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Analysis of pointing success factors in petanque athlete

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Abstract

The research was conducted because of the various factors that influence the success of the pointing throw, so the evidence is needed for the factors that contribute to its success. This research aims to analyze the factors that give success in pointing throws. The method applied in this study uses descriptive correlational analysis to obtain a factor of determination on the results of the pointing throw. The subjects were 15 male athletes aged 15-17 years registered at FOPI Pati Regency with a total sampling technique. The results of data analysis show that the analysis of the physical component factors at pointing explains the formation of 3 components in the independent variable. This is shown in each component formed to have their respective contributions. Component 1 with member variables Eye-hand Coordination, Concentration, and Kinesthetic Perception has an effect of 42.937%, component 2 with member variables Arm muscle strength, wrist flexibility, and balancing have an effect of 19.403%, and component 3 with member variable Sleeve length has an influence of 13.508%. This study concludes that athletes with Eye-hand Coordination, Concentration, and Kinesthetic Perception will have a high pointing success rate on petanque.

Keywords: factor analysis, pointing, petanque.

INTRODUCTION

Petanque is a new sport in Indonesia. The popularity of this sport still needs to catch up to sports such as football, badminton, volleyball, and others. However, the existence of the petanque sport is quite promising with the inclusion of the petanque branch in regional and national level championships. This game has competed in multi-branch sports events such as Porprov (Province Sports Event) and PON (National Sports Event). From this, development in the Petanque sport is needed to achieve achievements. In order to achieve high achievement, sports science support is needed to maximize the potential of athletes. Apart from

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that, with sports science, athletes can perform their best in using petanque game techniques such as pointing throws. This is because petanque is a sports game in throwing a ball made of iron with the aim of getting the ball closer to the target (Pelana, 2017; Sutrisna et al., 2018).

Techniques in Petanque are divided into two parts, namely, pointing techniques and shooting techniques. The pointing technique can be said to be an attempt to throw or send the ball in such a way that it approaches the target (Eko Cahyono & Nurkholis, 2018; Nanda Hanief, 2022; Pelana et al., 2021). The pointing technique has the characteristics of throwing the ball so that the ball is closer to the target. Then it takes special skills to carry out the pointing technique. Judging from these characteristics, several physical components are needed in carrying out the pointing technique so that the throw's success rate is higher (Hanief & Purnomo, 2019). The success of pointing throw is also heavily supported by body shape and height (Kustiawan & Perkasa, 2020), arm length (Pelana et al., 2021), arm muscle strength, wrist flexibility, hand-eye coordination, and balance (Hanief et al., 2017). Some of these opinions explain that the contribution of the physical component makes a positive contribution to the success of pointing. In addition, previous research has provided the advantages of each physical component, so this article provides a factor analysis formula for the physical components: height, arm length, wrist flexibility, arm muscle strength, concentration, balance, hand-eye coordination, and kinesthetic perception. Previous studies also have not analyzed factors formed from physical components such as arm muscle strength, wrist flexibility, coordination, body balance, height, arm length, and concentration on achievement of pointing (Hanief & Purnomo, 2019; Kristanto, 2020; Nanda Hanief, 2022; Pradana & Nurkholis, 2019). Factor analysis on the physical components in determining the success of this pointing is intended to obtain correlation pattern variables. In this article, the pattern in question is that the relationship between variables has an attachment so that it can contribute to pointing throw.

This study took physical components as independent variables, including height, arm length, arm muscle strength, wrist flexibility, balance, eye-hand coordination, concentration, and kinesthetic perception. The reason for taking multiple physical components is that each physical component contributes to the outcome of the pointing shot. Body height contributes 45.1% (Pradana & Nurkholis, 2019), and arm muscle strength also has an influence on the success of a throw at petanque (Badaru et al., 2021). Furthermore, eye-hand coordination correlates significantly with successful pointing (Arsi Rabani, 2021). Meanwhile, the components of the physical condition of balance, concentration, and flexibility of the wrist simultaneously also contribute to the result of throwing the petanque (Susandi Eka Wahyudhi et al., 2021). In this study, the researcher gave a kinesthetic perception variable because it contributes to the success of pointing. This is because kinesthetic perception contributes 10.3% in pointing (Kristanto, 2020). Seeing from the results of this study, the researchers took a study on the analysis of physical component factors on the results of pointing petanque athletes.

