

THE EFFECT OF ARM MUSCLE EXPLOSION, HANDS EYE COORDINATION AND ACHIEVEMENT MOTIVATION ON SPIN PASS SKILLS AT DKI JAKARTA RUGBY ATHLETES

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Abstract This research endeavor strives to elucidate the impact of Arm Muscle Explosive Power, Hand Eye Coordination, and Achievement Motivation on the proficiency of Spin Pass Skills in DKI Jakarta Rugby Athletes. The research sample encompasses a total of 45 DKI Jakarta rugby athletes, out of which 25 are male and 20 are female. This study utilized the multivariate associative research approach, which incorporated various survey methods and both test and non-test techniques. Analysis was conducted through a path analysis approach, with a statistical significance level of 0.05. the conclusion of each research finding shows (1) There is a direct influence between each independent variable Arm Muscle Explosive Power (X_1), Hand Eye Coordination (X_2), and Achievement Motivation (X_3), (2) There is a direct effect of each independent variable { Arm Muscle Explosive Power (X_1), Hand Eye Coordination (X_2), and Achievement Motivation (X_3) have a direct influence on Spin Pass Skills (Y), (3) There is an indirect effect of Arm Muscle Explosive Power (X_1) through Achievement Motivation (X_3) on Spin Pass Skills. (Y). There is an indirect effect of Eye-Hand Coordination (X_2) through Achievement Motivation (X_3) on Spin Pass Skills. (Y). Thus, Spin Pass Skills can be improved through increased Arm Muscle Explosive Power, Hand Eye Coordination and Achievement Motivation.

Keywords: coordination; motivation; spin pass; rugby



INTRODUCTION

Rugby is a sport that is played with full body contact. Rugby is a complex game and there are basic structured techniques, played with concentration and spread of different players (Greenwood, 2003). Rugby is a dynamic team sport (Lamb & Croft, 2016), requires a combination of fitness and physical ability (Higham, Pyne, Anson, & Eddy, 2012), implementation of technical skills (Meir, 2012), played with the ball as the main object (IRB, 2014). Rugby is a physically demanding, skillful sport, performed an intermittent high intensity (Chiwariidzo, Ferguson, & Smits-engelsman, 2020).

The sport of rugby usually involves open skills as the environment is constantly changing and movement has to be adapted (Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007). Rugby athletes also need to efficiently execute various technical and tactical skills during matches (Hendricks, Lambert, Masimla, & Durandt, 2015).

The sport of rugby needs special attention for the development of future generations of athletes who are expected to reach the highest level of play that can represent the region or country.

Club participation in a match that is included can help coaches and administrators to obtain results from what has been trained during training and be used as material for correction and evaluation so that athletes can improve their quality much better.

Judging from every match that the DKI Jakarta rugby club has participated in various national and international championships, there are many things that need to be used as corrections and improvements to improve the quality of the team and the quality of better athletes. One of the capitals to achieve the highest achievement in a sport is to have and master basic technical skills in playing well and correctly.

There are several aspects that need to be developed to achieve the highest achievement, namely aspects of basic technique, tactics, strategy and mentality of athletes. Improving these aspects requires a relatively long time and process so that athletes are able to perform skilled and perfect movements.

Success will come if the athlete's ability can read the situation and play what is in front of him, including the transition to play (Mckay & O'Connor, 2018). Each team tries to score by

kicking, passing and bringing the ball past the opponent's defense and placing it on the ground (try line) to get a score (Sutanto, 2016). In rugby union, most points are accrued when scoring a try (Grant et al., 2003). Rugby requires good skills so that the pattern of the game can run and score.

Mastery of basic techniques is the most important thing for every athlete, whether the athlete can apply it from training during competition. In rugby, there are several basic techniques that must be mastered, one of which is passing. Passing in rugby is an activity to pass the ball towards a friend whose position is diagonal and behind the feeder, with the aim of attacking and creating a try/score.

There are several kinds of passing in rugby including the spin pass, this pass is usually done to change the position of the attack with a long distance in order to accelerate the attack towards the opponent's gap. This technique is the most difficult thing for rugby athletes to do because it requires arm power, concentration and accuracy to pass the ball over long distances and the ball is right on target towards the target. To get good spin pass results, it is necessary to have a good mastery of

basic technical skills, mental readiness of athletes and support athletes' physicality. To do a spin pass, it is necessary to pay attention to several principles such as holding the ball, body position, arm swing, leg movement, and follow through.

