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## The effect of current power, arm strength and coordination on jump shoot skill basketball skills

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### Abstract

The purpose of the study to determine whether or not the direct influence of the explosive power leg muscle (X1), arm muscle strength (X2) and k oordinasi hand eye (X3) on skill *jump shoot* (Y) basketball SMEs basketball UNINUS. The research method used is a sociative quantitative approach, the analysis technique uses the path analysis approach (*Path analysis*). The sample included in this study amounted to 50 students. The results of the analysis that there menunjukkan contributions influence of X1 and X2 to Y 75.2% ( $\epsilon_1 = 0.4979$ ); contributions influence of X1, X2, X3 to Y 87.7% while the remaining 12.3% is contributed by other variables not researched ( $\epsilon_2 = 0.3507$ ). The conclusion of this experiment is the leg muscle power, k ekuatan arm muscles, hand-eye coordination are equally affect the skills of *the jump shot*. P ower muscle and strength of arm muscles directly influence the hand-eye coordination on SME UNINUS basketball.

**Keywords:** D aya explosive leg muscle, the muscle strength of arm, k oordinasi hand eye, *jump shoot*, the game of basketball

### Introduction

#### Preliminary

The basketball game was introduced by Naismith in 1891 to overcome the boredom of school students in America. Basketball game was created with the concept of a game that is played by highlighting the fun element that is played in teams, so that many students are involved in this game. With the advancement of human culture at this time more and more elements are contained therein, which makes the game of basketball as one of the sports achievements that have a good place through education, amateur organizations and even professional entertainment.

Basketball games can be said to be a very popular game and are often played by children up to people who are relatively old. This is indicated by the increasing number of basketball sports facilities and infrastructure both within the school and in the community. <sup>[1]</sup> Demenius describes basketball as, "this basketball game is very interesting, because it can be played by all age groups. besides that also because of the players required playing skills, physical freshness and strength of a strong immune system ". Basketball game is a game that uses standard basketball which is played in a relatively fast tempo and requires good skills to create an interesting game. Therefore, basketball athletes must not only have good playing skills but also good physical condition to be able to run fast and agile, catch and throw the ball well and pass the ball to the intended target.

Basketball requires teamwork and mastery of good basic techniques, this is very necessary in defense and attack. Every basic basketball game technique needs to be mastered perfectly by each player, one of which is the shooting technique, because the victory of a team in one team is determined by the numbers obtained through incoming shots.

Shooting skills are skills that provide immediate tangible results, because the victory of a team in one match is determined by the results of shots fired by a team, <sup>[2]</sup> Mcrobert stated, "*the most important skill in basketball is the ability to "shoot "or shoot the ball into the basket nets, this skill is a skill that provides real results directly"*". A basketball player should be able to shoot accurately, as disclosed <sup>[3]</sup> Yalcin bahwasannya, "*the basic skill that you have to*

practice is shooting accuracy. This will force your opponent to stick to you tightly and easily be fooled, and then make it easy to pass and dribble and shoot".

Shooting techniques have a variety of movements. Like the technique of shooting with one or two hands (*one / two handed shoot*), the technique of shooting by jumping (*jump shoot*), and the shooting technique that is preceded by dribbling and then stepping in rhythm 1-2 (*one and two rithme*) jumping with repulsion continues to shoot (*lay up shoot*). Besides that in basketball there are several types of shots that can be divided into two types of shots namely field shots and penalty shots. Field shots are shots taken in the 2-digit and 3-digit shots area. Whereas the penalty shot or *free throw* (*free throw*) is an opportunity given to a player to score one number from the position behind the line of free shots [4].

One of the shots that must be mastered by basketball players is *Jump shoot*. Shot jump (*jump shoot*) have a higher level of difficulty. To produce a good *jump shoot* technique requires a good physical condition support, which is produced by coordination between muscles in the limbs and muscles in the arms and coordination support in the eye-hand is also very important to produce a good jump shoot [5]. To perform the *jump shoot* technique movement requires good skills for jumping and releasing the ball, so that the skill in doing the technique can be done well certainly good physical conditions are needed. In this component the physical conditions needed are leg power, arm muscle strength and good eye-hand coordination.

Leg power, arm power and eye-hand coordination are inseparable and need each other in a series of *jump shoot* movements. Leg power is needed from the beginning to the end of the movement, because it is a foundation / body weight

of someone in a *jump shoot* [6]. Then arm muscle strength is one of the factors that determine the success of a person's shot, players who have great arm muscle strength will be easier and able to do *jump shoot* movements when pushing from back to front. *jump shoot* shots also use the eye to see the basketball hoop and the hand to insert the ball into the basketball hoop [7]. Therefore, eye and hand coordination also plays a role in *jump shoot* shots.