Seeing from the explanation above, this article examines the factor analysis on the success of pointing in Petanque athletes, which is studied from 8 physical components. This means that the physical components studied will obtain a pattern of factors that influence the success of pointing petanque. The research was conducted on male athletes aged 15-17 years at FOPI Pati Regency, Central Java.

METHODS

This research is a quantitative study with factor analysis to determine the pattern of independently variable factors on the dependent variable. The independent variables in this study were: Body Height (X1), Arm Length (X2), Arm Muscle Strength (X3), Wrist Flexibility (X4), Balance (X5), Eye and Hand Coordination (X6), Concentration (X7), kinesthetic perception (X8) While the dependent variable is the pointing throw (Y). The research was conducted on May 15-22, 2022, at the FOPI training field in Pati Regency with a sample of 15 male athletes selected using a total sampling system. The instruments used in this study used: (1)

Anthropometer to measure arm length, (2) a Height meter, (3) Geniometer, (4) Push Up 1 minute, (5) a Grid Concentration Test, (6) Crossbeam. 2 feet (7) catch the ball, (8) test throw pointing 6,7,8,9 meters. The research procedure was carried out by carrying out tests and measurements using the above instruments so that quantitative data were obtained and analyzed using statistical formulas. So found the factors that influence the success of the pointing throw. The research design will be more detailed, which can be seen in the following figure.

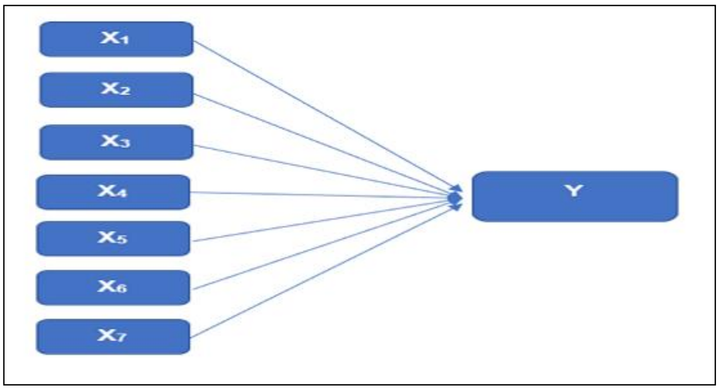

Figure 1. Research Design

Description:
1. (X1) Height
2. (X2) Sleeve Length
3. (X3) Arm Muscle Strength
4. (X4) Wrist Flexibility
5. (X5) Balancing
6. (X6) Eye-hand Coordination
7. (X7) Concentration
8. (X8) Kinestetic Perception
9. (Y) Pointing Accuration for Petanque

RESULTS

This study has data (X1) Height, (X2) Arm length, (X3) Arm muscle strength, (X4) wrist flexibility, (X5) Balance, (X6) Eye and hand coordination, (X7) Concentration, (X8) Kinesthetic perception and (Y) accuracy of petanque pointing results. Before entering the hypothesis test, the data was described first (table 1) and then entered the normality test stage (table 2). The following is a description of the data and normality test:

Table 1. Please show descriptive data research

Variable	N	Mean	Median	Mode	SD	Max	Min
Height	15	165.3	165.0	165.0	3.2	172.0	159.5
Sleeve Length	15	55.6	55.3	53.7	2.3	60.5	51.7
Arm Muscle Strength	15	24.2	24.3	23.5	1.2	26.3	22.4
Wrist Flexibility	15	13.1	13.1	11.5	1.6	16.3	11.0
Balancing	15	44.7	44.8	0.0	1.1	46.9	42.9
Eye-Hand Coordination	15	23.7	23.1	22.7	1.5	26.5	22.1
Concentration	15	29.8	29.5	29.5	2.1	33.6	27.4
Kinestetic Perception	15	19.7	19.4	0.0	2.0	23.5	16.8
Pointing Accurate	15	18.5	18.8	0.0	1.8	21.4	15.3

