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The Effect of Hurdle Drill and Dot Drill Training on Agility and Strength of Leg Muscles in Junior High School Athletic Extra-Curricular Students

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Abstract

This study aims to determine the difference in the effect of Hurdle Drill and Dot Drill exercises on the agility and strength of leg muscles of junior high school athletic extracurricular students. This study used an experimental method with a two-treatment group research design. The research subjects are students who participate in junior high school athletic extracurricular activities. The instruments used were in the form of agility tests and leg muscle strength tests. The research data was analyzed using statistical tests to determine the difference in the influence of the two exercise methods. The results of the study showed that Hurdle Drill and Dot Drill exercises both had a positive effect on increasing the agility and strength of students' leg muscles. However, there are differences in the increase in each group. The Hurdle Drill exercise is more effective in increasing the strength of the leg muscles because the explosive movement of jumping over obstacles provides a greater stimulus of load on the leg muscles. Meanwhile, Dot Drill exercises are more dominant in improving agility, foot coordination, and the ability to change direction quickly through rapid and repetitive movement patterns.

Keywords: Agility, Athleticism, Dot Drill, Hurdle Drill, Leg Muscle Strength.

INTRODUCTION

In the world of education, athletics has an important position as a mandatory material in physical education lessons from elementary to high school levels, with the aim of developing motor skills while instilling the values of sportsmanship, discipline, and fighting spirit.

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Furthermore, the existence of athletic extracurricular activities is a forum to hone students' interests and talents in the field of sports, as well as encourage the birth of non-academic achievements at the school level and higher. This shows that athletics not only plays a role as a basic sport, but also as an instrument of character formation as well as a driver of the nation's achievements in the international arena.

In the context of education, the existence of athletic extracurriculars at the school level is a strategic forum to foster students' interests and talents from an early age, as well as prepare them to be able to excel at a higher level. The success of athletic coaching in Bali can be seen from the achievements of national athletes from Bali, Maria Natalia Londa, who made a name for herself by winning gold medals at the 2014 Asian Games in Incheon and the 2023 SEA Games in Cambodia. At the regional level, data from PASI Gianyar Regency shows that the contribution of students to the Porjar Bali event is quite consistent. The results of the 2024 Bali Provincial Porjar recorded 1 gold (boy) and 1 bronze (women) medals at the elementary level, junior high school level won 2 gold (boys) and 1 bronze (boys), while the high school level won 1 gold (boy), 2 silver (women), and 1 bronze (women).

However, this achievement still shows that there is a gap, one of which is in Tegallalang District, where junior high school students were only able to contribute 1 gold medal and several bronze medals in the last two years, with a more dominant contribution from male athletes. This condition shows that athletic extracurricular coaching at the junior high school level not only functions as a means of physical development, but also becomes an important foundation in giving birth to a generation of athletes who have the potential to make the region and nation proud in the future.

The results of observations in the field show that the physical condition of students who participate in athletic extracurriculars at Tegallalang District Junior High School is still not optimal. Many students experience limitations in terms of agility and leg muscle strength, even though these two components are very important in supporting athletic performance, especially running and jumping numbers. Deficiencies in this physical aspect have direct implications for achievements. The achievement data of Porjar Gianyar Regency noted that in the last three years the contribution of junior high school athletes from Tegallalang District has tended to decrease, both in terms of the number of medals and the quality of acquisition. This stagnant and even declining achievement indicates that physical coaching carried out through extracurriculars is not fully effective, so improvement efforts are needed with a more targeted and tailored training program.

