

p-ISSN : 2788-5070 | e-ISSN : 2788-5089

DOI(Journal): 10.31703/gpessr  
DOI(Volume): 10.31703/gpessr/.2024(VII)  
DOI(Issue): 10.31703/gpessr.2024(VII.I)



**VOL. VII, ISSUE I, WINTER (MARCH-2024)**

# **GPSSR**

**GLOBAL PHYSICAL EDUCATION & SPORTS REVIEW**  
HEC-RECOGNIZED CATEGORY-Y



Double-blind Peer-review Research Journal  
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Article Title

The Effects of Plyometric Training on Agility

Global Physical Education & Sports Sciences  
Review

p-ISSN: 2788-5070 e-ISSN: 2788-5089

DOI(journal): 10.31703/gpessr

Volume: IX (2024)

DOI (volume): 10.31703/gpessr.2024(IX)

Issue: I (Winter-March 2024)

DOI(Issue): 10.31703/gpessr.2024(IX-I)

Home Page

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Volume: IX (2024)

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Issue: I-Winter (March-2024)

<https://www.gpessrjournal.com/Current-issues/9/1/2024>

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Abstract

The purpose of the study was to evaluate how football players' agility performance was affected by a 4-week plyometric training programme. at the school level. The study included 12 football players of GHSS Ramak Dera Ismail Khan, KP, Pakistan, aged between 15 to 18 years old, who followed the same twice-weekly workout schedule for a total of 8 sessions. The study was conducted using the one-group pre-posttest model of the experimental method. The Illinois Agility test was taken from each individual before the beginning of the training session and then following it. The findings revealed a noteworthy improvement in agility performance after the plyometric training program ( $t=5.32$ ,  $p=0.001$ ). This suggests that Plyometric training might be a useful method for enhancing agility in male football players, and can also be beneficial when performed for only 4 weeks. The study's findings can help coaches and trainers to improve the performance of their players.

**Keywords:** Plyometric training, Plyometric exercise, Football players

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Pages: 1-7

DOI: 10.31703/gpessr.2024(IX-I).01

DOI link: [https://dx.doi.org/10.31703/gpessr.2024\(IX-I\).01](https://dx.doi.org/10.31703/gpessr.2024(IX-I).01)

Article link: <http://www.gpessrjournal.com/article/A-b-c>

Full-text Link: <https://gpessrjournal.com/fulltext/>

Pdf link: <https://www.gpessrjournal.com/jadmin/Author/31rvl0lA2.pdf>



Citing this Article

		The Effects of Plyometric Training on Agility						
01	Author	Muhammad Safdar Luqman Syed Asif Abbas Mehwish Manzoor			DOI	10.31703/gpessr.2024(IX-I).01		
Pages	1-7	Year	2024	Volume	IX	Issue	I	
Referencing & Citing Styles	APA	Luqman, M. S., Abbas, S. A., & Manzoor, M. (2024). The Effects of Plyometric Training on Agility. <i>Global Physical Education &amp; Sports Sciences Review</i> , IX(I), 1-7. <a href="https://doi.org/10.31703/gpessr.2024(IX-I).01">https://doi.org/10.31703/gpessr.2024(IX-I).01</a>						
	CHICAGO	Luqman, Muhammad Safdar, Syed Asif Abbas, and Mehwish Manzoor. 2024. "The Effects of Plyometric Training on Agility." <i>Global Physical Education &amp; Sports Sciences Review</i> IX (I):1-7. doi: 10.31703/gpessr.2024(IX-I).01.						
	HARVARD	LUQMAN, M. S., ABBAS, S. A. & MANZOOR, M. 2024. The Effects of Plyometric Training on Agility. <i>Global Physical Education &amp; Sports Sciences Review</i> , IX, 1-7.						
	MHRA	Luqman, Muhammad Safdar, Syed Asif Abbas, and Mehwish Manzoor. 2024. 'The Effects of Plyometric Training on Agility', <i>Global Physical Education &amp; Sports Sciences Review</i> , IX: 1-7.						
	MLA	Luqman, Muhammad Safdar, Syed Asif Abbas, and Mehwish Manzoor. "The Effects of Plyometric Training on Agility." <i>Global Physical Education &amp; Sports Sciences Review</i> IX.I (2024): 1-7. Print.						
	OXFORD	Luqman, Muhammad Safdar, Abbas, Syed Asif, and Manzoor, Mehwish (2024), 'The Effects of Plyometric Training on Agility', <i>Global Physical Education &amp; Sports Sciences Review</i> , IX (I), 1-7.						
TURABIAN	Luqman, Muhammad Safdar, Syed Asif Abbas, and Mehwish Manzoor. "The Effects of Plyometric Training on Agility." <i>Global Physical Education &amp; Sports Sciences Review</i> IX, no. I (2024): 1-7. <a href="https://dx.doi.org/10.31703/gpessr.2024(IX-I).01">https://dx.doi.org/10.31703/gpessr.2024(IX-I).01</a> .							