For that every player must have the elements of the physical condition so that a player can *jump shoot* well, so we need an exercise that can improve the skills of these elements, so the players are able to *shoot jump* well [8]. Based on the background stated above, the researchers tried to reveal how much influence the leg muscle power, arm muscle strength and hand eye coordination on *jump shoot* skills in basketball.

## Method

It aims to determine the presence or absence of direct and indirect influence between Explosive power leg muscles, arm muscle strength and k oordinasi hand eye towards skill *jump shoot* basketball SMEs basketball Uninus. The method used in this research is quantitative approach a sosiatif, with test and measurement techniques, while the technique of analysis using the approach path analysis (*path analysis*). The variables studied consisted of four variables consisting of three exogenous variables and one endogenous variable. Exogenous variables consist of leg muscle explosive power ( $X_1$ ), arm muscle strength ( $X_2$ ) and hand eye coordination ( $X_3$ ). Endogenous variables consist of basketball *jump shoot* skills ( $Y$ ). The pattern of interrelationship between research variables can be seen in the following figure.

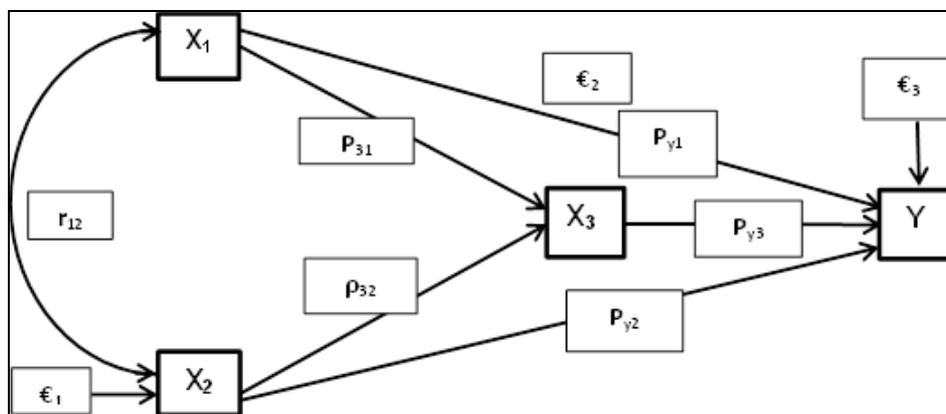


Fig 1: structural between research variables

## Information

$X_1$ : Leg muscle explosive power

$X_2$ : Arm muscle strength

$X_3$ : Hand eye coordination

$Y$ : Jump shoot skills

$\rho_{X_1 Y}$ : Variable Path coefficient  $X_1$  with Variable  $Y$

$\rho_{X_2 Y}$ : Path coefficient of variable  $X_2$  with variable  $Y$

$\rho_{X_3 Y}$ : Variable Path coefficient  $X_3$  with variable  $Y$

$\rho_{X_3 X_1}$ : Variable Path coefficient  $X_3$  with Variable  $X_1$

$\rho_{X_2 X_3}$ : Variable Path coefficient  $X_2$  With Variable  $X_3$

The population in this study was in the area of all Uninus Bandung basketball students. Based on variables, the number of studies was 50 people. Sampling was carried out using a saturated sample technique. The form of this sample is based on determining the sample with certain considerations. d) testing the validity and reliability of the instrument. "In

accordance with the type of variables in this study it, to get the data, the instrument used is either (1) " K Life Skills *jump shoot* the basketball ( $Y$ ) based on the accuracy of entering the ball into the basket. Jump shoot test. " (2) instrument Leg muscle explosive power ( $X_1$ ) using a vertical jump test (3) arm muscle strength ( $X_2$ ) using *over hand medicine ball throw* tests " and (4) hand eye coordination ( $X_3$ ) using hand eye coordination test ".

## Results and Discussion

Explanation of the general description of the data of a study can use descriptive data analysis of leg muscle power data, arm muscle tightness and hand eye coordination of jump shoot skills in basketball UKM at UNINUS. This is intended to give meaning to the results of the analysis that has been done. The results of descriptive data analysis can be seen in the following table:

**Table 1:** Results of analysis of leg muscle power data, arm muscle tightness and hand eye coordination of *jump shoot* skills in basketball UKM at UNINUS.

