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The Effect of Shuttle Run Training on 100-Metre Sprint Speed Among Students

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Abstract. Sprint speed in the 100-meter event is an important component of physical education; however, students often show inconsistent performance due to limited specific training. This study aimed to determine the effect of shuttle run training on students' sprint speed. An experimental method with a one-group pretest–posttest design was used involving 32 students of class X.8 at SMAN 1 Arjasa. Data were collected using a 100-meter sprint test and analyzed using a paired sample t-test. The results showed a significant improvement, with the average time decreasing from 15.58 seconds to 14.73 seconds ($p < 0.05$). The results of the analysis showed an increase in 100-metre sprint running speed after the shuttle run training. The average time decreased from 15.58 seconds in the pretest to 14.73 seconds in the posttest. The paired sample t-test showed a p-value < 0.001, indicating a significant difference between the results before and after treatment. Shuttle run training has been proven effective in improving students' 100-metre sprint speed. The application of this training can be a practical and efficient alternative in physical education in secondary schools. It can be concluded that shuttle run training is effective in improving students' sprint speed and can be applied as a practical training method in physical education.

Keywords: Speed, Shuttle Run, Sprint, Physical Education

INTRODUCTION

Physical education plays a vital role in developing pupils' physical fitness, motor skills and sporting attitude (Na'afisari et al., 2023). Through carefully planned learning activities, physical education helps to develop the basic physical abilities that underpin pupils' performance, both in an academic context and in sporting activities (Citra Permana & Ilham Pratama, 2021). One of the key areas of focus in physical education is running speed, particularly in the 100-metre sprint, which demands strength, explosive power and optimal motor coordination (Firman Pangestu et al., 2025). Good sprinting ability not only reflects physical fitness, but also serves as an indicator of the success of training programmes that emphasise movement efficiency and improved physical performance (Yoga Kurniawan et al., 2025), but also plays a decisive role in various sports, such as athletics, football and basketball (Yoga Kurniawan et al., 2025).

In recent years, the development of school sports in Indonesia has shown a positive trend. However, a report by the Ministry of Youth and Sports of the Republic of Indonesia (2023) reveals that the sprinting ability of secondary school students in various regions remains below the national average. This situation indicates that the majority of physical training programmes in schools have not yet fully accommodated students' physiological needs in improving their speed performance. Therefore, there is a need for a scientifically evidence-based training model that is easy to implement in a school setting to help students achieve effective improvements in their speed capabilities.

One training method considered effective for improving speed is the shuttle run. The shuttle run is a form of agility and speed training involving repeated short-distance back-and-forth movements, incorporating rapid changes of direction, acceleration and deceleration (Citra Permana & Muhardi, 2021). This exercise requires the synergistic engagement of the leg, hip and core muscles, and stimulates the anaerobic alactate energy system, which plays a key role in 100-metre sprinting (Yudith Tiara & H. Wada, 2024). In addition, the shuttle run helps improve explosive muscle strength, coordination and reaction time, which directly contributes to improved sprint performance (Arsadi Ihsan et al., 2025).

A number of previous studies have produced results consistent with these findings. Shuttle run training had a significant effect on improving the speed of football players at the ADS Academy in Tangerang, with a p-value of < 0.001 (Yudith Tiara & H. Wada, 2024) (2024). Similar findings indicate that incorporating variations of the shuttle run exercise has a positive and significant effect on improving 100-metre sprint performance among Year 11 students at SMKP Brajaguna Bangkalan, as evidenced by a statistically significant difference in performance between the pre- and post-intervention periods Na'afisari et al. (2023). Furthermore, the implementation of shuttle run training resulted in a significant improvement in athletes' short-distance running ability, as evidenced by an increase in average performance and statistical test results confirming an improvement in ability following the training intervention Fransiska et al. (2021).

Based on the results of initial observations carried out on pupils in Class X.8 at SMAN 1 Arjasa, it was found that the pupils' 100-metre sprinting ability was still

suboptimal. This was evident from their relatively slow finishing times and a lack of acceleration in the initial phase of the run. The physical education learning process that has taken place so far has tended to emphasise the delivery of content without being balanced by a structured training programme focused on improving specific physical components, particularly speed. Furthermore, time constraints have meant that teachers have not been able to fully implement specific training variations designed to improve sprint performance. This situation highlights a gap between the learning competency requirements and the students' actual physical performance on the field.

