



## Examining Physical Fitness with Long Jump Ability

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### ABSTRACT

**The purpose of the study.** To find out how far the influence of physical components (physical fitness) which includes speed, leg explosive power and balance on long jump ability.

**Materials and methods.** This research is descriptive with regression technique which gives a general description about agility, limb explosive power and balance with long jump ability. The research subjects used were 40 people. With a random sampling technique, the data is processed using a correlation technique through the help of the SPSS program.

**Results.** From the data analysis, the results obtained are: (1). There is a significant effect of speed on the long jump ability, with the value of  $r$  arithmetic ( $r_0$ ) = 0.687 ( $P < 0.05$ ) with a contribution value of 47.2% (2). There is a significant effect of limb explosive power on Long Jump Ability. with a calculated  $r$  value ( $r_0$ ) = 0.504 ( $P < 0.05$ ) with a contribution value of 25.4% (3). There is a significant effect on the balance of Long Jump Ability, with a calculated  $r$  value ( $r_0$ ) = 0.415 ( $P < 0.05$ ) with a contribution value of 17.2% (4). There is a significant effect together in terms of speed, leg explosive power, balance on Long Jump Ability, with a calculated  $r$  value ( $r_0$ ) = 0.725 ( $P < 0.05$ ) with a contribution value of 52.6%.

**Conclusions.** From the results of data processing, it shows that it has a significant influence from data analysis, namely speed, leg explosive power and balance on long jump ability.

**Keywords:** Physical Fitness Analysis; Long Jump.

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### INTRODUCTION

The development of sports in the country is meant to improve the physical fitness of the Indonesian people and optimally improve performance to lift the nation's achievements in inter-state forums and to cultivate people who have broad dimensions in Indonesia's development. (Rubiana et al., 2019). Coaching as a sport, including sports that are curricula at the formal level, is not only directed at physical fitness but also to increase knowledge, desire for recreation and achievement.

Athletics is a sport in which every movement uses physical or physical activity, wherein doing so all members of the body will move, be it feet, hands, or other body parts and physical components. As a coach in the training process, it is required to achieve optimal results which are marked by an increase in the basic technical skills of the sport achieved by athletes. To achieve the basic technical skills of sports such as

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long jump sports optimally, coaches must try to improve the athlete's motion skills in doing the long jump starting from the initial attitude, repulsion, hovering, and landing which is an unbroken movement pattern. The results of the basic technical ability of the long jump ability are expected to achieve automatic movement of the athlete's muscular responses. One of the basic models for achieving achievement results in a long-jump sport is the potential of the athlete's body and excellent physical condition.

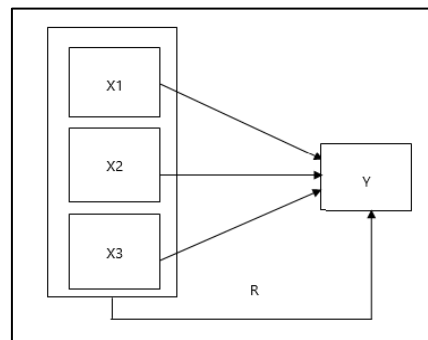
Physical conditions are specifically adapted to the demands of the long jump sport in order to be able to perform high technical movements to achieve maximum ability in doing the long jump. (Yani, 2015). Special physical conditions in physical potential such as speed, explosive power, flexibility and balance, which are the needs for long jump motion such as prefix, pedestal, hovering and landing.(Rofifah, 2020). Thus the ability to perform the long jump clearly requires elements of physical ability, and the physical abilities that are considered to have an influence on the long jump ability are speed, limb explosive power and balance so that they can perform long jump movements or techniques such as running at the start and end of the long jump. rest before jumping forward(Rofifah, 2020).

Speed is one of the most important physical elements in supporting athletic sports, especially the long jump (Abbas, 2015). Because the long jump requires the ability to move, in this case, what is meant is the speed to get a good start before doing repulsion. Then the explosive power of the limbs, in this case, is a supporting factor in doing the long jump where the explosive power of the legs is needed when doing the repulsion, namely departing with one of the strongest legs when transitioning from horizontal speed to vertical speed. (Son, 2021), while the balance is also an equally important component in long jumps. The balance referred to in the long jump sport is dynamic balance, namely when running, departing, hovering, and landing(Ramanda & Rizky, 2020). From each of the above aspects that are considered to play a role in the implementation of sports activities such as the long jump athletics branch, it is clear that the physical components with the long jump ability are two things that cannot be separated, therefore it is expected that coaches, teachers and athletes and students understand about the aspects that play a role in the long jump sport so that it can

become capital in achieving optimal results which are marked by an increase in basic technical skills in the long jump sport.