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Based on these problems, an appropriate and targeted training program is needed to increase the agility and strength of the leg muscles, so that the athlete's movement efficiency is better and performance in the race can increase. One form of exercise that can be used as an alternative is *hurdle drill* and *dot drill*. *Hurdle drill* is a power and coordination exercise that is varied and innovative, and can be modified with simple tools (Ismoko & Sukoco, 2013). Meanwhile, *dot drill* is an exercise in the form of jumping to certain points forward, backward, or to the side which functions to train the agility of leg movements (Ngurah Nala, 2002:81). These two training methods are considered relevant to be applied in athletic extracurricular coaching at Tegallalang District Junior High School because it focuses on increasing agility and leg strength which is the main component in running and jumping numbers. With the implementation of the exercise, it is hoped that athletic achievements at the junior high school level can increase again and make a real contribution to the region.

RESEARCH METHODS

This study is a pseudo-experiment (*Quasi Experimental*). Basically, this study aims to determine the influence of independent variables on bound variables, namely the effect of training *hurdle drill* and *dot drill* against the agility and strength of the leg muscles. The design of this research is a design *the non randomized control group pretest-posttest design* (I Nyoman Kanca, 2010: 94-95). Design

It can be seen in the picture below:

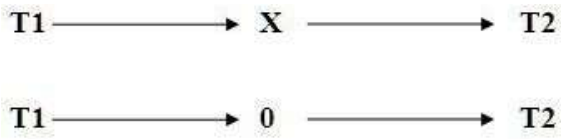


Figure 1. Research Design *The Non Randomized Control Group Pretest- Posttest Design*
(Source: I Nyoman Kanca, 2010:95)

Description:

T1 : Initial test
T2 : Final test
X : Treatment group
0 : Control group

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This design is used to examine treatment groups and control groups. In this study, 2 treatment groups were used, namely *hurdle drill* and *dot* drill training and one control group, so that *the modified non randomized control group pretest-posttest design* was used. For a clear description of the research design, see Figure 3.2.

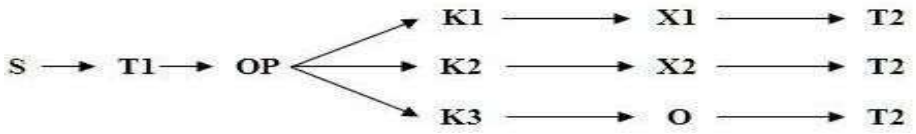


Figure 2. Research Design

Description:

S :Subyek
T1 : Initial test (*pretest*)
ON **:** *Ordinal Pairing*
K1 **:** Treatment Group 1 with *Hurdle Drill* **K2 :** Treatment Group 2 with *Dot Drill* **K3** : Control Group
X1 : Training *Hurdle drill*.
X2 : Training *Dot Drill* **O** : control group **T2** : Final test (*posttest*)

The total population in this study consists of 45 people who are active students participating in athletic extracurricular activities at SMPN in Tegallalang District consisting of SMPN 2 Tegallalang and SMPN 3 Tegallalang. The sampling technique in this study uses *multi-stage random sampling*. In the first stage, the researcher chose schools that had active athletic extracurricular activities, namely SMPN 2 Tegallalang and SMPN 3 Tegallalang. In the second stage, from each school is randomly selected classes whose students are actively involved in athletic extracurricular activities. In the third stage, students are randomized from the selected class to ensure that all members of the population have the same opportunity to be a research sample.

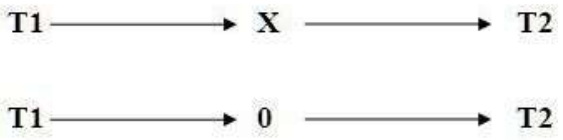
RESEARCH METHODS

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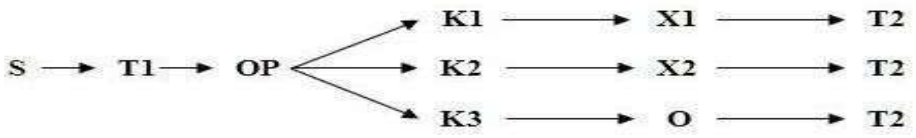


Figure 3.4 Research Design

Description:

S : Subyek
T1 : Initial test (*pretest*)
ON : *Ordinal Pairing*
K1 : Treatment Group 1 with *Hurdle Drill* **K2 :** Treatment Group

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2 with *Dot Drill* **K3** : Control Group
X1 : Training *Hurdle drill*.
X2 : Training *Dot Drill* **O** : control group
T2 : Final test (*posttest*)

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RESULTS AND DISCUSSION

Data Normality Test

This normality test will use the Shapiro Wilk test because the sample is less than 50. The basis for decision-making in the test can be done through the probability approach, the significance used α=0.05. The basis for decision-making is to look at the probability numbers, with the following conditions.