In every match that is held, players or clubs experience improvements and improvements to the way they play, from basic techniques to advanced techniques. From the observations of the researchers, during the XX PON pre-match which was held in Bali in 2020, then the XX PON match which was held in Papua in October 2021, frequent violations and making unnecessary mistakes were one of the problems that must be resolved immediately, especially the problem in doing the spin pass technique. Many athletes find it difficult to do the spin pass technique.

The cause of athletes finding it difficult to do the spin pass technique is starting from they athlete who does not master the spin pass skill technique perfectly, as well as the field situation during the match, the pressure from the opponent who becomes the athlete panics.

The basic technique of spin pass in rugby games can be done properly and correctly if the athlete is able to control the ball according to the game situation, speed of movement, arm muscle explosive power and good physical condition

As for doing the spin pass properly and correctly, the things that need to be trained, especially in the arms, the explosive power of the arm muscles are very much needed by athletes to be able to produce spin passes, besides that, it has an important effect on the success and improvement of technique.

Explosive power is the ability of the muscular system or group of muscles to carry heavy loads with high strength and speed in one complete movement (Lahinda & Nugroho, 2019). Relative explosive power means the power to complete a load with the weight of one's own body (Mariati, Rasyid, & Barat, 2018). When the athlete performs a spin pass, it is included in the category of relative explosive power even though the athlete's hand is gripping the ball. Syafruddin defines explosive power as a combination of two abilities, namely strength and speed of dynamic and explosive muscle contraction in a fast time (Adnan & Arlidas, 2019).

The dominant muscle spin pass movement is used by the arm, such as a throwing motion that must be done as hard as possible and in a fast time. The better the arm muscle power, the better the ball is fed, making the game faster and more effective. To get maximum results in the arm muscles, it is necessary to carry out exercises that involve the explosive power of the arm muscles.

Eye-hand coordination is a component that supports the success of the spin pass, having good eye-hand coordination can provide effective, efficient and rhythmic movements with several movements combined with the body when doing a spin pass. Coordination is the ability to perform movements or work appropriately and efficiently (Reggie Reginald, Fahmy Fachrezzy, & Iwan Hermawan, 2021). If seen by the naked eye, the spin pass movement has several complicated sequences to be carried out, so with the need for eye-hand coordination, athletes do not experience difficulties when performing these movements. In addition, hand eye coordination can practice precise accuracy.

The psychological factors that influence, namely achievement motivation. Without having high

achievement motivation, athletes will not achieve the success expected from sports as athletes. High motivation is someone who feels motivated and excited to carry out activities with expectations as expected or the success of the goals to be achieved.

Empirically, the achievement motivation of DKI Jakarta athletes is still relatively low. It is hoped that after being given special training material there will be an increase in the athlete's achievement to take part in the existing championships.

In the game of rugby, each body size has a different position, in general, a large body size is preferred to defend and a lean body size to attack. In addition to requiring good physical condition, athletes need high achievement motivation.

To support good spin pass skills, explosive power of arm muscles, hand eye coordination and high achievement motivation is needed. these three things are related to each other to produce a perfect movement on the spin pass. From the background of the problem, the authors are interested in knowing how much influence the explosive power of the arm muscles, hand eye coordination and achievement motivation with spin

pass skills on rugby athletes in DKI Jakarta.

METHOD

This study aims to determine and reveal whether or not there is an influence between arm muscle explosive power, hand eye coordination and achievement motivation on spin pass skills in DKI Jakarta rugby athletes.

This research was conducted with a quantitative approach using a survey method with path analysis techniques. The population in this study consisted of 45 Jakarta rugby athletes including 25 male athletes and 20 female athletes. Intake in this study is to use a total sampling technique.

Arm muscle explosive power instrument using Lateral Medicine Ball Throw. Hand eye coordination instrument using Throw Catch Tennis Ball. The motivational instrument uses a motivational questionnaire. The spin pass skill instrument uses a side throw medicine ball. The data that has been obtained will go through a data analysis process using SPSS version 22 through 1). Description of data, 2). Data normality test and homogeneity test 3). Regression linearity test and regression significant test, 4). Path analysis which includes hypothesis testing.

RESULT AND DISCUSSION

Result

In this study, there were four variables, consisting of three exogenous (free) variables and one endogenous (bound) variable. These variables include: arm muscle explosive power (X₁), hand eye coordination (X₂), and achievement motivation (X₃) and spin pass skills (Y).

Variable Spin pass Skill (Y)

The results from the data description table show that the data from the spin pass skill results are quite varied, with a minimum value of 25 and a maximum value of 45 with a Mean of 36.4, Standard Deviation of 4.66, and Variance of 21.73.