## MATERIALS AND METHODS

This research is a descriptive type of research that will reveal the analysis of physical components which include speed, limb explosive power, and balance with long jump ability, so that the correlational research design model is as follows:



### Information :

- X1 = Speed
- X2 = Explosive leg power
- X3 = Balance
- Y = Long jump ability
- R = Combined

Figure 1. Correlational research design model, Source: Sugiyono (2014)

## RESULTS

The descriptive analysis includes; total value, mean, standard deviation, variance, maximum and minimum. From these statistical values, it is hoped that it can provide a general description of the state of speed, limb explosive power, balance, and long jump ability. The results of the descriptive analysis of each research variable can be seen in table 1 below:

Table 1. The results of the descriptive analysis of each variable.

Variable	N	Sum	mean	Stdv	Variance	Min.	Max.
Speed	40	329,70	8.2425	0.61079	0.373	7.55	9.45
Explosive power	40	100.39	2.5097	0.41299	0.171	1.90	3.67
Balance	40	3736.00	93,4000	2.81753	7,938	85.00	99.00
Long jump	40	139.41	3.4852	0.46216	0.214	2.60	4.80

The results of the descriptive data analysis above are just an illustration of speed, limb explosive power, balance, and long jump ability. The data above has not described how the relationship or mutual contribution between the independent variables consisting of speed, leg explosive power, and balance to the dependent variable in the

form of long jump ability. To prove whether there is a significant contribution of independent variables to the dependent variable, further testing is needed, namely by conducting a data normality test to determine whether to use parametric or non-parametric and linearity tests to determine whether there is a relationship between the independent variable and the dependent variable.

#### *Normality Test*

One of the assumptions that must be met for parametric statistics to be used in research is that the data must follow a normal distribution. To determine the distribution of speed, limb explosive power, balance, and long jump ability, a normality test of the data was carried out using the Kolmogorov Smirnov Test (KS-Z). The results of the normality analysis of the data can be seen in the following summary table 4.2:

*Table 2. Normality test results for each variable*

<b>Variable</b>	<b>K – SZ</b>	<b>P</b>	<b><math>\alpha</math></b>	<b>Note.</b>
Speed	0.905	0.386	0.05	Normal
Leg Explosive Power	0.938	0.342	0.05	Normal
Balance	0.885	0.414	0.05	Normal
Long jump ability	1.118	0.164	0.05	Normal

Thus the freshness of the speed obtained follows a normal distribution or is normally distributed. a) In testing the normality of explosive power, the Kolmogorov-Smirnov Test value is 0.938 with a probability level (P) of 0.342 greater than the value (0.05). Thus the freshness of the speed is obtained following a normal distribution or normally distributed. b) In testing the normality of balance at the Kijang Tambora Athletic Club, the Kolmogorov-Smirnov Test value was obtained at 0.885 with a probability level (P) of 0.414 greater than the (0.05). Thus the freshness of the speed obtained follows a normal distribution or is normally distributed. c) In testing the normality of the long jump ability, the Kolmogorov-Smirnov Test test value is 1.118 with a probability level (P) of 0.164 greater than the value (0.05). Thus the freshness of the speed obtained follows a normal distribution or is normally distributed. Because the research data is normally distributed, the hypothesis testing will be used parametric statistical test.

#### *Linearity Test*

Linearity Test of Data Between Speed and Long Jump Ability to find out whether there is a relationship between the independent variable, namely speed, and the dependent variable, namely the long jump ability, it can be seen in table 3 below.

*Table 3. Test linearity of speed on long jump ability*



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Variable	Fcount	Ftable	P	$\alpha$	Note:
Speed	1,681	2.138872	0.129	0.05	linear

From the results of table 3 above between speed and long jump ability. Account  $=1.681 < F_{table}=2.138872$  with a significant level  $(P) > \alpha 0.05$ . So, there is a linear relationship between speed and long jump ability. Linearity Test of Data Between Limb Explosiveness and Long Jump Ability to find out whether there is a relationship between the independent variable, namely limb explosive power, and the dependent variable, namely the long jump ability, it can be seen in Table 4 below. Linearity Test of Data Between Limb Explosiveness and Long Jump Ability.