If *sig.* > 0.05 then the assumption of normality is met.
If *sig.* < 0.05, the assumption of normality is not met.

Table 1. Normality Test Results of Leg Muscle Agility Data Using Shapiro-Wilk

Variabel	Groups	Statistic	df	Say.	Remarks
Agility Pretest	Hurdle Drill	0,965	15	0,777	Normal
	Dot Drill	0,876	15	0,068	Normal
	Control	0,954	15	0,585	Normal
Posttest Agility	Hurdle Drill	0,961	15	0,711	Normal
	Dot Drill	0,938	15	0,357	Normal
	Control	0,935	15	0,326	Normal
Gain Agility	Hurdle Drill	0,926	15	0,238	Normal

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	Dot Drill	0,970	15	0,858	Normal
	Control	0,888	15	0,063	Normal

Table 2. Normality Test Results of Leg Muscle Strength Data Using Shapiro-Wilk

Variabel	Groups	Statistic	df	Say.	Remarks
Strength Pretest	Hurdle Drill	0,903	15	0,105	Normal
	Dot Drill	0,600	15	0,065	Normal
	Control	0,913	15	0,150	Normal
Posttest Strength	Hurdle Drill	0,974	15	0,916	Normal
	Dot Drill	0,947	15	0,485	Normal
	Control	0,889	15	0,064	Normal
Power Gain	Hurdle Drill	0,915	15	0,161	Normal
	Dot Drill	0,342	15	0,075	Normal
	Control	0,923	15	0,212	Normal

Homogeneity Test

The data homogeneity test uses the Levene's Test statistical technique. The decision in this test was based on a probability approach with a significance level of α=0.05. The results are taken by examining the probability value, following the following criteria:

- If the *value of Sig.* > 0.05 then the homogeneity assumption is met.
- If the *value of Sig.* < 0.05 then the homogeneity assumption is not met.

Table 3. Results of the Variance Homogeneity Test

Data	F	df1	df2	Say.
Agility Pretest	0,657	2	42	0,524
Posttest Agility	0,535	2	42	0,590
Gain Agility	2,348	2	42	0,108
Strength Pretest	1,120	2	42	0,336
Posttest Strength	0,841	2	42	0,438
Power Gain	3,054	2	42	0,058

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Variance Matrix Homogeneity Test

The variance matrix homogeneity test was aimed at finding out whether the variable variance matrix bound to each study group was the same. The homogeneity test of the variance/covariance matrix was carried out using the Box's M test. The matrix of bound variable variance was declared homogeneous if the significance value in the Box's M test was greater than 0.05. A summary of the results of the variance/covariance matrix homogeneity test is shown in Table 4 below.

Table 4. Variance Matrix Homogeneity Test Results

Box's M	4.585
F	0.712
df1	6
df2	43964.308
Say.	0.640

Bound Variable Multicollinearity Test

Multicollinearity testing of bound variables was performed using the Product Moment (r) correlation test. This test aims to determine the relationship between two bound variables, namely agility and leg muscle strength. In this study, the correlation significance limit was set at 0.80. If the correlation value (r) < 0.80, then there is no multicollinearity between bound variables, so that the Multivariate Analysis of Variance analysis can be continued. A summary of the results of the Product Moment correlation test can be seen in Table 5 below.