The basis for decision-making is based on probability. If the probability > 0.05, then the research data is normally distributed. The following is a summary of normality testing:

Table 2. Normality test

Variable	N	Sign	Probability	Conclusion
Height	15	0.96	0.05	Normal
Sleeve Length	15	0.856	0.05	Normal
Arm Muscle Strength	15	0.293	0.05	Normal
Wrist Flexibility	15	0.533	0.05	Normal
Balancing	15	0.96	0.05	Normal
Eye-Hand Coordination	15	0.57	0.05	Normal
Concentration	15	0.953	0.05	Normal
Kinestetic Perception	15	0.139	0.05	Normal
Pointing Accurate	15	0.869	0.05	Normal

Table 2 shows the results of the normality test on the research data. It can be seen in the table of sign values that each variable is greater than the probability value (0.05), so it can be concluded that each variable data is normally distributed. If it is explained as follows: 1) The sign value on the height variable = 0.96 > 0.05 then it can be concluded that it is normally distributed, 2) The sign value on the arm length variable = 0.856 > 0.05 then it can be concluded that it is normally distributed, 3) The value of the sign on the arm muscle strength variable = 0.293 > 0.05 then it can be concluded that it is normally distributed, 4) The value of the sign on the first flexibility variable = 0.533 > 0.05 can be concluded that it is normally distributed, 5) The value of the sign on the balance variable = 0 .96 > 0.05, it can be concluded that the distribution is normal, 6) The value of the sign on the eye-hand coordination variable = 0.57 > 0.05, it can be concluded that it is normally distributed, 7) The value of the sign on the concentration

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variable = 0.953 > 0 0.05, it can be concluded that it is normally distributed, 8) The value of the sign on the kinesthetic perception variable = 0.139 > 0.05, it can be concluded that it is normally distributed, and 9) The value of the sign on the variable accuracy of appointment = 0.869 > 0.05, it can be concluded that the distribution normal.

Hypothesis testing was carried out using the Kaiser-Meyer-Olkin and Barlett test formulas about sphericity, anti-image correlation test, total variance explained test, communality, component matrix, and component score coefficient matrix. So that the hypothesis testing can be seen as follows:

Table 3. Output KMO and Bartlett's

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.584
Bartlett's Test of Sphericity	Approx. Chi-Square	58.105
	df	36
	Sig.	0.011

Table 3 shows that the KMO and Bartlett's test is assumed to be a feasibility variable for further processing. Table 3 shows that the KMO MSA value = 0.584> 0.50 and the Sig value = 0.011 <0.05, so it can be concluded that factor analysis can be continued.

After the variables are declared eligible to enter the factor analysis stage, the next test is the Anti-Image Matrics Test to find out which variables are eligible to enter the factor analysis test. The test results can be seen as follows:

Table 4. Anti-image matrics

Variable	Value	Probability	Conclusion
Height	0.797[a]	0.5	Valid
Sleeve Length	0.296[a]	0.5	Valid
Arm Muscle Strength	0.573[a]	0.5	Valid
Wrist Flexibility	0.504[a]	0.5	Valid
Balancing	0.622[a]	0.5	Valid
Eye-Hand Coordination	0.553[a]	0.5	Valid
Concentration	0.631[a]	0.5	Valid
Kinestetic Perception	0.587[a]	0.5	Valid
Pointing Accurate	0.654[a]	0.5	Valid

Table 4 shows the results of the anti-image matrix test, which is known that the sleeve length variable has a value of 0.296 < 0.5, which is concluded to be invalid. However, other variables show that the value is

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greater than 0.5, so it can be concluded that it is valid to be tested for factor analysis. The next step is testing whether the value of the variable is able to explain the factor or not, so the conclusions can be seen in the following table:

Table 5. Communities

	Initial	Extraction	Probability	Conclusion
Height	1.000	0.522	0.5	Valid
Sleeve Length	1.000	0.875	0.5	Valid
Arm Muscle Strength	1.000	0.845	0.5	Valid
Wrist Flexibility	1.000	0.714	0.5	Valid
Balancing	1.000	0.891	0.5	Valid
Eye-Hand Coordination	1.000	0.756	0.5	Valid
Concentration	1.000	0.831	0.5	Valid
Kinestetic Perception	1.000	0.603	0.5	Valid
Pointing Accurate	1.000	0.788	0.5	Valid

Table 5 shows the test of the ability of the variable to explain the factor or not. It can be seen in the table that the value of the extraction of all variables is greater than 0.50 (Value Extraction > 0,50), so it can be concluded that each variable can explain the determining factor.