*Table 4. Linearity test of limb explosive power on long jump ability*

Variable	Fcount	Ftable	P	$\alpha$	Note:
Limb Explosive Power Long jump ability	2.066	2.131264	0.057	0.05	linear

From the results of table 4 above, the explosive power of the legs on the long jump ability. Account  $=2.066 < F_{table}=2.131264$  with significant level  $(P) > \alpha 0.05$ . So, the explosive power of the limbs on the long jump ability in junior high school students. Negeri 1 Bajeng obtained has a relationship or linear.

*Data Linearity Test Between Balance and Long Jump Ability*

To find out whether there is a relationship between the independent variable, namely balance, and the dependent variable, namely the long jump ability, it can be seen in Table 5 below.

*Table 5. Balance linearity test on long jump ability*

Variable	Fcount	Ftable	P	$\alpha$	Note:
Speed Long Jump Ability	0.839	2.222874	0.587	0.05	linear

From the results of table 5 above, there is a balance between the long jump ability. The value of Fount  $= 0.839 < F_{table} = 2.222874$  with a significant level  $(P) > 0.05$ . So, the balance between the long jump ability obtained has a relationship or is linear.

*Hypothesis Testing*

The hypothesis proposed in this study needs to be tested and proven through empirical data obtained in the field through tests and measurements of the variables studied, then the data will be processed statistically. Because the research data follow a normal distribution, then to test the hypothesis of this study used parametric statistical analysis was. To test the hypothesis, a regression test of speed, leg explosive power, and balance was carried out on the long jump ability.



*There is a Contribution of Speed to Long Jump Ability*

Regression analysis was conducted to determine the contribution of the independent variable to the dependent variable. Regression analysis used is simple regression analysis at 95% or 0.05. The results of the complete regression analysis can be seen in the appendix. This is intended to determine the contribution speed to long jump ability is obtained according to the following table 6 summary:

*Table 6. The results of the regression analysis for the first hypothesis*

VARIABLE	N	r	R <sup>2</sup>	F	T	P	α
speed (X1) Long jump ability (Y)	40	0.687	0.472	33,917	-5.824	0.000	0.05

Based on the test results as shown in table 4.5, the regression equation is:

$$= a + bX_1$$

$$= 7.768 + (0.687) X_1$$

So what is contained in the regression equation can be explained as follows: a) The constant of 7.768 states that if the speed does not change, then the long jump ability is 7.768. b) The regression coefficient for the physical fitness variable is 0.687, which states that each addition of one percent (1%) of the speed variable will cause an increase of 0.687. means there is a speed contribution to the long jump ability.

Based on the results of the regression analysis of the speed data on the long jump hoop ability in table 4.5, the regression coefficient value is 0.687 with a significant level of  $0.000 < \alpha 0.05$ , for the coefficient of determination of 0.472. This means 47.2% of the effect of speed on long jump ability. While the rest ( $100\% - 47.2\% = 52.8\%$ ) was caused by other factors not included in the study. The results of the analysis can be seen that the value of count is -5.824 which can be seen in the table above with a significant level of 0.000, 0.05. So  $H_0$  is rejected and  $H_1$  is accepted or the regression coefficient is significant, or speed has a significant influence on the long jump ability. Thus there is a contribution of speed to the long jump ability of 47.2%. Testing on the regression model shows the F value of 33.917 with a significant value level of  $0.000 < 0.05$ . This means that the long jump ability can be explained significantly by speed.

*There is a Contribution of Limb Explosive Power to the Long Jump Ability.*

Regression analysis was conducted to determine the contribution of the independent variable to the dependent variable. Regression analysis used is simple regression analysis at 95% or 0.05. The results of the complete regression analysis can be seen in

the appendix. It is intended to determine the contribution of limb explosive power to the long jump ability is obtained according to the following table 4.6 summary:

*Table 7. Results of Regression Analysis for the Second Hypothesis*

VARIABLE	N	r	R <sup>2</sup>	F	T	P	$\alpha$
Limb explosive power(X <sup>2</sup> ) Long jump ability (Y)	40	0.504	0.254	12,945	3,598	0.001	0.05

Based on the test results as shown in table 4.6, the regression equation is:

$$= a + bX^2$$

$$= 2.070 + 0.504X^2$$

So what is contained in the regression equation can be explained as follows: a) The constant of 2.070 states that if the explosive power of the limbs does not change, then the long jump ability is 2.070. b) The regression coefficient of the leg explosive power variable is 0.504 which states that each addition of one percent (1%) of the limb explosive power variable will cause an increase in long jump ability of 0.504. There is a contribution of limb explosive power to the long jump ability.