Thus, it can be said that the DKI Jakarta rugby athletes who were sampled have various spin pass skills. The following is a table of interval results for the spin pass skills of DKI Jakarta rugby athletes.

Table 1.
Spin pass Skill Interval Table

Interval Class	Freq. Absolute	Freq. Relatively
25 – 27	2	4,44
28 – 30	3	6,67
31 – 33	7	15,55
34 – 36	14	31,11
37 – 39	8	17,78
40 – 41	7	15,55
43 – 45	4	8,90
Total	45	100%

Variable Arm muscle explosive power (X₁)

The results from the data description table show that the data from the explosive power of the arm muscles are quite varied, with a minimum value of 365 and a maximum value of 700 with a mean of 538.31, standard deviation of 97.94, and variance of 9592.1. Thus, it can be said that the DKI Jakarta rugby athletes who were sampled have various characteristics of arm muscle explosive power. The following table can be seen in the arm muscle explosive power interval table.

Table 2.
Arm muscle explosive power interval table

Interval Class	Freq. Absolute	Freq. Relatively
365 – 412	3	6,67
413 – 460	4	8,90
461 – 508	8	17,78
509 – 556	12	26,67
557 – 604	9	20
605 – 657	6	13,33
658 – 700	3	6,67
Total	45	100%

Variable Eye-Hand Coordination (X₂)

The results from the data description table show that the data from eye-hand coordination is quite varied, with a minimum value of 7 and a maximum value of 20 with a mean of 13.62, standard deviation of 3.02, and

variance of 9.01. Thus, it can be said that the DKI Jakarta rugby athletes sampled have various characteristics of eye-hand coordination.

Table 3.
 Eye-hand Coordination Interval Table

Interval Class	Freq. Absolute	Freq. Relatively
7 – 8	2	4,44
9 – 10	5	11,11
11 – 12	8	17,78
13 – 14	14	31,11
15 – 16	8	17,78
17 – 18	6	13,33
19 – 20	2	4,44
Total	45	100.00

Achievement Motivation Variable (X₃)

The results of the data description table show that the data from achievement motivation is quite varied, with a minimum value of 131 and a maximum value of 165 with a mean of 149.84, Standard Deviation 9.18, and Variance 84.32. So, the DKI Jakarta rugby athletes sampled have various characteristics of achievement motivation.

Table 4.
 Achievement Motivation Interval Table

Interval Class	Freq. Absolute	Freq. Relatively
131 – 135	3	6,67
136 – 140	4	8,90
141 – 145	7	15,55
146 – 150	13	28,89
151 – 155	8	17,78
156 – 160	7	15,55
161 – 165	3	6,67
Total	45	100.00

The results of the decisions on all proposed hypotheses can be explained as follows:

Sub Structure I

In sub structure 1 shows the combined and partial effect between arm muscle explosive power and hand eye coordination on achievement motivation. The effect of arm muscle explosive power and hand eye coordination on achievement motivation can be seen through the calculation results in the following summary model. Table 4.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Dimension 1 0	.695 ^a	.483	.471	8.661

a. Predictors: (Constant), X₂, X₁

The magnitude of the number R square (r²) is 0.483. This figure can be used to determine the effect of arm muscle explosive power and hand eye coordination on achievement motivation, which is 0.483 or 48.3%.

This shows the effect of arm muscle explosive power and hand eye coordination on achievement motivation of 48.3%, while the rest (51.7%) is influenced by other factors. In other

words, the variability of achievement motivation can be explained by using the arm muscle explosive power and hand eye coordination variables, which is 48.3%, while the effect of 51.7% is caused by other variables outside the model. The structural equation of sub structure II is: $X_3 = 0,552X_1 + 0,289X_2 + 0,517\varepsilon_2$

a. Effect of arm muscle explosive power on achievement motivation

The effect of arm muscle explosive power on achievement motivation is indicated by a beta coefficient of 0.539. The results of the test with the t test obtained a t value of 6198 with a significance of 0.000. Because the significance number is below 0.05, it can be concluded that there is a linear effect of arm muscle explosive power on achievement motivation. The magnitude of the influence of arm muscle explosive power on achievement motivation is 0.539 or 53.9%.

b. Effect of eye-hand coordination on achievement motivation

The effect of eye-hand coordination on achievement motivation is indicated by a beta coefficient of 0.255. The results of the test with the t test obtained a t value of 2,930 with a

significance of 0.004. Because the significance number is below 0.05, it can be concluded that there is a linear effect of eye-hand coordination on achievement motivation. The magnitude of the effect of eye-hand coordination on achievement motivation is 0.255 or 25.5%.