Table 5. Results of the Bound Variable Multicollinearity Test

		Posttest Agility	Posttest Strength
Posttest Agility	Pearson Correlation	1	-0.222
	Sig. (2-tailed)		0.142
	N	45	45
Posttest Strength	Pearson Correlation	-0.222	1
	Sig. (2-tailed)	0.142	
	N	45	45

Analysis of Variance (ANOVA)

Hypothesis tests were carried out to determine the effect of the Hurdle Drill and Dot Drill

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training methods on the agility and strength of the leg muscles of junior high school athletic extracurricular students. Hypothesis testing in this study was carried out using the one-way Analysis of Variance test (*One Way ANOVA)* and continued with the Least Significant Difference (LSD) *post hoc* test.

Table 6. ANOVA One Way Test Results

Variabel	Sum of Squares	Df	Mean Square	F	Say.	Remarks
Posttest Agility	54,899	2	27,449	40,503	0,000	Signifikan
Posttest Strength	1,349,200	2	674,600	6,942	0,002	Signifikan

Table 7. LSD Advanced Test Results for Agility

Groups	Mean Difference	Say.	Remarks
Hurdle Drill – Dot Drill	1,491	0,000	Signifikan
Hurdle Drill – Kontrol	-1,210	0,000	Signifikan
Dot Drill – Kontrol	-2,701	0,000	Signifikan

Table 8. LSD Advanced Test Results on Leg Muscle Strength

Groups	Mean Difference	Say.	Remarks
Hurdle Drill – Dot Drill	6,200	0,092	Insignificant
Hurdle Drill – Kontrol	13,400	0,001	Signifikan
Dot Drill – Kontrol	7,200	0,052	Insignificant

MANOVA Test

The Multivariate Analysis of Variance test was conducted to determine the effect of the Hurdle Drill, Dot Drill, and control group training methods on the variables of agility and leg muscle strength simultaneously. The MANOVA analysis was used because this study had more than one bound variable, namely the agility and strength of the leg muscles.

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Table 9. MANOVA Test Results

Statistics	Value	F	Hypothesis df	Error df	Say.
Pillai's Trace	0,862	15,917	4	84	0,000
Wilks' Lambda	0,269	19,006	4	82	0,000
Hotelling's Trace	2,225	22,252	4	80	0,000
Roy's Largest Root	1,978	41,541	2	42	0,000

DISCUSSION

Difference in Agility Effect between Hurdle Drill and Dot Drill Groups

The results of the study showed that there was a difference in the influence of Hurdle Drill and Dot Drill exercises on the agility of junior high school athletic extracurricular students. Both training methods provide an increase in agility, but the magnitude of the increase in each group shows different characteristics according to the form of exercise given. According to Ngurah Nala (2002), agility is the ability to change the position of the body or the direction of movement quickly when it is moving quickly without losing balance or awareness of orientation towards the position of the body. This opinion is strengthened by Ismaryati (2008) who states that agility is a component of physical conditions that are indispensable in activities that require rapid and precise changes in body position. Thus, agility is needed in athletics because students are required to be able to move quickly, change direction, maintain balance, and maintain optimal body coordination.

The results of this study are in line with the research of Adi Sumarno (2017) who stated that the agility hurdle drill training method has an influence on the foot coordination of futsal UKM members of Musamus University Merauke. The study showed that hurdle drill practice was able to improve the ability to coordinate footwork which is an important part of agility. In the context of this study, improving footwork coordination also supports students' ability to change direction quickly during athletic activities.

The results of this study are also supported by research by Rahayu, Nugraheni, and Saleh (2022) which shows that dot drill exercises are able to improve fast and accurate movement patterns in pencak silat athletes. This exercise helps improve nerve and muscle coordination in efficiently moving the body position. This condition is relevant to the needs of athletics which require the ability to accelerate, decelerate, and change direction quickly. Thus, the results of this study show that Hurdle Drill and Dot Drill exercises are both effective in increasing the agility of junior high school athletic extracurricular students. However, the effectiveness of the increase is

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influenced by the characteristics of the exercise movements given, so teachers or trainers need to adjust the training method to the purpose of fostering the physical condition of students.