The next step is to explain the factor value for each variable. This study uses nine variables meaning that there are nine components analyzed. So we get two kinds of analysis: Initial Eigenvalues and Extraction Sums of Squared Loadings. The test results can be seen more clearly in the following table:

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Table 6. Total variance explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	3.864	42.937	42.937	3.864	42.937	42.937
2	1.746	19.403	62.340	1.746	19.403	62.340
3	1.216	13.508	75.848	1.216	13.508	75.848
4	0.78	8.705	84.553			
5	0.57	6.350	90.903			
6	0.36	3.966	94.868			
7	0.26	2.858	97.726			
8	0.13	1.430	99.156			
9	0.08	0.844	100.000			

Table 6 shows that there are three factors formed from the variable testing. The assumption of the total initial eigenvalues on the variable is greater than one (total eigenvalues > 1), so it can be used as a factor explanation. From the table above, it is found as follows: 1) The eigenvalues of component 1 = 3.864 > 1, then it is able to be a factor by explaining 42.937% variation, 2) the eigenvalues of component 2 = 1.746 > 1, then it is able to be a factor and explain 19.403% of the variation, 3) the eigenvalues of component 3 = 1,216 > 1, then it can be a factor and explain 13.508% variation, if depicted with a plot diagram, it can be seen as follows:

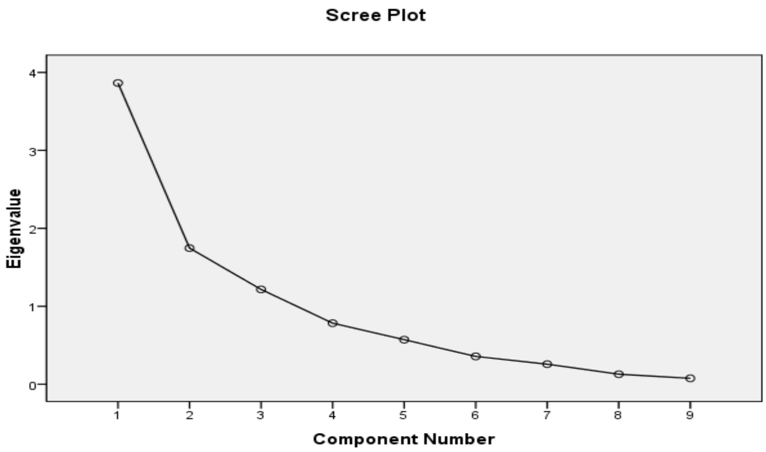

Figure 2. Scree Plots

Figure 1 shows the number of factors formed in each variable. The picture shows that three factors are formed: component 1, component 2, and component 3. After seeing the formation of factors from the analysis of variables, the next step is to find out the magnitude of the correlation in the factors formed for each variable. So it is known that the magnitude of the correlation on each variable becomes a factor. More details can be seen in the following component matrix tables:

Table 7. Rotation Component Matrix

	Component		
	1	2	3
Height	0.31	0.454	0.471
Sleeve Length	0.04	-0.07	0.932
Arm Muscle Strength	-0.02	0.911	-0.13
Wrist Flexibility	0.26	0.804	-0.05
Balancing	0.2	0.863	0.328
Eye-Hand Coordination	0.74	0.232	0.391
Concentration	0.9	0.055	0.119
Kinestetic Perception	0.72	0.235	0.166