Testing the substructure hypothesis II

The magnitude of the number R square (r^2) is 0.401. This figure can be used to determine the effect of arm muscle explosive power, hand eye coordination and achievement motivation on spin pass skills, which is 0.401 or 40.1%. This figure shows the effect of arm muscle explosive power, hand eye coordination and achievement motivation on spin pass skills by 40.1%, while the rest (59.9%) is influenced by other factors. In other words, the variability of arm muscle explosive power, hand eye coordination and achievement motivation on spin pass skills is 40.1%, while the effect of 59.9% is caused by other variables outside the model.

Based on the table, the F value is 19.217 with a significance of 0.000. Because the significance number is less than 0.05, the research hypothesis that arm muscle explosive power, hand eye

coordination and achievement motivation affect spin pass skills can be accepted. The structural equation of sub structure II is:

$$Y = 0,114X_1 + 0,89X_2 + 0,85X_3 + 0.599\varepsilon_3$$

a. The effect of arm muscle explosive power on spin pass skills

The effect of arm muscle explosive power with spin pass skills is shown by a beta coefficient of 0.306. The results of the test with the t-test obtained a t-value of 2.708 with a significance of 0.008. Because the significance number is below 0.05, it can be concluded that there is a linear effect of arm muscle explosive power on spin pass skills. The magnitude of the effect of arm muscle explosive power on spin pass skills is 0.306 or 30.6%.

b. Effect of eye-hand coordination on spin pass skills

The effect of eye-hand coordination on spin pass skills is shown by a beta coefficient of 0.216. The results of the test with t test obtained t value of 2.190 with a significance of 0.031. Because the significance number is below 0.05, it can be concluded that there is a linear effect of eye-hand coordination on spin pass skills. The magnitude of the effect of eye-hand

coordination on spin pass skills is 0.216 or 21.6%.

c. The Effect of Achievement Motivation on Spin Pass Skills

The effect of achievement motivation on spin pass skills is indicated by a beta coefficient of 0.234. The results of the test with the t test obtained a t value of 2.017 with a significance of 0.047. Because the significance number is below 0.05, it can be concluded that there is a linear influence of achievement motivation on spin pass skills. The magnitude of the influence of achievement motivation on spin pass skills is 0.12017 or 20.17%.

Influence Calculation

1) Direct Influence

To calculate the direct effect, the following formula is used:

- The effect of arm muscle explosive power on achievement motivation $X_1 \rightarrow X_3 = 0.539$.
- Effect of eye-hand coordination on achievement motivation $X_2 \rightarrow X_3 = 0.255$.
- The effect of arm muscle explosive power on spin pass skills $X_1 \rightarrow Y = 0.306$.
- Effect of hand eye coordination on spin pass skills $X_2 \rightarrow Y = 0.216$.
- The effect of achievement motivation on spin pass skills $X_3 \rightarrow Y = 0.234$.

2) Indirect Influence

Testing using the Sobel Test with the formula:

$$Z = \frac{a b}{\sqrt{(b^2 SEa^2) + (a^2 SEb^2)}}$$

- The effect of arm muscle explosive power on spin pass skills through achievement motivation:

$X_1 \rightarrow X_3 \rightarrow Y$ = diperoleh nilai 4,843

- Effect of eye-hand coordination on spin pass skills through achievement motivation: $X_2 \rightarrow X_3 \rightarrow Y$ = earned value 4,054

Discussion

Based on the test results of all hypotheses that have been carried out in the hypothesis testing section, it can be stated that:

First, the hypothesis that there is a significant effect of arm muscle explosive power and hand eye coordination on achievement motivation after testing the hypothesis is proven jointly and individually to have a significant effect on achievement motivation.

The magnitude of the contribution of the arm muscle explosive power and hand eye coordination together on achievement motivation is 48.3% while the remaining 51.7% is the influence of other variables apart from

the arm muscle explosive power and arm eye coordination variables. The results of research conducted by Nayyiroh show that hand-eye coordination indirectly affects bowling skills through the power arm by 18.6% (Nayyiroh, Puspitorini, Pelana, & Lubis, 2021). The contribution of arm muscle explosive power to achievement motivation directly is 0.539 or 53.9%. While the eye-hand coordination variable has a direct contribution to achievement motivation of 0.255 or 25.5%.

Second, there is a significant effect of arm muscle explosive power, hand eye coordination and achievement motivation together on spin pass skills.