Difference in Effect of Leg Muscle Strength between Hurdle Drill and Dot Drill Groups

The results showed that the group given the Hurdle Drill exercise experienced a greater increase in leg muscle strength than the Dot Drill group. This happens because hurdle drill is a form of plyometric exercise that involves jumping over obstacles explosively so as to provide greater stimulus to the leg muscles. These movements cause the quadriceps, hamstring, gastrocnemius, and gluteus muscles to work optimally to generate the body's thrust when passing obstacles. According to Pradana et al. (2019), hurdle drill is an exercise that uses obstacles to increase leg muscle strength, reaction speed, and coordination of movements through fast jump movements. This opinion is strengthened by Wibowo and Firmansyah (2020) who stated that hurdle drill includes plyometric exercises that aim to develop leg muscle power and the ability to change direction quickly. In addition, Ramadhan et al. (2021) stated that hurdle drills are effective in improving neuromuscular responses and explosive movement abilities through repetitive jumping exercises.

The increase in leg muscle strength in the hurdle drill group is also in accordance with the principle of overload in training. According to Satriya et al. (2009), the overload principle emphasizes that exercise must be given with a heavier load than ordinary activities so that the body undergoes physiological adaptation. In this study, the repetitive movement of jumping over obstacles put a greater load on the leg muscles, causing an increase in muscle contraction ability and leg strength of students.

In addition, the increase in leg muscle strength is also affected by neuromuscular adaptation due to continuous exercise. Hurdle drill exercises are able to improve nerve and muscle coordination so that motor unit recruitment becomes more effective in producing strong and fast muscle contractions. This adaptation causes the ability of the leg muscles to produce power and strength to increase after being given exercise treatment. The results of this study are supported by the research of Anung Probo Ismoko (2020) who stated that the plyometric hurdle hops training method has a better influence on increasing power than the multiple box jump up-down method. The study showed that hurdle-based exercises effectively improve the explosive abilities of the legs which are closely related to the strength of the leg muscles.

Research by Pamungkas, Sumaryanto, Komarudin, Prasetyo, Sabillah, and Saryono (2023) also shows that hurdle drill and agility training are able to improve athletes' physical abilities

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through improving leg coordination, agility, and limb explosive ability. The findings reinforce that hurdle drill training has a great contribution to improving the physical performance of young athletes. Meanwhile, the group given the Dot Drill exercise also experienced an increase in leg muscle strength although it was not as large as the Hurdle Drill group. This happens because dot drill exercises involve rapid and repetitive movement of changing points which causes the leg muscles to work dynamically in maintaining balance and changing the direction of movement. The movement still provides stimulus to the leg muscles, especially the lower body stabilizer muscles.

Based on the results of existing research and theory, it can be concluded that Hurdle Drill exercises are more effective in increasing leg muscle strength than Dot Drill in junior high school athletic extracurricular students. This is because the hurdle drill provides a greater explosive load and contraction stimulus to the leg muscles so that the adaptation of muscle strength occurs more optimally.

Difference in Increased Agility and Leg Muscle Strength between the Hurdle Drill Group and the Dot Drill

The results showed that there was a difference in increased agility and strength of leg muscles between the group of students who participated in the Hurdle Drill exercise and the group who participated in the Dot Drill exercise in the junior high school athletic extracurricular. Both training methods have an influence on improving the physical condition of students, but the amount of improvement obtained shows differences according to the characteristics of the exercises given.

The results of this study are supported by research by Adi Sumarno (2017) which shows that the agility hurdle drill training method has an influence on the foot coordination of futsal UKM members of Musamus University Merauke. The study proves that hurdle drill training is able to improve footwork coordination, which is an important part of agility.

