

Integrating Plyometric and Strength Training to Improve Basketball Jump Shot Performance

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Integrating Plyometric and Strength Training to Improve Basketball Jump Shot Performance

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Abstract

Objectives:

This study aims to determine the contribution of PLYOMETRIC and STRENGTH TRAINING to the improvement of jump shot performance among male basketball players in the extracurricular program at SMA Negeri 2 Tebing Tinggi City during the 2026 year.

Materials and Methods:

The research employs an experimental method involving the implementation of Plyometric and Strength Training sessions. The population consisted of 15 male basketball players. A sample of 12 players was selected using purposive sampling

Results:

Statistical regression analysis was performed on the post test data (Plyometri and push up results) in relation to jump shot performance. The calculated R value was 0.94, yielding a coefficient of determination of 97% (indicating a very high level of influence). Meanwhile, the calculated F value was 4204.42, and the F table value was 4.26 at a significance level of $\alpha = 0.05$. Since $F_{\text{calculated}} > F_{\text{table}}$, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_a) was accepted.

Conclusions:

Based on the hypothesis testing and research findings, it can be concluded that plyometric training significantly contributes to improving jump shot performance among male basketball players in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026, whereas push up training does not show a significant contribution when considered individually. However, plyometric and push up training together make a significant contribution to improving jump shot performance.

Keywords: Plyometric; Strength Training; Jump Shot.

3

Introduction

Basketball is a sport played between two teams, each consisting of five players. The objective is to score points by successfully shooting the ball into the opponent's basket. The playing area is relatively small, allowing the sport to be played both indoors, in sports halls, and outdoors under comparable conditions. Furthermore, the large ball used in basketball makes the game relatively easy to learn, enabling players to understand its basic principles. Due to the rapid development of basketball in the region, various organizations, including government institutions, private companies, schools, and universities, have organized interstudent basketball competitions throughout North Sumatra. These competitions are held across the province and may follow either a three on three format or a full team format (five on five), depending on the competition structure.

The purpose of these competitions is not only to meet the organizers' objectives but also to promote greater awareness and development of basketball more broadly. However, despite its growing popularity, basketball still faces various challenges, both during training sessions and official matches.

SMA Negeri 2 Kota Tebing Tinggi, also known as State Senior High School 2 of Tebing Tinggi City, is a formal educational institution that actively contributes to the



development of basketball in Tebing Tinggi City. Student participation in extracurricular activities is one way to achieve this objective. Currently, fifteen male students actively participate in the basketball extracurricular program at SMA Negeri 2 Kota Tebing Tinggi. This program was established in 2006 and has continued to operate to the present day. Since its establishment, the team has participated in several official student competitions.

According to the following list, the basketball team of SMA Negeri 2 Kota Tebing Tinggi has participated in the following basketball championships:

Table 1. Achievements of Students Participating in the Basketball Extracurricular Program at SMA Negeri 2 Tebing Tinggi

No	School name	Year	Level	Ranking	Activity
1	SMA N 2 Tebing Tinggi	2020	Regency	II	LKS Gebyar SMK
2	SMA N 2 Tebing Tinggi	2022	Province	I	LKS Gebyar SMK
3	SMA N 2 Tebing Tinggi	2022	Regency	II	Libala
4	SMA N 2 Tebing Tinggi	2023	Nasional	VIII	Gebyar SMK
5	SMA N 2 Tebing Tinggi	2024	Nasional	I	O2SN

This study identified problems during practice matches (friendly matches) and official competitions involving the boys' basketball team of SMA Negeri 2 Kota Tebing Tinggi. On May 10, 2024, the team participated in a tournament that included the National Student Sports Olympiad (O2SN) among its events. During the observation process, the researcher examined the team's performance. The findings indicated a problem that required attention, namely the limited number of athletes capable of executing an effective jump shot. Although the players demonstrated relatively low leg muscle explosive power and arm muscle explosive power, both physical capacities can be improved through appropriate training.