Table 7 shows the results of the relationship of each variable with the three factors formed. The height variable shows a correlation with component 1 of 0.31, a correlation with component 2 of 0.454, and a correlation with component 3 of 0.471. So that the biggest correlation with the height variable is with component 3, which is 0,471. The sleeve length variable shows a correlation with component 1 of 0.04, a correlation with component 2 of -0.07, and a correlation with component 3 of 0.932. Then the biggest correlation on the sleeve length variable with component 3 is 0.932. The arm muscle strength variable shows a correlation with component 1 of -0,02, a correlation with component 2 of 0.911, and a correlation with component 3 of -13. Then the biggest correlation between arm muscle strength and component 2 is 0.911. The wrist flexibility variable shows a correlation with component 1 of 0.26, a correlation with component 2 of 0.804, and a correlation with component 3 of -0.05. Then the biggest correlation with the wrist flexibility variable with component 2 is 0.804. The balancing variable shows a correlation with component 1 of 0.2, a correlation with component 2 of 0.863, and a correlation with component 3 of 0.328. Then the biggest correlation of the balancing

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variable with component 2 is 0.863. The eye-hand coordination variable shows a correlation with component 1 of 0.74, a correlation with component 2 of -0.232, and a correlation with component 3 of 0.391. Then the greatest correlation of the deeye-hand coordination variable with component 1 is 0.74. The concentration variable shows a correlation with component 1 of -0.9, a correlation with component 2 of 0.055, and a correlation with component 3 of 0.119. Then the biggest correlation of the concentration variable with component 1 is 0.9. The Kinesthetic Perception variable shows a correlation with component 1 of 0.72, a correlation with component 2 of 0.35, and a correlation with component 3 of 0.166. Then the biggest correlation with the Kinesthetic Perception variable with component 1 is 0.72.

Seeing from the results of the component matrix above, it can be concluded that 3 component factors have each variable member. So each component has a member variable that has the largest value or > 0.5 so that you can see the members of each component in the table below.

Table 8. Result factor analisys

Component Factor	Variable
1	Eye-hand Coordination, Concentration, Kinesthetic Perception
2	Arm muscle strength, wirst flexibility, Balancing
3	Sleeve length

Table 8 shows the components of the factors formed to have their respective member variables. The factor 1 component has members as hand-eye coordination, concentration, and kinesthetic perception variables. Component factor 2 has member variable arm muscle strength, wrist flexibility, and balance. While the factor 3 component only consists of variable sleeve strength. The height variable is not included in any component because the correlation value does not meet the requirements, namely <0.5.

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DISCUSSION

The results of the data analysis show that the physical component factor analysis in pointing explains the formation of the three components in the independent variables. This is shown in each component formed to have their respective contributions. Component 1, with the variable members' Eye-hand Coordination, Concentration, and Kinesthetic Perception, has an influence of 42.937%, component 2, with the variable members' Arm muscle strength, wrist flexibility, and balancing, has an effect of 19.403%, and component 3 with the variable sleeve length has an influence of 13.508%. Judging from these results, athletes who have good eye-hand coordination, concentration, and kinesthetic perception will give a high success rate of pointing throws. So it needs to be justified that good concentration is needed in petanque sports.

It is clear from the data analysis that the factors found in this study suggest that not all physical component variables greatly impact the success of the pointing throw. It can be seen that each factor component formed has a different percentage of successful pointing. Component 1, which has hand-eye coordination, concentration, and kinesthetic perception variables, gets the highest percentage. This physical component shows that the pointing throw requires good coordination and concentration. Concentration contributes to the success of pointing by 26.5% of several other physical components. This means that every time there is an increase in the physical component of concentration, the pointing shot will also improve (Pradana & Nurkholis, 2019).

Meanwhile, the eye-hand coordination component contributed to the success of the petanque throw by 54.61% (Nurfatoni & Hanief, 2020). These studies explain how necessary the physical components of hand-eye coordination, concentration, and kinesthetic perception are in the success of the pointing shot in petanque (Adil et al., 2018; Arsi Rabani, 2021; Davids et al., 2013). This strengthens the results of this study which provide evidence that the physical components of hand-eye coordination, concentration, and kinesthetic perception form their factor pattern, which

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influences the success of the pointing throw by 42.937%.