Variable	N	Sum	The mean	Stdv	Range	Min	Max	Variance
Leg muscle power	50	2772	51,1 9	3,223	16	34.52	69.9	10 0.386
Arm muscle tightness	50	2789	53.13	3,987	16	33.62	76.1	100,895
Hand eye coordination	50	2689	54.45	3,273	12	29.47	68, 7	10 0.713
<i>Jump shoot</i> skills	50	2765	56.12	27,112	94	27.91	75.1	100,062

Associated with data processing in this study using statistics with the *Path Analysis* technique, it is necessary to test in this study the test requirements referred to include: data normality test and data linearity test. One of the assumptions that must be met so that the parametric test can be used in research is that the data must follow the normal distribution, then the data normality test is performed. Data normality testing can be done to find out whether the data obtained on the results of the study are in the normal distribution. Testing data analysis can be done with the *Kolmogorov Smirnov test*. The results of normality test results of leg muscle power variables, arm muscle strength and hand eye coordination of basketball basketball shoot jumping skills at UKM basketball in UNINUS can be seen from the following table.

**Table 2:** Test results for normality of leg muscle power variable, leg muscle tightness, hand eye coordination and *jump shoot* skills in basketball UKM UKM basketball at UNINUS.

Variable	KS-Z	P-Value / sig	$\alpha$	Ket
Leg muscle power	.141	.135	0.05	Normal
Kekutan muscular arm	0.098	.200	0.05	Normal
Hand eye coordination	0.126	.200	0.05	Normal
<i>Jump shoot</i> skills	.116	.200	0.05	Normal

The table above explains the value of having a significant value > 0.05, which means that each variable is normally distributed. Because this research data follows the normal distribution, then to test the hypothesis of this study used parametric statistical analysis using linearity analysis. This research revealed five hypotheses, where the truth must be tested for truth by using statistical analysis that is by using *Path Analysis*. Hypothesis testing of each variable presented in the hypothesis is carried out using SPSS version 22. The results obtained can be seen in the table of the structural equation coefficient model 1 as follows:

**Table 3:** Multivariate analysis results of regression of leg muscle power variables, leg arm muscle strength on hand eye coordination

Variable	$\beta$	P-Value / Sig	$\alpha$
Leg muscle power	.402	0,001 / 2 = 0,0005	0.05
Hand eye coordination			
Muscle strength of limbs	0.589	0,000 / 2 = 0,000	0.05
Hand eye coordination			

**Table 4:** Determinant Coefficient of Sub-Structure I (Determination Coefficient Analysis Results)

Model	R	R Square	Adjusted R. Square	Std. Error of the Estimate
1	0.867	0.752	0.734	1,688

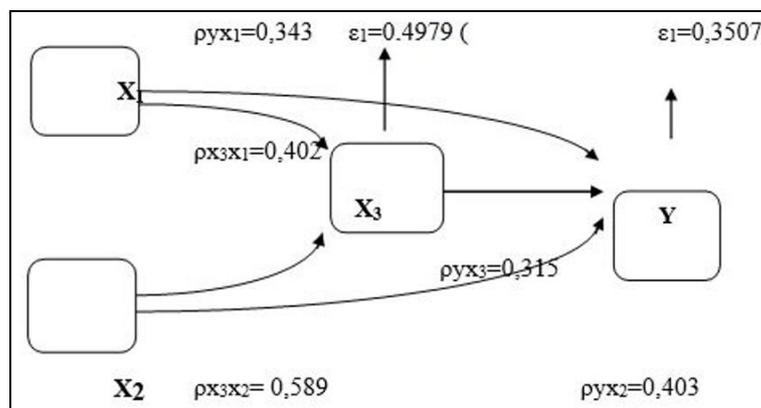
**Table 5:** The results of multivariate regression analysis of structure 2 variables of leg muscle power, leg arm muscle strength and hand eye coordination of *jump shoot* skills in basketball UKM at UNINUS

Variable	$\beta$	P-Value / sig	$\alpha$
Leg muscle power	.343	0.002 / 2 = 0.001	0.05
<i>Jump shoot</i> skills			
Arm muscle strength	.403	0.002 / 2 = 0.001	0.05
<i>Jump shoot</i> skills			
Hand eye coordination	0.315	0.031 / 2 = 0.016	0.05
<i>Jump shoot</i> skills			