Considering these circumstances, implementing appropriate training methods is expected to improve the explosive power of the leg and arm muscles. In performing a jump shot, athletes must maximize two key components: achieving sufficient jumping height and executing an accurate shot. Furthermore, observations of basketball matches show that offensive players often face difficulties overcoming tight defensive pressure, particularly when opponents employ man to man defense. This situation is commonly encountered in basketball games.

Consequently, offensive teams may struggle to penetrate the opponent's defense and are often compelled to attempt jump shots. In certain situations, offensive players must shoot toward the basket from relatively long distances (Wissel, 1996, p. 59) because of the opponent's strong defensive pressure. Therefore, players need sufficient jumping height and shooting power to make their jump shots more effective and difficult for opponents to block. Accordingly, it is important to identify scientifically based training methods to address these problems. One potential strategy is to implement exercises designed to develop leg muscle explosive power and arm muscle explosive power. Both physical capacities are essential for effective jump shot performance.



Based on championship records and interviews conducted with the coach, as well as observations of male athletes participating in the extracurricular basketball program at SMA Negeri 2 Kota Tebing Tinggi during their training sessions, the researcher determined that the athletes' jump shot performance was unsatisfactory. According to the coach, this performance was characterized by poor shooting accuracy and insufficient jumping ability when attacking the opponent's area. The coach also reported that the athletes' jump shot execution remained inadequate because they sometimes missed the basket completely (air balls) or had their shots blocked by opponents, contributing to an increased number of turnovers.

Explosive power in the leg and arm muscles can be developed through systematic training. Various exercises can be used to improve the physical abilities required for effective jump shots. Two suitable training methods are depth jumps, which aim to improve leg muscle explosive power, and push ups, which are intended to develop arm muscle explosive power. Both training methods are designed to enhance the physical capabilities necessary for improved jump shot performance.

Because the players demonstrate insufficient leg and arm muscle explosive power, the researcher is interested in investigating two different training methods to improve the jump shot ability of male basketball players and achieve better performance during practice matches and competitions. The purpose of this experiment is to improve the athletes' jump shot ability through depth jump training and repeated push up exercises. Furthermore, to support the findings obtained from observations and discussions with the coach, the researcher conducted a preliminary jump shot test, including the assessment results and relevant reference standards.

Materials and Methods

Study Design

The method employed in this study is an experimental method (involving the administration of a treatment). Prior to the training, baseline data (pre test) were collected to assess the subjects' initial capabilities; the subjects then underwent the treatment for six weeks, after which final data (post test) were gathered. Data collection was conducted using tests and measurements.

Study Participants

The total population consists of 15 individuals, and the sample to be studied comprises 12 individuals. Purposive sampling was used to select the sample.

Study Organization

Data collection instruments included tests and measurements: a Strength Training test for leg muscle power, a medicine ball test for arm muscle explosive power, and a jump shot test.

Statistical Analysis

The data were analyzed to test three hypotheses: the individual contributions of plyometric training and strength training to improving the jump shot performance of male basketball players in the extracurricular program at SMA Negeri 2 Kota Tebing Tinggi in the 2025/2026 academic year, and their combined contribution. Hypothesis testing was conducted using the F test at a significance level of 0.05. The null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) accepted when the calculated F value (F count) exceeded the critical F value (F table).

Results

Using research instruments, data were obtained regarding the variables of plyometrics, push up exercises, and jump shots among male basketball players in the SMA Negeri 2 Tebing Tinggi extracurricular program (2026).

Table 2. Pre test data on leg muscle power, arm muscle power, and jump.