Based on the results of the regression analysis of limb explosive power data on long jump ability in table 7, the regression coefficient of determination value is 0.504 with a significant level of  $0.001 < \alpha 0.05$ , for the regression coefficient of 0.244. This means 24.4% of the effect of explosive power on the long jump ability. While the rest ( $100\% - 24.4\% = 75.6\%$ ) was caused by other factors not included in the study. From the results of the analysis, it can be seen that the tcount value is 3.598, which can be seen in the table above with a significant level of 0.001, 0.05. So  $H_0$  is rejected and  $H_1$  is accepted or the regression coefficient is significant, or the explosive power of the limbs has a significant effect on the long jump ability. Thus, there is a contribution of limb explosive power to the long jump ability of junior high school students. Negeri 1 Bajeng by 24.4%. Testing on the regression model shows the F value of 12,945 with a significant value level of  $0.001 < 0.05$ . This means that the long jump ability can be explained significantly by the explosive power of the limbs.

*There is a balance contribution to the long jump ability.*

Regression analysis was conducted to determine the contribution of the independent variable to the dependent variable. Regression analysis used is simple regression analysis at 95% or 0.05. The results of the complete regression analysis can be seen in the appendix. It is intended to determine the contribution of balance to



The long jump ability at the Kijang Tambora Athletic Club is obtained according to the following table 8 summary:

*Table 8. The results of the regression analysis for the third hypothesis*

VARIABLE	N	r	R <sup>2</sup>	F	T	P	α
balance (X <sub>3</sub> ) Long jump ability (Y)	40	0.415	0.172	7,898	2,810	0.008	0.05

Based on the test results as shown in table 4.6, the regression equation is:

$$= a + bX_2$$

$$= -2.870 + 0.068 X_2$$

So what is contained in the regression equation can be explained as follows: a) The constant of -2.870 states that if the balance does not change, then the long jump ability is -2.870. b) The regression coefficient for the balance variable is 0.068 which states that each addition of one percent (1%) of the balance variable will cause an increase in the long jump ability of 0.068. There is a balance contribution to the long jump ability. Based on the results of the regression analysis of the balance data on the long jump ability in table 8, the regression coefficient of determination value is 0.068 with a significant level of  $0.008 < \alpha 0.05$ , for the coefficient of determination of 0.172. This means 17.2% of the effect of balance on long jump ability. While the rest ( $100\% - 17.2\% = 82.8\%$ ) was caused by other factors not included in the study. From the results of the analysis, it can be seen that the value of the count is 2.810, which can be seen in the table above with a significant level of 0.008, 0.05. Then  $H_0$  is rejected and  $H_1$  is accepted or the regression coefficient is significant, or balance has a significant effect on the long jump ability. Thus there is a balance contribution to the long jump ability of 17.2%. Tests on the regression model showed an F value of 7.898 with a significant value level of  $0.008 < \alpha 0.05$ . This means that the long jump ability skill can be explained significantly by balance.

*There is a contribution of speed, limb explosive power and balance to the long jump ability*

Regression analysis was conducted to determine the contribution of the independent variable to the dependent variable. Regression analysis used is simple regression analysis at 95% or 0.05. The results of the complete regression analysis can be seen in the appendix. It is intended to determine the contribution of speed, leg explosive power, and balance to the long jump ability at the Kijang Tambora Athletic Club is obtained according to the summary of table 9 below:



Table 9. The results of the regression analysis for the fourth hypothesis

VARIABLE	N	R	R2	F	P	$\alpha$
Speed (X1), limb explosive power (X2) and balance (X3) Long jump ability (Y)	40	0.725	0.526	13,324	0.000	0.05

Based on the test results as shown in table 9, the regression equation is:

$$= a + bX1 + bX2 + bX3$$

$$= 4.313 + (-0.407) X1 + 0.231 X2 + 0.021 X3$$

There is a contribution of speed, leg explosive power, and balance together to the long jump ability. Based on the results of the data regression analysis of speed, leg explosive power, and balance on the long jump ability in table 4.8, a regression value (Ro) of 0.725 is obtained with a significance level in the sig column, of  $(0.000) < \alpha 0.05$  for the value of R Square (coefficient of determination) 0.526. This means that 52.6% of the contribution of speed, leg explosive power, and balance together to the long jump ability. While the rest  $(100\% - 52.6\% = 47.4\%)$  was caused by other factors not included in the study.

From the Anova test or F-test, the Fount is 13.324 with a significance level of 0.000. Because the significance (0.000) is much smaller than 0.05, the regression model can be used to predict speed, leg explosive power, and balance on long jump ability (applicable to the population where the sample is taken).