The component factor 2 formed has member variables Arm muscle strength, wrist flexibility, and Balancing with an effect on pointing success of 19.403%. This shows that component 2 that is formed is still below component 1 in its level of influence on the success of pointing. However, the variables formed by component 2 have their own influence. This has been proven in previous studies. In throwing a ball (iron ball) in petanque sports, the component of arm muscle strength is impossible to eliminate (Nicholsosn et al., 2021). The component of arm muscle strength gives its own contribution to the overall sport, especially petanque. Although the pointing throw has a lower percentage of an effect than the factor 1 component, this component has an influence on the pointing result. With good arm strength, it will be easy to produce a throw with a parabolic-shaped ball trajectory so that the accuracy will be higher with this throw (Andrade et al., 2010; Silva-Filho et al., 2020). Proper throwing and accuracy require a component of arm muscle strength to control the ball throw (Lubis et al., 2021). This explanation can provide an overview of the components formed by factor 2, which also influences the success of pointing.

CONCLUSION

This study concludes that the formation of the factor components can explain all the independent variables that influence the success of pointing. But the percentage level is different. This is shown in the data analysis that the analysis of the physical component factors in pointing explains the formation of the three components in the independent variables. This is shown in that each component formed has its contribution. Component 1, with the member variables Eye-Hand Coordination, Concentration, and Kinesthetic Perception, has an effect of 42.937%, component 2, with the member variables Arm muscle strength, hand flexibility, and balancing, has an effect of 19.403%, and component 3, with the arm variable. The Length has an effect of 13.508%. Judging

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from these results, it can be said that athletes who have good eye-hand coordination, concentration, and kinesthetic perception will give a high success rate of pointing throws. So it needs to be justified that good concentration is needed in petanque sports

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REFERENCE

Adil, A., Tangkudung, J., & Hanif, A. S. (2018). The Influence of Speed, Agility, Coordination of Foot, Balance and Motivation on Skill of Playing Football. *Jipes - Journal of Indonesian Physical Education and Sport*, *4*(1), 19–34. https://doi.org/10.21009/jipes.041.02

Andrade, M. D. S., Fleury, A. M., de Lira, C. A. B., Dubas, J. P., & da Silva, A. C. (2010). Profile of isokinetic eccentric-to-concentric strength ratios of shoulder rotator muscles in elite female team handball players. *Journal of Sports Sciences*, *28*(7), 743–749. https://doi.org/10.1080/02640411003645687

Arsi Rabani, N. N. (2021). Hubungan Koordinasi Mata Tangan dengan Kemampuan Pointing Game Pada Mahasiswa Minat Bakat Olahraga Petanque Universitas Muhammadiyah Surakarta. *Journal of Innovation Research and Knowledge*, *1*(6), 937–944.

Badaru, B., Rachmat Kasmad, M., Juhanis, J., & Anwar, N. I. (2021). Effect of Accuracy and Muscle Strength Training on the Result of Shooting Throws in Petanque. *Jurnal Maenpo : Jurnal Pendidikan Jasmani Kesehatan Dan Rekreasi*, *11*(1), 56. https://doi.org/10.35194/jm.v11i1.1213

Davids, K., Lees, A., & Burwitz, L. (2013). Understanding and measuring coordination and control in kicking skills in soccer: implications for talent identification and skill acquisition. / Comprehension et mesure de la coordination et du controle lors de la frappe avec le pied en football: implica. *Journal of Sports Sciences*, *18*(9), 703–714. http://articles.sirc.ca/search.cfm?id=S-

660571%5Cnhttp://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=SPHS-660571&site=ehost-live%5Cnhttp:

Eko Cahyono, R., & Nurkholis. (2018). Analisis Backswing Dan Release Shooting Carreau Jarak 7 Meter Olahraga Petanque Pada Atlet Jawa Timur. *Jurnal Prestasi Olahraga*, *1*(1), 1–5.