No	Name	Leg Muscle Power	Arm Muscle Power	Jump Shot
1	Guntur Rivaldi	50	347	2
2	M Angga Prayoga	46	353	1
3	M Hafiz Manik	34	358	1
4	Rizki Ramadan	47	390	3
2	Ilham Pranata	41	355	2
6	Imam Sarwira	40	430	2
7	Jaka Asmara Dana	44	373	2
8	M Firly Rinaldi	54	416	1
9	Wahyu Pramana	42	415	4
10	Sukma Wijaya	41	409	3
11	Irfan halomoan	43	420	2
12	Razzaq Hanur Wijaya	33	405	2
SIGMA		515	4671	25
N		12	12	12
X AVERAGE		42,92	389,25	2,08
SD		5,99	30,36	0,9

Pre test results regarding the impact of plyometric and push up training on the jump shot performance of male basketball players at SMA Negeri 2 Tebing Tinggi (2026) yielded vertical jump data (leg muscle power) with a score range of 33-54, a mean of 42.92, and a standard deviation of 5.99. Meanwhile, pre test results for the medicine ball test (arm muscle power) showed a range of 347-430, with a mean of 389.25 and a standard deviation of 30.36. Finally, jump shot pre test results showed a range of 1-4, with a mean of 2.08 and a standard deviation of 0.9.

Table 3. Post test data for leg muscle power, arm muscle power, and jump shot performance

No	Name	Leg Muscle Power	Arm Muscle Power	Jump Shot
1	Guntur Rivaldi	61	379	6
2	M Angga Prayoga	55	378	5
3	M Hafiz Manik	39	385	5
4	Rizki Ramadan	50	407	5
2	Ilham Pranata	48	373	4
6	Imam Sarwira	45	457	6
7	Jaka Asmara Dana	51	395	5
8	M Firly Rinaldi	58	442	7
9	Wahyu Pramana	45	437	5
10	Sukma Wijaya	45	429	6
11	Irfan halomoan	55	435	6
12	Razzaq Hanur Wijaya	41	413	4
-		593	4930	64
N		12	12	12
X AVERAGE		49,42	410,83	5,33
SD		6,83	28,86	0,89

Post test results regarding the effects of plyometric and push up training on the jump shot performance of male basketball players in the SMA Negeri 2 Tebing Tinggi extracurricular program (2026) yielded vertical jump data (leg muscle power) with a score



range of 39–61, a mean of 49.42, and a standard deviation of 6.83. Meanwhile, post test results for the medicine ball test (arm muscle power) showed a range of 373–457, with a mean of 410.83 and a standard deviation of 28.86. Finally, jump shot post test results showed a range of 4–7, with a mean of 5.33 and a standard deviation of 0.89.

Table 4. Data Normality Test

Variable	Mean & Std. Dev.	L_o	L_{table}	α	Information
Post test Data Leg Muscle Power	$\bar{x}_i = 50$ S= 10	0,090	0,242	0,05	Normal
Post test Data Medicine Ball	$\bar{x}_i = 50$ S= 10	0,150	0,242	0,05	Normal
Post test Data Jump Shot	$\bar{x}_i = 50$ S= 10	0,230	0,242	0,05	Normal

Data normality testing using the Lilliefors test on the leg muscle power post test data yielded $L_o = 0.090$ and $L_{table} = 0.242$ (with $n = 12$ and a significance level of 0.05). Since $L_{calculated} < L_{table}$, it can be concluded that the sample is drawn from a normally distributed population.

Data normality testing using the Lilliefors test on the medicine ball post test data yielded $L_o = 0.150$ and $L_{table} = 0.242$ (with $n = 12$ and a significance level of 0.05). Since $L_{calculated} < L_{table}$, it can be concluded that the sample is drawn from a normally distributed population.

Data normality testing using the Lilliefors test on the jump shot post test data yielded $L_o = 0.230$ and $L_{table} = 0.242$ (with $n = 12$ and a significance level of 0.05). Since $L_{calculated} < L_{table}$, it can be concluded that the sample is drawn from a normally distributed population.

For the homogeneity test comparing the leg muscle power post test data and the jump shot post test data, the calculated F value was 1. Given that $n_1 = 12$ ($v_1 = 11$) and $n_2 = 12$ ($v_2 = 11$), the critical F value at the 0.05 significance level is $F_{0.05}(11,11) = 2.82$; since the calculated F value is less than the critical F value ($1 < 2.82$), it can be concluded that the two variables are homogeneous.