## DISCUSSION

*There is a Contribution of Speed to Long Jump Ability.*

The results of statistical analysis showed that there was a relationship between running speed and long jump ability as evidenced from the analysis results obtained that the regression correlation value was greater than the probability value with a significant level of 95% or 0.05 of 47.2%. If the results of this study are related to the theory and the underlying framework, then basically the results of this study support and strengthen the theories and results of previous studies that already exist. This proves that speed greatly affects long jump ability. Because speed is one of the determining factors in sports such as sprint numbers, long jumps, several sports games, and so on. Speed is the ability to perform similar movements in succession in the shortest possible time (Handoko, 2011), or the ability to cover a distance in the shortest time (Rompas, 2020). So the role of speed in the implementation of the long jump

sport when doing the long jump, the running speed must be maximized so that the jump results obtained are maximized (Azwar, 2019). If the athlete is not supported by the physical component of speed, in doing the long jump, the repulsion will be less than optimal, resulting in a jump that is not optimal. So running speed in the long jump sport is very supportive. Thus the speed has a significant relationship with the long jump ability.

*There is a Contribution of Limb Explosive Power to the Long Jump Ability.*

The results of statistical analysis showed that there was a relationship between limb explosive power and long jump ability as evidenced by the results of the analysis that the regression correlation value was greater than the probability value with a significant level of 95% or 0.05 of 24.4%. If the results of this study are related to the theory and the underlying framework, then basically the results of this study support and strengthen the theories and results of previous studies that already exist. This proves that limb explosive power greatly affects the long jump ability. Limb explosive force is a very influential component in sports, especially long jump numbers wherein doing long jumps at the pedestal or repulsion stage requires good leg explosive power to achieve the maximum jump distance. Power is the result of strength and speed (Cahyadi et al., 2018). So the role of limb explosive power in the implementation of the long jump sport when doing the long jump the explosive power of the limbs must be maximized so that the jump results obtained are maximized. (Arsyal Aswindi, Andi Rizal, 2018). If the athlete is not supported by the physical component of the explosive power of the limbs, then in doing the long jump, the repulsion will be less than optimal, resulting in a jump that is not optimal. So the explosive power of the legs in the long jump sport is very supportive. Thus the explosive power of the limbs has a significant relationship to the long jump ability.

*There is a balance contribution to the long jump ability.*

Statistical analysis results that there is a balanced relationship to long jump ability as evidenced from the analysis results obtained that the regression correlation value is greater than the probability value with a significant level of 95% or 0.05 of 17.2%. If the results of this study are related to the theory and the underlying framework, then basically the results of this study support and strengthen the theories and results of

previous studies that already exist. This proves that balance greatly affects the long jump ability (Yulmiando, 2020). Stability very influential component in sports, especially the long jump number where doing the long jump requires balata ball balance achieving maximum jumping distance. Balance is a person's ability to maintain body systems both in static positions and in dynamic motion positions where balance is also very important in carrying out a movement because, with good, balance, a person can move. (Freni Budiwibowo, 2015). So role a role balance implementation of the long jump sport when doing the long jump it is very necessary so that the jump results obtained are maximal (Mappaompo, 2018). If the athlete is not supported by the physical component of the explosive power of the limbs, then in doing the long jump, the repulsion will be less than optimal, resulting in a jump that is not optimal. So the explosive power of the legs in the long jump sport is very supportive. Thus the balance has a significant relationship with the long jump ability.

*There is a contribution of speed, limb explosive power, and ba, lance to the long jump ability.*

Results The results of the variable analysis show that there is a significant relationship together with speed, leg explosive power, and balance on long jump ability. It is evident from the results of the analysis that the regression correlation value is greater than the probability value with a significant level of 95% or 0.05 of 52.6%. If the results of this study are related to the theory and the underlying variable framework, basically the results of this study support and strengthen the existing theory. This proves that if students have running speed, leg explosive power, and balance together in good condition, they will be able to do the whole series in the long jump implementation well. (Ridwan & Sumanto, 2017). Thus it can be seen that speed, explosive power and balance have a relationship on long jump ability.

## CONCLUSION

Based on the results of the research and discussion that has been started, the following conclusions can be drawn: 1) Speed has a significant contribution to long jump ability. 2) The explosive power of the limbs has a significant contribution to the long jump ability. 3) Balance has a significant contribution to long jump ability. So speed, leg explosive power, and balance have a significant contribution to long jump ability.

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## APPENDIX

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