Hanief, Y. N., & Purnomo, A. M. I. (2019). Petanque : What are the physical factors that determine performance ? *Jurnal Keolahragaan*, *7*(2), 116–125. https://doi.org/10.21831/jk.v7i2.26619

Hanief, Y. N., Puspodari, & Sugito. (2017). Profile of physical condition of Taekwondo Junior Athletes Pusklatkot (Training centre) Kediri city year 2016 to compete in 2017 east java regional Competition. *International Journal of Physiology, Nutrition and Physical Education*, *2*(2), 262–265. http://www.journalofsports.com/archives/2017/vol2/issue2/PartE/2-2-19

Kristanto, N. (2020). Persepsi Kinestetik Terhadap Hasil Pointing Atlet Petanque Jawa Timur. *Prestasi Olahraga*, *3*(1), 1–5.

Kustiawan, A., & Perkasa, B. S. (2020). Analisis Faktor Antropometri, Biomotor, dan Psikomotor Terhadap Lemparan Pointing Olahraga Petanque Atlet Porprov 2020 Kabupaten Ngawi. *Productive and Upcoming Sport Education Profesional*, *3*(1), 31–36.

Lubis, M. R., Permadi, A. G., & Muhaimin, A. (2021). The Effectiveness of Using Le Duo Tir Tools in Increasing Petanque Shooting Accuracy. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *9*(2), 186. https://doi.org/10.33394/j-ps.v9i2.4074

Nanda Hanief, Y. (2022). Kontribusi Komponen Fisik dengan Performa Olahraga Petanque: Studi Meta Analisis. *DJS (Dharmas Journal of Sport)*, *2*(1), 8–17.

Nicholsosn, K. F., Hulburt, T. C., Kimura, B. M., & Aguinaldo, A. L. (2021). Relationship between ground reaction force and throwing arm kinetics in high school and collegiate pitchers. *The Journal of Sports Medicine and Physical Fitness*, *62*(9), 316–319. https://doi.org/10.23736/s0022-4707.21.13150-0

Nurfatoni, A., & Hanief, Y. N. (2020). Petanque: dapatkah koordinasi mata tangan, fleksibilitas pergelangan tangan, fleksibilitas togok dan keseimbangan memberi sumbangan pada shooting shot on the iron? *Journal of Physical Activity (JPA)*, *1*(1), 10–20.

Pelana, R. (2017). Persepsi Atlet Terhadap Sdm Pplm Tentang Prestasi Atlet. *Gladi Jurnal Ilmu Keolahragaan*, *7*(2), 765. https://doi.org/10.21009/gjik.072.03

Pelana, R., Setiakarnawijaya, Y., Dwiyana, F., Sari, L. P., Abdurrahman, Antoni, R., & Yusmawati. (2021). The effect of arm length, arm endurance and self-confidence on petanque shooting. *Journal of Physical Education and Sport*, *21*(4), 2381–2388. https://doi.org/10.7752/jpes.2021.s4319

Pradana, S. W. K. C., & Nurkholis. (2019). Kontribusi Tinggi Badan, Panjang Lengan, Keseimbangan, Konsentrasi, dan Persepsi Kinestetik Terhadap Ketepatan Shooting Pada Olahraga Petanque. *Jurnal Prestasi Olahraga*, *2*(1), 1–5.

Silva-Filho, E., Teixeira, A. L. S., Xavier, J. R. D. S., Júnior, D. D. S. B., Barbosa, R. A., & Albuquerque, J. A. De. (2020). Physical education role during coronavirus disease 2019 (COVID-19) pandemic Physical education and COVID-19. *Motriz. Revista de Educacao Fisica*, *26*(2), 2019–2020. https://doi.org/10.1590/s1980-6574202000020086

Susandi Eka Wahyudhi, A. S. B., Ismail, M., & Arfah, M. (2021). Koordinasi Mata Tangan, Kekuatan Otot Lengan dan Kelentukan Pergelangan Tangan terhadap Keterampilan Shooting Atlet Petanque. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, *5*(1), 1. https://doi.org/10.26858/sportive.v5i1.19169

Sutrisna, T., Asmawi, M., & Pelana, R. (2018). Model Latihan Keterampilan Shooting Olahraga Petanque Untuk Pemula. *Jurnal Segar*, *7*(1), 46–53. https://doi.org/https://doi.org/10.21009/segar/0701.05