Nevertheless, the majority of these studies still focus on populations of athletes, football players, and primary and lower secondary school pupils. Meanwhile, research into the effectiveness of shuttle run training for upper secondary school pupils within the context of physical education remains very limited. The scarcity of research examining the application of shuttle run training on 100-metre sprint ability within a school setting indicates a research gap that needs to be addressed through scientific studies grounded in the context of formal education. Consequently, this research holds high scientific urgency, not only to enrich the academic literature in the field of sports science but also to support the development of a science-based physical education curriculum (Vigna Glauc et al., 2025).

This study specifically aims to analyse the effect of shuttle run training on 100-metre sprint speed among Year 10, Class 8 students at SMAN 1 Arjasa. This objective stems from the need to demonstrate the effectiveness of shuttle run training as a form of exercise that can be practically applied in physical education lessons to improve students' speed (Fathoni & Rachman, 2020). In theory, the findings of this study are expected to contribute to the development of speed training concepts based on physiological and methodological principles (Aziz et al., 2022). In practical terms, this study is expected to provide guidance for physical education teachers in designing training programmes that are effective, efficient and tailored to the characteristics of their pupils (Sulaiman et al., 2024), thereby improving the quality of learning and pupils' physical performance at school (Bahriyanto Ahmad et al., 2021).

METHOD

This study employed a quantitative approach using an experimental method. The design applied was a one-group pretest–posttest design, whereby a single group of subjects was given the treatment and measurements were taken before and after the intervention to determine the changes resulting from the exercise programme.

The study population consisted of 32 students from Class X.8 at SMAN 1 Arjasa. The sampling technique used was total sampling, a method in which all individuals in the population are selected as research subjects without exception. Consequently, all members of the population were included as research subjects. The criteria for participation included students who actively participated in physical education lessons, had no history of injuries that would hinder running activities, were in good health, and were willing to participate in the entire research process until completion.

The shuttle run exercise was adapted from (Nidomuddin et al., 2025) The programme was conducted over a period of six weeks, with one session per week, in line with the school's physical education timetable. The six-week duration was chosen based on the principle of exercise adaptation, whereby improvements in speed and neuromuscular ability generally begin to emerge after a structured training period of at least four to six weeks (Fadhilah Ilmi & Wahyuni, 2024). Each training session consists of 4–6 repetitions of shuttle runs over a distance of 10–20 metres, with a rest period of approximately 1–2 minutes between repetitions. The training programme is followed consistently at every session to uphold the principles of overload and progression.

The research instrument used was a 100-metre sprint test adapted from Priyono (2019). Measurements were taken by recording the time taken by the pupils to cover a distance of 100 metres. The test was conducted twice during the pre-test and post-test using the same procedure to ensure that the data obtained was objective and comparable.

The data obtained were analysed using descriptive statistics. Descriptive statistics were used to calculate the mean and standard deviation of the pre-test and post-test results. Prior to hypothesis testing, a normality test was conducted to verify the data distribution. Subsequently, a paired-sample t-test was used to determine the significance of the effect of shuttle run training on students' 100-metre sprint times. The research hypothesis was accepted if the significance level was less than 0.05.

RESULT AND DISCUSSION

Result

The descriptive data provide an overview of pretest and posttest scores, showing changes in performance after the training programme.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	32	13.30	17.24	15.5847	1.03775
Posttest	32	13.14	16.65	14.7334	1.12973
Valid N (listwise)	32				

Based on Table 1, the results of the descriptive analysis show that the mean time for the 100-metre sprint in the pre-test was 15.58 seconds, with a minimum of 13.30 seconds and a maximum of 17.24 seconds. Following the shuttle run training intervention, the mean time in the post-test decreased to 14.73 seconds, with a range of 13.14 to 16.65 seconds. Furthermore, the data distribution in the post-test appeared more controlled compared to the pre-test, as reflected by the change in the standard deviation.

These results indicate an improvement in the students' 100-metre sprint performance following the shuttle run training.