**Table 6:** Determination coefficient sub Structure 2 (Results of the analysis of the coefficient of determination)

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
2	0.937	0.877	0.863	10,034

Based on the test results for structure 1 and structure 2, the results of the overall variable path diagram are as follows:



**Fig 2:** Model testing results of models 1 and 2

**There is a direct influence of leg muscle power on eye hand coordination in basketball UKM at UNINUS**

The first hypothesis is that there is a direct effect on leg muscle power on hand eye coordination. Based on the results of hypothesis testing is done, a significant value obtained is 0, 0005 due to the significant value less than 0.05 (0.0005

<0.05) then the hypothesis is accepted. Based on the results of the study showed that there is a direct influence of leg muscle power on the eye coordination of the basketball UKM in UNINUS by 0.402. These results indicate the analysis that a jumper's leg muscle power is needed to improve eye hand coordination.

This is in line with the theory, that in basketball the leg muscle power is very influential to achieve maximum jump results. Athletes or students who have adequate leg muscle power allow students to have the opportunity to reach adequate distances as well. Because with long legs will affect the range when doing the jump. But there are many other factors that influence the game of basketball including physical activity and regular training, hand eye coordination, enthusiasm, weight and others. Leg muscle power and its relationship to the basketball game are very influential in achieving the range or jumping results achieved because the jumpers who have maximum leg muscle power will greatly support the athlete or student to excel in basketball. But the leg muscle power possessed and good hand eye coordination do not guarantee the same skills for other sports. Because of the order to each person had their individual skills in the form of performance and skills d a lam activity basketball game.

#### **There is a direct influence of arm muscle strength on hand eye coordination in basketball UKM at UNINUS**

Based on the results of hypothesis testing conducted, the significant value obtained was 0,000 because the significant value was smaller than 0, 05 (0,000 <0.05). Based on the results of the study showed that there was an influence of arm muscle strength on the coordination of the eyes of basketball SMEs in UNINUS by 0.589 These results indicate the analysis that a jumper's arm muscle strength is needed to improve eye hand coordination.

Strength of arm muscle is often called the power of *the explosive*, marked by a movement or a sudden change that fast, where the body is pushed upward or vertically by way of jump one foot stepping or jumping (two feet tread, high jump), or push it forward horizontally, run fast, Basketball game with maximum muscle exertion. According to Sajoto (1995: 8) argues that "muscle strength is a person's skill to use the maximum power that is deployed in the shortest possible time". In this case it can be said that *power* is = *force* x speed (*velocity*). To get the results of a long jump and high speed a jumper must have great muscular strength and hand eye coordination. So the strength of the arm muscles as a driving force of the legs to make a jump in carrying out the game of basketball must be accompanied by eye hand coordination. This indicates that in carrying out an activity that requires explosive strength, in order to obtain maximum strength it is necessary to encourage the coordination of the eyes to have a spirit of strength training and adequate speed.

#### **There is a direct influence of leg muscle power on jump shooting skills at basketball UKM at Uninus.**

The third hypothesis is that there is a direct influence on leg muscle power on *jump shoot* skills in basketball UKM at UNINUS. Based on the results of the hypothesis test, the significant value obtained is 0.001 because the significant value is smaller than 0.05 (0.001 <0.05), so the proposed hypothesis is accepted.

Based on the results of the study showed that there is a direct influence of leg muscle power on *jump shoot* skills in basketball UKM at UNINUS beta value of 0.343. These results indicate the analysis that a jumper's leg muscle power is needed to improve *jump shoot* skills. This is in line with what was stated by several experts. In the game of basketball power leg muscles are very influential to achieve maximum jump results. Athletes or students who have adequate leg muscle power allow students to have the opportunity to reach adequate jump distances as well. Because with long legs will

affect the range when making a jump, but there are many other factors that affect the game. These basketball include physical activity and regular exercise, hand eye coordination, enthusiasm, weight and others. Leg muscle power and its relationship to the game of basketball are very influential in achieving the range or results of jumps achieved because the jumpers who have maximum leg muscle power will greatly support the athlete or student to excel in playing basketball. But having leg muscle power does not guarantee the same good skills for other sports. Because everyone has their respective skills both in the form of performance and skills in basketball game activities. Thus the less than ideal limb muscle power such as too short, it will be difficult to reach great jump distances. But on the other hand athletes or students who have ideal or high leg muscle power, the athlete has the potential to win.