For the homogeneity test comparing the medicine ball post test data and the jump shot post test data, the calculated F value was 1. Given that $n_1 = 12$ ($v_1 = 11$) and $n_2 = 12$ ($v_2 = 11$), the critical F value at the 0.05 significance level is $F_{0.05}(11,11) = 2.82$; since the calculated F value is less than the critical F value ($1 < 2.82$), it can be concluded that the two variables are homogeneous.

Discussion

The analysis of the first hypothesis, concerning the contribution of plyometric training to improving the jump shot performance of male basketball players participating in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026, showed a significant contribution between the post test results of plyometric training and jump shot performance. This indicates that plyometric training contributes substantially to improving jump shot performance. A six week plyometric training program can increase lower limb muscle power, a physical component essential for performing a jump shot. This finding is consistent with Bompa (1986:37), who stated that training is a systematic process involving repeated activities over an extended period, with gradual and individualized increases, aimed at developing muscular physiological and psychological functions to meet task demands.



Plyometric training is a form of exercise that can increase lower limb muscle power, thereby maximizing jump height during a jump shot in basketball. Plyometric exercises can also improve strength, speed, and the combination of strength and speed. This is consistent with Redillife and Farentinos (1985:6), who stated that plyometric training is primarily used to improve physical capabilities required in sports, including speed, strength, and power. The movement characteristics of plyometric exercises offer advantages in jumping and shooting speed, as well as body balance during flight and landing. These characteristics are closely related to the movements involved in a jump shot.

These findings indicate that plyometric training makes a meaningful contribution to improving the jump shot performance of male basketball players in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026. Several factors may influence training performance, including player motivation, weather conditions, and the players' economic circumstances. The analysis of the second hypothesis, concerning the contribution of push up training to improving the jump shot performance of male basketball players participating in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026, showed no significant contribution between the post test results of push up training and jump shot performance.

This finding indicates that push up training does not contribute significantly to improving jump shot performance when performed alone. Push ups primarily target upper body muscles, particularly the arms, and therefore may be insufficient to improve jump shot performance without complementary plyometric exercises that develop lower limb power. An effective jump shot requires coordination between lower limb power and upper limb power. Push ups are exercises intended to strengthen the arm muscles and support shooting performance.

According to the cited source, the extensor carpi radialis brevis is a wrist extensor and abductor muscle located near the radius bone. It is shorter than its counterpart, the extensor carpi radialis longus. The movement characteristics associated with push up training may support proper body positioning, arm alignment toward the basketball hoop, and repeated muscular strengthening. However, push ups alone do not fully replicate the technical demands of a jump shot, which requires coordinated leg extension, jumping, and shooting movements.

The analysis of the third hypothesis, concerning the combined contribution of plyometric training and push up training to improving the jump shot performance of male basketball players participating in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026, demonstrated a significant contribution of the two training methods to improved jump shot performance.

A systematically structured training program can improve the physical capabilities of male basketball players. Technical skill development should be accompanied by improvements in physical fitness. This is consistent with Harsono (1988:100), who identified several physical components that should be developed, including cardiovascular endurance, muscular endurance, muscular strength, flexibility, speed, stamina, agility, and power.

Plyometric and push up training can help develop strength, speed, lower limb power, and upper limb power. The systematically designed training program was implemented over six weeks, consisting of 18 sessions. Each player was expected to train to the best of their ability and follow the coach's instructions seriously. The program was intended to improve jump shot performance, and the findings demonstrated that the combination of plyometric and push up training made a meaningful contribution to improving the jump shot performance of male basketball players in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026.



10

Conclusions

Based on the hypothesis testing and research findings, it can be concluded that plyometric training significantly contributes to improving jump shot performance among male basketball players in the extracurricular program at SMA Negeri 2 Tebing Tinggi in 2026, whereas push up training does not show a significant contribution when considered individually. However, plyometric and push up training together make a significant contribution to improving jump shot performance.

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Conflict of Interest

The authors declare no conflict of interest.

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