Research by Fratiwie, Suratmin, and Kardiawan (2015) also showed that dot drill practice has a significant influence on increasing the agility of karate athletes aged 14–16 years. In addition, research by Palguna, Ariani, and Darmawan (2014) found that dot drill practice is superior to down the line drill in improving kick agility. The findings reinforce that dot drill exercises are effective in improving students' footwork coordination and quick reaction skills.

Based on the results of existing research and theory, it can be concluded that Hurdle Drill and Dot Drill exercises are equally effective in increasing the agility and strength of the leg muscles of junior high school athletic extracurricular students. However, Hurdle Drill exercises tend to be

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more dominant in increasing leg muscle strength and power through explosive movements, while Dot Drill exercises are more dominant in improving agility, footwork coordination, and speed of change of direction. Therefore, the selection of training methods needs to be adjusted to the purpose of fostering the physical condition of students so that the results of the exercises are more optimal.

CONCLUSION

Based on the results of research and discussion on the effect of Hurdle Drill and Dot Drill exercises on the agility and strength of leg muscles of junior high school athletic extracurricular students, it can be concluded as follows: There was a difference in the influence of agility between the group of students who participated in the Hurdle Drill exercise and the group of students who participated in the Dot Drill exercise in the junior high school athletic extracurricular. Both training methods are able to increase students' agility, but Dot Drill exercises tend to be more effective in improving students' ability to change direction, foot coordination, and foot speed. There was a difference in the influence of leg muscle strength between the group of students who participated in the Hurdle Drill exercise and the group of students who participated in the Dot Drill exercise in the junior high school athletic extracurricular. The Hurdle Drill exercise showed a better increase in leg muscle strength than the Dot Drill exercise because it involved explosive movements and greater load on the leg muscles. There was a difference in increased agility and leg muscle strength between the group of students who participated in the Hurdle Drill exercise and the group of students who participated in the Dot Drill exercise in the junior high school athletic extracurricular. Hurdle Drill exercises are more dominant in improving leg muscle strength and power, while Dot Drill exercises are more dominant in improving agility, footwork coordination, and speed of change of direction.

REFERENCES

Adhi, B. P., Sugiharto, & Soenyoto, T. (2017). Pengaruh latihan dan kekuatan otot tungkai terhadap power otot tungkai. *Journal of Physical Education and Sports*, *6*(1), 7–13.

Artanayasa, I. W. (2014). Pengaruh pelatihan juggling terhadap kelincahan dribbling bola dalam permainan sepakbola mahasiswa Jurusan Penjaskesrek FOK Undiksha. *Jurnal Penjakora*, *1*(1), 16–33.

Bafirman, H. B., & Wahyuri, A. S. (2019). *Pembentukan kondisi fisik*. Rajawali Pers.

Dantes, N. (2012). *Metode penelitian*. Andi Offset.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-Share Alike 4.0 International License

Firmansyah, M., & Suryadi, T. (2019). Klasifikasi Jenis Pelatihan dalam Pembinaan Atlet. *Jurnal Olahraga Prestasi*, *15*(1), 25–34.

Fratiwie, A. G. I., Suratmin, S. P. M., & Kardiawan, I. K. H. (2015). Pengaruh Pelatihan Three Corner Drill Dan Dot Drill Terhadap Kelincahan Atlet Karate Kumite Usia 14-16 Tahun Dojo Mahakerti Jembrana Tahun 2015. *Jurnal Pendidikan Kepelatihan Olahraga Undiksha*, *3*(1).

Ismoko, A. P. (2020). Pliometrik dan kelincahan untuk peningkatan power. In *Journal of Sport and Health*.

Ismoko, A. P., & Sukoco, P. (2013). Pengaruh metode latihan dan koordinasi terhadap power tungkai atlet bola voli junior putri. *Jurnal Keolahragaan*, *1*(1), 1–12. https://doi.org/10.21831/jk.v1i1.2339

Nala, N. (2002). *Prinsip pelatihan fisik olahraga*. Komite Olahraga Nasional Indonesia Daerah Bali.