The magnitude of the contribution of the arm muscle explosive power, hand eye coordination and achievement motivation together to the spin pass skill is 40.1% while the remaining 59.9% is the influence of other variables apart from the arm muscle explosive power, coordination hands and achievement motivation.

The variable contribution of arm muscle explosive power to spin pass skills directly is 0.306 or 30.6%. The contribution of the eye-hand coordination variable to the spin pass skill directly is 0.216 or 21.6%.

Meanwhile, the contribution of the achievement motivation variable to spin pass skills directly is 0.234 or 23.4%. These findings indicate that in order to improve spin pass skills, students must have a good perception of arm muscle explosive power and hand eye coordination and achievement motivation. This finding shows that to increase achievement motivation, students must have a good perception of arm muscle explosive power and good eye-hand coordination, both of which have a contribution of 48.3% to increase achievement motivation.

Research conducted by Wahyuni that the results of this study are that there is an effect of hand eye coordination on smash skills of 0.329. The effect of leg muscle explosive power on smash skills is 0.248. the influence of motivation on smash skills of 0.419. from the results of this study there is a positive influence between eye-hand coordination, leg muscle explosive power, and achievement motivation on volleyball smash skills throughout Cirebon (Wahyuni, 2020).

Indirect effect of arm muscle explosive power on spin pass skills through hand eye coordination $Z=3,605 > 1.96$, means that there is a significant

effect. Indirect effect of arm muscle explosive power on spin pass skills through achievement motivation obtained a value of $Z= 4,843 > 1.96$, means that there is a significant effect. The indirect effect of eye-hand coordination on spin pass skills through achievement motivation is obtained by the value of $Z= 4,054 > 1.96$, means that there is a significant effect.

The results of this study were reinforced by Sangap that there was a significant relationship between arm muscle power and rugby passing accuracy of 16.64%. There is a significant relationship between hand eye coordination and rugby passing accuracy of 73.78%. There is a significant relationship between arm muscle power, hand eye coordination together with rugby passing accuracy of 80.82% (Sangap, 2019).

Another study by Oktariana and Hardiyono found that the effect of the explosive power of the arm muscles on the volleyball smash was 18.9%. The magnitude of the influence of the explosive power of the leg muscles on the volleyball smash is 26.4%. The magnitude of the influence of abdominal muscle strength on the volleyball smash

is 16.4% (Oktariana & Hardiyono, 2020).

This finding indicates that to improve spin pass skills, it is necessary to pay attention and increase perceptions of arm muscle explosive power, hand eye coordination and achievement motivation because both directly and indirectly can improve spin pass skills.

CONCLUSION

Conclusions were drawn based on research findings with exogenous variables consisting of arm muscle explosive power (X_1), hand eye coordination (X_2) and achievement motivation (X_3). The endogenous variable is Spin pass Skill (Y), as follows:

1. There is a direct effect of arm muscle explosive power on achievement motivation. This means that the better the explosive power of the arm muscles, the better the achievement motivation that will be obtained. Conversely, the lower the explosive power of the arm muscles, the lower the achievement motivation obtained.
2. There is a direct effect of eye-hand coordination on achievement motivation. This means that the better eye-hand coordination, the

better the achievement motivation that will be obtained. On the other hand, the lower the eye-hand coordination, the lower the achievement motivation obtained.

3. There is a direct effect of arm muscle explosive power on spin pass skills. This means that the better the explosive power of the arm muscles, the better the spin pass skills that will be obtained. Conversely, the lower the explosive power of the arm muscles, the lower the spin pass skills obtained.
4. There is a direct effect of eye-hand coordination on spin pass skills. This means that the better eye-hand coordination, the better the spin pass skills that will be obtained. On the other hand, the lower the eye-hand coordination, the lower the spin pass skill obtained.
5. There is a direct influence of achievement motivation on spin pass skills. This means that the better the achievement motivation, the better the spin pass skills that will be obtained. On the other hand, the lower the achievement motivation, the lower the spin pass skills obtained.

6. There is an indirect effect of arm muscle explosive power through achievement motivation. This means that the better the explosive power of the arm muscles and achievement motivation, the better the spin pass skills that will be obtained. On the other hand, the lower the arm muscle explosive power and learning motivation, the lower the spin pass skill obtained.
7. There is an indirect effect of eye-hand coordination through achievement motivation. This means that the better eye-hand coordination and achievement motivation, the better the spin pass skills that will be obtained. On the other hand, the lower eye-hand coordination and learning motivation, the lower the spin pass skills obtained.

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