Table 2. Tests of Normality

	Shapiro-Wilk		
	Statistic	df	sig
Pretest	.961	32	0.290
Posttest	.924	32	0.260

a. Lilliefors Significance Correction

S*. This is a lower bound of the true significance.

The results of the Shapiro–Wilk test indicate that both pretest (Sig. = 0.290) and posttest (Sig. = 0.260) data are normally distributed ($p > 0.05$). Therefore, the data met the assumption of normality, allowing further analysis using the paired sample t-test to examine the differences between pretest and posttest results.

Table 3. Paired Samples Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Pretest - Posttest	.85125	1.04056	.18395	.47609	1.22641	4.628	<.001	<.001	<.001

The results of the paired-sample t-test showed a t-value of 4.628 with a p-value of <0.001. This value is smaller than the significance level of 0.05; therefore, it can be concluded that there is a significant difference between the pre-test and post-test shuttle run results. Consequently, the intervention administered was found to have a significant effect on improving 100-metre sprint speed, as demonstrated by the reduction in shuttle run times in the post-test.

Discussion

This study aimed to investigate the effect of shuttle run training on the 100-metre sprint speed of Year 10, Class 8 students at SMAN 1 Arjasa. The results indicated that the study's objective had been achieved, as evidenced by a significant difference in 100-metre sprint speed before and after the students participated in a six-week shuttle run training programme. This change in performance indicates that the training provided was able to positively influence the students' physical capacity.

The improvement in 100-metre sprint speed following the intervention can be interpreted as an adaptation to the characteristics of shuttle run training, which emphasises repeated acceleration, changes of direction, and footwork coordination (Primadi et al., 2021). Training with this pattern is known to improve neuromuscular efficiency, particularly in the leg muscles that play a dominant role in the acceleration phase and the transition to maximum speed during sprinting (Fadhilah Ilmi & Wahyuni, 2024). In other words, shuttle run training not only develops agility but also contributes to improvements in linear speed components (Fransiska et al., 2021).

The findings of this study are consistent with previous research. Arsadi Ihsan et al. (2025) reported that students who undertook shuttle run training showed significant improvements in sprint performance compared to their baseline levels. Similar results were also found by Tiara and Wada (2024), who demonstrated that shuttle run training had a significant effect on improving the speed of football players, with a very strong level of significance ($p < 0.001$). The consistency of these results indicates that the characteristics of shuttle run training are effective in enhancing speed capabilities across various groups of subjects. The results of this study are also consistent with the findings of Na'afisari et al. (2023), who concluded that direction-change-based training is effective in improving acceleration and maximum speed in secondary school students. The consistency of these findings suggests that shuttle run training has a strong empirical basis as a method for improving speed.

A key and relatively novel aspect of this study lies in its application within a school setting with limited training frequency, namely once a week. Although the intensity and frequency of training were moderate, the results still demonstrated a significant improvement in performance. This indicates that shuttle run training is highly efficient and can be adapted for physical education programmes with limited time and facilities (Hidayat et al., 2021). Consequently, this study makes a practical contribution to the development of simple yet effective training models in schools (Sulaiman et al., 2024).

In terms of the research implications, these findings suggest that physical education teachers can utilise the shuttle run as an alternative exercise to improve students' sprinting speed without the need for specialised equipment (Priyono, 2019). Furthermore, this exercise has the potential to enhance students' physical readiness for

sports activities that require both speed and agility (Syahab et al., 2025). These results further confirm that shuttle run training contributes to both agility and linear sprint performance through neuromuscular adaptation.

However, this study has several limitations. Firstly, the study sample was limited to a single class, so the generalisation of the results must be approached with caution. Secondly, this study did not control for external factors such as students' physical activity outside school hours, which may have influenced the measurement results. Therefore, future research is recommended to involve a larger sample size, a longer training duration, and to combine shuttle run exercises with other training methods to obtain a more comprehensive picture of improvements in sprint running speed.

CONCLUSION

Based on the research findings, it can be concluded that shuttle run training has a positive effect on improving 100-metre sprint speed among students in Class X.8 at SMAN 1 Arjasa. The incorporation of this training into physical education lessons has resulted in an improvement in students' running ability following the intervention. This indicates that shuttle run training can be used as an effective alternative speed training method within the school learning context.