Noe, R. A. (2010). *Employee Training and Development*. McGraw-Hill.

Nurhasan. (2001). *Tes dan pengukuran dalam pendidikan jasmani*. Direktorat Jendral Olahraga.

Palguna, I. K. M., Ariani, L. P. T., Darmawan, G. E. B., & Or, M. (2014). Pengaruh Pelatihan Dot Drill Dan Down The Line Drill Terhadap Kelincahan Tendangan T. *Jurnal Pendidikan Kepelatihan Olahraga Undiksha*, *2*(1).

Pamungkas, G., Sumaryanto, S., Komarudin, K., Prasetyo, Y., Sabillah, M. I., & Saryono, S. (2023). The influence of hurdle drill, ladder drill and agility training on women's football skills: English. *Retos*, *50*, 127–133.

Pradana, A., Suryadi, D., & Kurniawan, T. (2019). Pengaruh latihan hurdle drill terhadap peningkatan kelincahan atlet futsal. *Jurnal Ilmu Keolahragaan*, *7*(2), 110–118. https://doi.org/10.21009/jik.072.05

Prasetyo, E., Wijaya, R., & Anwar, M. (2020). Pengaruh Intensitas Latihan Terhadap Daya Tahan Atlet Sepak Bola. *Jurnal Keolahragaan*, *8*(2), 155–163. https://doi.org/10.21831/jk.v8i2.33121

Putra, A., & Nugroho, Y. (2019). Hubungan frekuensi latihan terhadap peningkatan VO_2Max atlet renang. *Jurnal Ilmu Keolahragaan*, *7*(2), 87–94. https://doi.org/10.21009/JIK.072.03

Rahayu, R., Nugraheni, W., & Saleh, M. (2022). Pengaruh Latihan Ladder Drill Dan Dot Drill Terhadap Kelincahan Tendangan T di UKM Pencak Silat Tapak Suci Universitas Muhammadiyah Sukabumi. *Riyadhoh Jurnal Pendidikan Olahraga*, *5*, 89–97.

Ramadhan, F., Putra, H., & Santoso, B. (2021). Efektivitas latihan hurdle drill terhadap kecepatan

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reaksi dan kelincahan pemain sepak bola. *Jurnal Olahraga Prestasi*, *19*(1), 45–53. https://doi.org/10.21831/jorpres.v19i1.40123

Santoso, S. (2011). *Mastering SPSS*. Elex Media Komputindo.

Satriya, & others. (2009). *Modul metodologi kepelatihan olahraga*. Universitas Pendidikan Indonesia.

Suharto, B., & Yulianto, A. (2019). Hubungan Intensitas Latihan dengan Peningkatan VO_2Max Atlet. *Jurnal Ilmu Keolahragaan*, *7*(1), 45–53. https://doi.org/10.21009/JIK.071.06

Suhendra, I., & Maulana, A. (2022). Pengaruh hurdle drill terhadap peningkatan kelincahan dan koordinasi gerak atlet pencak silat. *Jurnal Pendidikan Jasmani Dan Olahraga*, *7*(2), 134–142. https://doi.org/10.17509/jpjo.v7i2.48211

Suryana, D., Mulyana, A., & Hidayat, T. (2020). Hubungan frekuensi latihan terhadap keterampilan dribbling pada atlet sepak bola. *Jurnal Ilmiah Olahraga*, *8*(1), 55–62. https://doi.org/10.1234/jio.v8i1.4567

Sutrisno, E. (2016). *Manajemen Sumber Daya Manusia*. Kencana.

Wahjoedi, I. P. P. A., & Damiati. (2017). *Model pengembangan pendidikan karakter pada anak usia dini berbasis outbound di Kota Singaraja*.

Wahyudi, A., Nugroho, S., & Putra, D. (2021). Tujuan dan Prinsip Pelatihan Fisik dalam Olahraga Prestasi. *Jurnal Ilmu Keolahragaan*, *9*(2), 112–120.

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