). Jumping power is a system, and the typical physical quality elements in the Jumping power system consist of lower limb strength, speed, and jumping endurance and the uncoordinated proportion between the quality elements is the main reason for the structural internal friction in the Jumping power system, which is a negative factor in the Jumping power system (Yao, 1989). Although there are differences in the above concepts, it is recognized that jumping power is a comprehensive quality, which is a reasonable combination of strength, speed (mainly referring to the speed of muscle contraction), technique, and other qualities.

Adolescent basketball training is an important part of the development of basketball, is an indispensable part of the sustainable development of basketball in China, one of the main characteristics of basketball is that a large number of actions need to be completed in the air, basketball players want to complete a variety of aerial action and get the advantage of the air must have a good jump quality. Therefore, in the physical quality training of basketball players, jumping performance training should be a very important component. However, in the existing training process, many teams do not raise the jumping performance training to the corresponding height. Compared with foreign countries, there are still many shortcomings in the scientific training of basketball. In order to improve the jumping performance, it is necessary to use sports science training methods. The functional training method is in line with the vision of China's basketball trainers, but in the field of basketball training, there are few related training applications to improve the jumping performance of basketball players. Therefore, this study selects adolescent basketball players with a certain level of competition as the research object, through the imposition of functional training means, to explore the impact of functional training on the jumping performance, the application of functional training in basketball practice to carry out theoretical analysis and experimental validation for the reference of the coaches and athletes, to contribute to the process of promoting the scientific training of young basketball players. We hope to contribute to the scientific process of promoting the training of adolescent basketball players.

Objectives

1. Study of the effects of weight training and functional training on the jumping of adolescent basketball players.
2. Compare the effects of weight training and functional training on the jumping of adolescent basketball players

Literature Review

Weight training is an exercise training that aims to increase muscle strength and volume (Huang, 2016), usually refers to the exercise training that relies on or with the help of heavy weights (the weight or resistance of dumbbells, barbells, and other equipment) to make the contraction of skeletal muscle tissues in different parts of the body (centripetal contraction or centrifugal contraction) to produce reflexive force, resisting neutrality, to increase the strength of the muscles, develop the clusters, and improve the endurance

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

(Liu, 2014). It is one of the most basic training methods in sports. The above is a broad definition of weight training, which means that strength training with the help of external weight can be regarded as weight training. In this article, weight-bearing training refers to the human body under the load of a certain external gravity to carry out a variety of physical exercises. Commonly used exercises include sandbags tied to the legs, sandbags wrapped around the waist, or wearing a sand suit (Tao Li, 1994), and the specific weight will be adjusted according to the different sports, which is a narrower definition of weight-bearing training.

Functional training early originated in the field of sports rehabilitation, with the rapid development of competitive sports, in the early 1990s, some foreign scholars cited this kind of strength training to the field of competitive sports, after the study found that this kind of strength training not only can effectively prevent injuries during training, but also to a certain extent, can improve the quality of the organism to complete the action in the training.

Chen Changzeng pointed out that: the integration of functional training with the basketball special techniques of general high school female basketball players, the game characteristics of basketball and special technical training methods for effective (Chen, 2019) and safe integration, and for the general high school female basketball players, the analysis of its jump shot hitting rate, neuromuscular control and the overall coordination are significantly improved, and the fusion of the game characteristics and the steering technique of the comparison, it is necessary to pay attention to the athletes' body index change status, reduce the incidence of injury and disease, and play a positive role in the improvement of the quality of the functional training.

The 2004 edition of the Dictionary published by the Shanghai Dictionary Publishing House defines adolescents as: adolescents refer to the period in the human life cycle between childhood and adulthood, which is usually referred to as the teenage years, and usually undergoes the puberty period of sexual maturity during this period, but because of the differences between individuals and the genders, the age of puberty of both men and women fluctuates to a certain extent, and in the case of males, adolescents are generally referred to as the age group of between 14 and 21 years of age.