The shuttle run training provided after the warm-up session was found to help improve students' physical readiness without disrupting the delivery of the core learning material. Therefore, this exercise is recommended for use by physical education teachers as part of a variety of speed training exercises. Further research is suggested to develop this study with a broader research design in order to obtain more in-depth and comprehensive results. These findings reinforce the effectiveness of simple, school-based training methods in improving students' physical performance.

REFERENCES

Arsadi Ihsan, Endrawan I Bagus, Fikri Aprizal, & Muslimin. (2025). *The Effect Of Fartlek And Shuttle Run Training On 60 Meter Sprint Running Speed* (Vol. 5, Number 1). Http://Journal.Unugiri.Ac.Id/Index.Php/Citius

Aziz, M. I. M., Hendriana, D., & Muhardi, A. (2022). Analisis Latihan Shuttle Run Terhadap Peningkatan Kemampuan Kecepatan Lari Jarak Pendek (Sprint) Atlet Atletik Pada Tingkat Sekolah Dasar Di Kabupaten Pandeglang. *Jurnal Pendidikan Mutiara*, *Vol.7 No. 1*, 32–43. Https://Doi.Org/Https://Doi.Org/10.2478/Afepuc-2020-0003

Bahriyanto Ahmad, Utomo Prasetyo Agus, Sulaiman Ahmad, Mustofa Ahmad, & Toybah Putri Dinda. (2021). Pelatihan Senam Bugar Muhammadiyah Sebagai Upaya

Meningkatkan Imunitas Di Sd Muhammadiyah Rowotengah Jember. *Journal Berkarya*, *3*. Https://Doi.Org/Https://Doi.Org/10.24036/Jba.0301.2021.06

Citra Permana, S., & Ilham Pratama, Y. (2021). Pengaruh Latihan Circuit Training Terhadap Hasil Kecepatan Lari Sprint 100 Meter (Studi Eksperimen Ektrakurikuler Atletik Di Smp-It Al Barokah Kabupaten Pandeglang). *Jurnal Pendidikan Mutiara*, *Vol 6 No 2 (2021)*. Https://Ejurnal.Stkipmutiarabanten.Ac.Id/Index.Php/Jpm/Article/View/58

Citra Permana, S., & Muhardi, A. (2021). Pengaruh Latihan Shuttle Run Dan Resistance Sprint Terhadap Kecepatan Lari Sprint (Studi Eksperimen Ektrakurikuler Atletik Sdit Irsyadul Ibad Kabupaten Pandeglang Tahun 2020). *Jurnal Pendidikan Mutiara*, *6*(1).

Fadhilah Ilmi, D., & Wahyuni. (2024). Effects Of Plyometric Zig-Zag Run And Single Leg Speed Hop Exercises On Agility And Leg Muscles Explosive Power In Football Players. *Indonesian Journal Of Medicine*, *9*(1), 33–38. Https://Doi.Org/10.26911/Theijmed.2024.09.01.05

Fathoni, A., & Rachman, H. A. (2020). Effect Of Sprint Training Exercise, Shuttle Run And Prevention On Base Softball Running Speed Among High School Students. *Acta Facultatis Educationis Physicae Universitatis Comenianae*, *60*(1), 32–43. Https://Doi.Org/10.2478/Afepuc-2020-0003

Firman Pangestu, A., Gustiawati, R., & Afrinaldi, R. (2025). Pengaruh Metode Latihan Saq (Speed, Agility, Quicknes) Terhadap Kemampuan Lari Sprint 100 Meter Dalam Kegiatan Esktrakulikuler Atletik Siswa Smpn 3 Cikarang Utara. *Pendas: Jurnal Pendidikan Dasar*, *Vol. 10 No. 03*. Https://Doi.Org/Https://Doi.Org/10.23969/Jp.V10i03.32348

Fransiska, A., Suhdy, M., & Syafutra, W. (2021). Penerapan Latihan Shuttle Run Pada Atlet Lari Jarak Pendek Di Club Linggau Runners. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga (Jpjo)*, *5*(1), 40–50. Https://Doi.Org/10.31539/Jpjo.V5i1.2872