#### **No direct impact on the strength o tot arms against skill jump shoot SMEs basketball in UNINUS**

The fourth hypothesis is that there is a direct influence of arm muscle strength on *jump shoot* skills. Based on the results of the hypothesis test, the significant value obtained is 0.001 because the significant value is smaller than 0, 05 (0.001 <0.05), so the proposed hypothesis is accepted. Based on the results of the study showed that there is a direct effect of arm muscle strength on *jump shoot* skills in basketball UKM at UNINUS beta value of 0.403. These results indicate an analysis that the muscle strength of a jumper's arm is needed to improve *jump shoot* skills.

Widiastuti (2011: 100) argues that "*Power* or explosive power is a series of actions of several elements of muscle movement and produces muscle strength if the two forces are working simultaneously. Muscle strength *Tungka* is often called the explosive power, characterized by the movement or sudden changes quickly, where the body is pushed upward or vertical by way of jump one foot stepping or jumping m (two feet tread, high jump), or push forward horizontal, sprint, Basketball Game with maximum muscle exertion. According to Sajoto (1995: 8) argues that "muscle strength is a person's skill to use the maximum power that is deployed in the shortest possible time". In this case it can be said that *power* is = *force* x speed (*velocity*). To get the results of a long jump and high speed a jumper must have maximum arm muscle strength. So the strength of the arm muscle as a driving force for the legs to make a jump in the implementation of Basketball Games. This indicates that in carrying out an activity that requires explosive strength, to get maximum strength it is necessary to encourage and strengthen muscles, strength training and adequate speed.

#### **There is a direct influence of hand-eye coordination on jump shooting skills at UNINUS basketball UKM**

The fifth hypothesis is that there is a direct influence of hand eye coordination on *jump shoot* skills. Based on the results of the hypothesis test, the significant value obtained is 0.016 because the significant value is smaller than 0.05 (0.016 <0.05), so the proposed hypothesis is accepted. Based on the results of the study showed that there is a direct influence of hand eye coordination on *jump shoot* skills in basketball UKM at UNINUS beta value of 0.315. These results indicate the analysis that the eye coordination of a jumper's hand is needed to increase the maximum distance achieved in basketball. In other words, hand eye coordination directly influences *jump shoot* skills.

Means this is in accordance with the theory according to

Gunarsa *et al.* (1996: 111) that "hand eye coordination which means briefly is the power or driving force for someone to behave. So in the case of athletes, hand eye coordination means the strength or driving force of an athlete in his appearance ". Hand-eye coordination is positive when the driving force is very strong, but with no load is too heavy, causing excessive tension, so it caused quite a strong desire to win, characterized by behavior that *all out*. This means that eye hand coordination is one of the major supporting factors for achieving maximum distance in playing basketball. Because the students or jumper who has the spirit and hand-eye coordination is high then will greatly support the achievement of the maximum jump.

Basketball game is a movement activity that starts from the beginning of running then rests, then drifts and the last is landing with both feet. Arm muscle strength is needed when relying on Basketball Games. Arm muscle strength aims to spur and push the body quickly to jump. To produce maximum jumping distance in basketball, good hand eye coordination is required. Because there is a strong urge so that someone is able to do a desired set of movements. So arm muscle strength is very needed in basketball because it accelerates the body quickly and with the support of strong hand eye coordination, a jumper will be able to produce a jump with a long distance and effective.

### Conclusions and suggestions

Explanation according to the contents of the results and the existing conclusions concluded the results of testing the hypothesis that explained that (1) leg muscle power affects the *jump shot* skills in UNINUS basketball UKM, (2) arm muscle strength affects the *jump shot* skills in UNINUS basketball UKM, (3) hand eye coordination influences *jump shot* skills in UNINUS basketball UKM, (4) leg muscle power directly influences eye hand coordination in UNINUS basketball UKM, (5) arm muscle strength directly influences hand eye coordination in basketball UKM UNINUS.

The conclusion is complete when it is expected that the coaches or teaching staff should always provide encouragement and motivation to the athletes to be interested in participating in coaching seriously in basketball. In order to improve the ability of athletes who have leg muscle power, a good level of arm muscle strength and ankle coordination is expected so that the trainer gives room for special training. The facilitators either parents or coaches always monitor the development of athletes who are taught or coached. If you see an athlete who has a high level of leg muscle power, good arm muscle strength and good ankle coordination, it can be directed by giving more incentive training. To get better information about leg muscle power, arm muscle strength and ankle coordination on jump shoot skills, further research is expected on this subject. With the implementation of better research without being disturbed by other factors such as conditions that are not possible.

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