Conceptual Framework

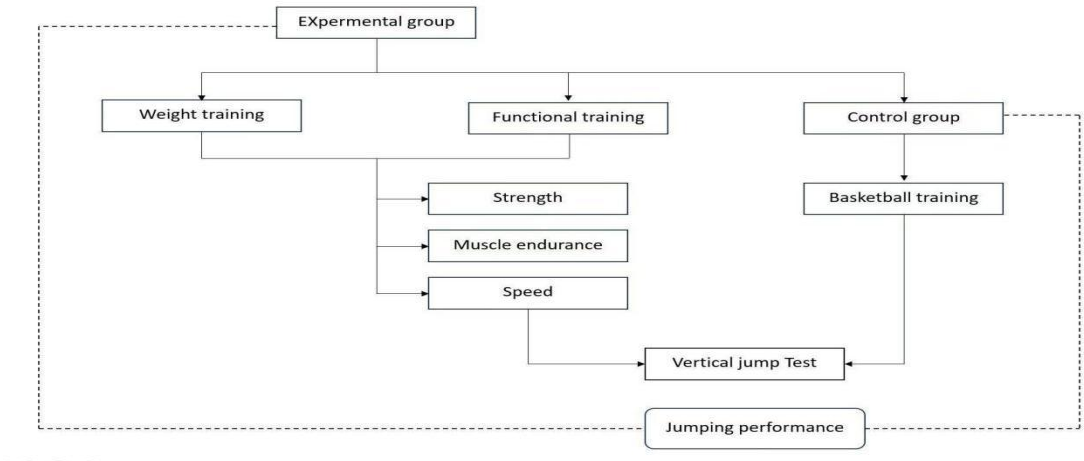

Figure 1 Conceptual Framework

Methodology

This paper takes the influence of weight training and functional training on the Jumping quality of adolescent male basketball players as the research object. Because the basketball beginners are limited by their conditions of athletic ability, and to ensure the scientific and rationality of this study, the experimental subjects selected in this paper are the men's basketball team of Jiuquan Vocational and Technical College, totaling 50 people. (Purposive Sampling) G*power, power of test=0.95, alpha error=0.05,Effect size=0.85)

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

1. The experimental subjects were tested by jumping; the jumping data of the subjects were collected and ranked from high to low, and the top 30 were selected as the research samples.

2. According to the money, the 30 athletes' performance ranking order from high to low, the subjects were assigned to experimental group 1, experimental group 2, and experimental group 3, with 10 people in each group.

3. According to the group set-up training program

3.1 Experimental group 1 is the weight training group

3.2 Experimental group 2 is the functional training

3.3 Control group 3

Results

1. The basic statistics of muscle strength in the high jump test of the three 3sample groups are as follows:

Sample group	Pre- training	After 4 week of training	After 8 week of training
Control Group			
$\bar{X}$	2.87	2.88	2.98
S.D.	.06	.06	.08
Weight Training			
$\bar{X}$	2.85	2.94	3.07
S.D.	.06	.07	.07
Functional Training			
$\bar{X}$	2.86	2.91	3.02
S.D.	.06	.06	.08

2. The results of This shows that leg muscle strength from the high jump test of the 3 sample groups before training had similar leg muscle strength from the high jump test, with the same effect as after training in the 4 week and after training in the 8 week Training and the ability of the 3 sample groups had similar leg muscle strength from the high jump test

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

Source of variance	SS	df	MS	F	P
Pre- training					
Between groups	.00	2	.00	.21	.81
	.11	27	.00		
Within groups					
Total	.11	29			

Statistically significant at .05

3. The results of this show that the leg muscle strength from the high jump test of the 3 sample groups for the period after the 4 weeks of training had leg muscle strength from the high jump test that was similar, with the same effect as before the training. And after the 8 weeks of training, the leg and strength of the 3 sample groups were similar in leg muscle strength from the high jump test.

Source of variance	SS	df	MS	F	P
After 4 week of training					
Between groups	.02	2	.01	2.54	.09
Within groups	.10	27	.00		
Total	.12	29			

Statistically significant at the .05

4. The results of this show that any training period affected the jump height differently from any other period.

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

Source of variance	SS	df	MS	F	P
After 8 week of training					
Between groups	.03	2	.01	3.37	.04
Within groups	.15	27	.00		
Total	.19	29			

Statistically significant at .05

5. The results of pairwise comparisons of the three groups in the leg muscle strength test in the high jump test before training showed that the three groups were not significantly different before training at the .05 level.

Pairwise comparison	Control Group	Weight Training	Functional Training
Control Group	-	1.00	1.00
Weight Training		-	1.00
Functional Training		-	

Statistically significant at .05

6. The results of pairwise comparisons of the three groups in the leg muscle strength test in the high jump test after 4 weeks of training showed that after 4 weeks of training, the 3 groups were not significantly different at the .05 level.

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

Pairwise comparison	Control Group	Weight Training	Functional Training
Control Group	-	.15	1.00
Weight Training		-	.23
Functional Training		-	

Statistically significant at .05

Discussion

This study investigated the effects of functional training and weight training on the jumping performance of adolescent basketball players over an 8-week schedule. After the 4th and 8th weeks of training, we measured the athletes' jumping performance and then analyzed the results statistically to discuss the results.

1. After 8 weeks of group training, the comparison and analysis of the experimental data of the two groups proved that functional training can significantly improve the jumping performance of adolescent basketball players. Therefore, although weight training is also a good training method, from the perspective of comprehensive and coordinated development of basketball-specific jumping performance, the integration of functional strength and strength will be more helpful to enhance the jumping performance of athletes in situ. Weight-bearing training is a kind of training that increases the load when the body is in a stable state, mainly targeting the large muscle groups of the body, including the upper and lower limbs and the waist and abdomen. Through the stimulation of appropriate load, the number of muscle fibers and the cross-sectional area of the muscles are increased, so that the strength, speed, endurance, etc. Some of the muscles are improved (Zhai, 2011).