Hidayat, R., Riswanto, A. H., & Hasanuddin, M. I. (2021). The Effect Of Shuttle Run And Zig-Zag Run Training On Dribbling Skills. *Jp.Jok (Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan)*, *5*(1), 113–125. Https://Doi.Org/10.33503/Jp.Jok.V5i1.1694

Na'afisari, I., Anwar, K., Hidayatullah, F., & Purwoto, S. P. (2023). Pengaruh Pembelajaran Variasi Shuttle Run Terhadap Hasil Belajar Lari Sprint 100 Meter Pada Siswa Kelas Xi Smkp Brajaguna Bangkalan. *Jurnal Terapan Ilmu Keolahragaan*, *8*(1), 14–19. Https://Doi.Org/10.17509/Jtikor.V8i1.60355

Nidomuddin, M., Ramadhan Pramana, A., Pamungkas, H., Habibi, A. I., & Mardikaningsih, A. (2025). Shuttle Run Training On The Physical Performance Of Persik Kendal Football Players. *Jurnal Pendidikan Jasmani (Jpj)*, *6*(2).

Primadi, M. B., Adiputra, N., Made, I., Dinata, K., Karmaya, N. M., Agung, A., Sawitri, S., & Widianti, G. A. (2021). *Pemberian Latihan Tambahan Zig-Zag Run Lebih Baik Daripada Pemberian Latihan Tambahan Shuttle Run Dalam Meningkatkan Kelincahan Pada Program Latihan Di Akademi Opel Futsal Lamongan*. *9*(1), 34–40.

Priyono, A. (2019). Pengaruh Latihan Akselerasi Balance Coordination Running Terhadap Peningkatan Hasil Belajar Lari Cepat Pada Siswa Sekolah Dasar. *Research Physical Education And Sports*, *1*(1), 39–47. Https://Doi.Org/Doi:10.31949/Jr.V1i1.1071.

Sulaiman, A., Apriliyanto, R., Dwi, Y., Ningtyas, W. K., & Ramadhani, D. (2024). Profit Gaining Strategies Through Learning Videos For Physical Education Teachers In Jember Central Region Strategi Memperoleh Profit Melalui Video Pembelajaran Bagi Guru Pendidikan Jasmani Di Jember Wilayah Tengah. *Journal Of Humanities Community Empowerment Jurnal Pengabdian Masyarakat Jhce*, *2*(1), 20–23. Https://Doi.Org/10.32528/Jhce

Syahab, A. A., Bahriyanto, A., Ishaq, H. M., & Abstrak, I. A. (2025). Perencanaan Kurikulum Deep Learning Dalam Pembelajaran Pendidikan Jasmani Pada Mgmp Smp Di Kabupaten Lumajang. In *Jurnal Pengabdian Masyarakat Multidisiplin* (Vol. 1, Number 1).

Vigna Glauc, C., Yono, T., & Sulaiman, A. (2025). Implementasi Model Pembelajaran Tgfu (Teaching Games For Understanding) Dalam Meningkatkan Minat Siswa Terhadap Pendidikan Jasmani. *Journal Of Physical Education And Sport Science*, *13*, 474–480. Https://Doi.Org/10.32682/Bravos.V13i1/150

Yoga Kurniawan, A., Mulyana, N., Muldan, D., Jasmani Kesehatan Dan Rekreasi, P., Muhammadiyah Kuningan, U., Author Author, C., Yoga Kurniawan Departement, A., & Jasmani Kesehatan Dan Rekreasi Afiliasi, P. (2025). Pengaruh Latihan Abc Running Drill Terhadap Kecepatan Lari Jarak Pendek Pada Komunitas Tegal Runner. *Journal Of Physical Education And Sport Science*, *7*(1), 18–23.

Yudith Tiara, A., & H. Wada, Z. (2024). Pengaruh Latihan Shuttle Run Terhadap Kecepatan Atlet Sepak Bola Di Academy Ads Tanggerang Tahun 2023. *Jurnal Joubahs*, *Vol 04, No. 1*. Https://Doi.Org/Https://Doi.Org/10.47080/Joubahs.V4i01.2907