2. After 8 weeks of group training, the comparison and analysis of the two groups of experimental data proved that functional training can significantly improve the jumping performance of adolescent basketball players. It can be seen that the use of functional training can more effectively improve the special jumping performance level of high school male basketball players than strength training. Functional training is a new type of competitive sports training method. It is to apply some training methods and means that are often used in the fields of fitness and rehabilitation to improve the stability of the spine in the training process of athletes. This plays a vital role in improving the competitive ability of athletes, preventing injuries to athletes, and accelerating the recovery process of fatigue 3. After 8 weeks of group training, the comparison and analysis of the experimental data of the two groups proved that functional training and weight training did not significantly improve the continuous jumping performance of basketball players. This shows that in the process of taking off speed, jumping endurance, and whole body coordinated force, both functional strength and traditional strength training play an extremely important role. "Jumping performance" is also called "Jumping performance" or "jumping power", which refers to the force that enables the human body to jump quickly into the air through the coordinated force of the lower limbs and the whole body. Jumping power is a comprehensive quality. When training, it is necessary to grasp the important factors of strength, speed, and coordination, and combine them with technical training (Sun, 2001).

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850

Recommendation

1. It is hoped that in the future, when training the jumping performance of adolescent basketball players, functional training methods and means can be applied to athletes based on strength, and the two strength training methods can be combined for training. It is also hoped that future scholars can study the effects of functional training on other aspects of the physical quality of high school male basketball players.

2. According to the actual conditions of the school, the selection of training equipment must be strictly screened. The functional training method is a training method with high requirements for equipment, so it must not be replaced by general equipment. It is hoped that the majority of coaches will apply to the school to purchase more training equipment when implementing functional training for athletes.

3. When conducting functional training for athletes, coaches must be strict with the athletes' movements and pay attention to controlling muscles through nerves to ensure the quality of the movements during the completion of the movements. When formulating training plans, it is necessary to combine special projects, and in the later stages of training, advanced exercises of training methods can be added to further enhance the stability of athletes.

References

Bach, C. W., & Ransone, J. W. (2017). Anthropometric evolution of professional basketball positions. *Medicine & Science in Sports & Exercise, 49*(5S), 267.

Chen, C. Z. (2019). *Experimental study on the characteristics of myoelectric changes in explosive turning movements of basketball players* (Doctoral dissertation). Capital Sports Institute.

Gary, P. (1997). The effect of weight training on muscle properties in athletes. *Fujian Sports Science and Technology*, (01), 39–44.

Huang, E. N. (2016). Exploring the role of rope ladder training on the sensitivity of women's basketball players at Beijing Sport University. *Campaigns*, 22, 18–19.

Li, B. (1991). Basketball specializes in jumping quality and its training methods. *Journal of Tianjin Sports Institute*, 3, 32–36.

Liu, Y. Y. (2014). *Applied research on the weight training model for excellent male bodybuilders* (Doctoral dissertation). East China Normal University.

Siddell, . (2014). *Functional training for sports*. Human Kinetics.

Sun, C. Z. (2001). A study of functional training on jump shot shooting percentage of college female basketball players. *Journal of Chifeng College (Natural Science Edition), 35*(11), 145–147.

Sun, M. Z. (2004). *Applied research on the weight training model for excellent male bodybuilders* (Master's thesis). East China Normal University.

Sun, M. Z. (2020). *Advanced tutorial on basketball*. People's Sports Publishing.

Tao, L. Y., & Li, J. Y. (1994). *Dictionary of School Sports*. Wuhan University of Technology Press.

Yao, X. N. (1989). *An empirical study on the training effect of vertical resistance sprint-specific strength training means* (Master's thesis). Wuhan Sports Institute.

Zhai, F. (2011). The effect of weight training on the performance of middle-distance runners in secondary schools in Henan province. *Journal of Henan Normal University (Natural Science Edition), 39*(6), 172–174.

Zhong, F. (2011). Functional training: Interpretation and application. *Journal of Shandong Institute of Physical Education, 27*(10), 71–76.

Zhou, H. T., & Dang, F. (2018). An empirical study on the effect of functional training on the physical quality development of adolescent basketball players. *Journal of Jilin Institute of Education, 31*(7), 101–102.

Citation
Cui, J., & Panurushthanon, P. (2025). Comparison of Weight Training and Functional Training on Jumping Performance in Adolescent Basketball Players. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 115-122; DOI: https://doi.org/10.60027/ijsasr.2025.7850