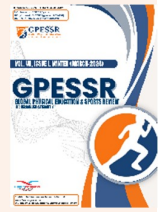




## Global Physical Education & Sports Sciences Review

[www.gpessrjournal.com](http://www.gpessrjournal.com)

DOI: <http://dx.doi.org/10.31703/glsr>



Pages: 1-7

URL: [https://doi.org/10.31703/gpessr.2024\(IX-I\).01](https://doi.org/10.31703/gpessr.2024(IX-I).01)

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### Title

## The Effects of Plyometric Training on Agility

### Abstract

The purpose of the study was to evaluate how football players' agility performance was affected by a 4-week plyometric training programme. At the school level. The study included 12 football players of GHSS Ramak Dera Ismail Khan, KP, Pakistan, aged between 15 to 18 years old, who followed the same twice-weekly workout schedule for a total of 8 sessions. The study was conducted using the one-group pre-posttest model of the experimental method. The Illinois Agility test was taken from each individual before the beginning of the training session and then following it. The findings revealed a noteworthy improvement in agility performance after the plyometric training program ( $t=5.32$ ,  $p=0.001$ ). This suggests that Plyometric training might be a useful method for enhancing agility in male football players, and can also be beneficial when performed for only 4 weeks. The study's findings can help coaches and trainers to improve the performance of their players.

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**Keywords:** [Plyometric Training](#), [Agility](#), [Athletic Performance](#)

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### Introduction

Plyometrics are exercise methods that athletes in various sports utilize to build strength and explosiveness (Sasmitha, [2020](#)). In plyometrics, a quick eccentric action

is used to rapidly stretch the muscle, then quickly perform a concentric action. (Galay et al., [2021](#)). More force is produced than can be given by a concentric



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action alone due to the elastic energy that has been stored inside the muscle (Hafner et al., [2002](#)).

Plyometric activities, also known as stretch-strengthening training or stretch-shortening training, involve activating muscles at a fast enough velocity to cause movement patterns ranging from concentric to eccentric (Dass et al., [2021](#)). The stretch phase of the muscle is revealed when the muscle rapidly loads itself eccentrically, whereas the shortening phase is revealed when the muscle loads itself concentrically (Franchi et al., [2017](#)). Plyometric exercises typically entail abrupt stopping, starting, and direction changes.

The goal of this exercise is to improve your capacity to switch fast or "explosively" from a muscle extension to a contraction. Exercises that develop power combine strength and speed for high-intensity, explosive muscular contractions. In physical treatment, hops and jumps are used to take advantage of the muscle's stretch-shortening cycle. (Aksović et al., [2021](#)) These actions are elements that can help one acquire agility. The definition of agility is the capacity to uphold a firm posture and quick shifts in direction without sacrificing speed, balance, or bodily control (Acar & Eler, [2019](#)). Being agile means having the capacity to swiftly alter direction while keeping control over one's body posture during a series of manoeuvres (Sekulic et al., [2013](#)). Agility exercise is thought to reinforce motor programming through neuromuscular conditioning, a neuronal adaptation of muscle spindles, Golgi-tendon organs, and joint proprioceptors (Craig, [2004](#)).

It is thought that increasing balance and body position awareness will increase agility. Plyometric exercises and agility training goals have been employed in sports including football, tennis, basketball, and other competitions where athletes may benefit from agility (Yap & Brown, [2000](#)). Although it has been demonstrated that plyometric exercise increases performance characteristics, there is little empirical evidence to suggest that it improves agility (Yemataw, [2022](#)).

Plyometric Training (PT) programme effects on agility, though extensively investigated in international literature, are not well supported by scientific studies. This study aims to investigate how school-level football players in KP, Pakistan, respond to a 4-week short-term plyometric training programme in terms of their agility and swiftness. The study's objective is to ascertain if plyometric exercise can effectively train athletes to become more agile and how it affects school-level football players' agility. The results of this research could potentially offer valuable insights for coaches and

trainers who are looking to improve the agility of their athletes.

## Objective

To evaluate how a 4-week plyometric training programme affects male football players' agility aged 15 to 18 years old.

## Hypothesis

Male football players' agility performance will significantly increase after four weeks of plyometric training.

## Methods

### Area and Length of the Study

This study looked at how a 4-week plyometric training programme affected school-level football players' agility between the ages of 15 and 18. One-group pre-posttest model using a quasi-experimental method was used to conduct the study.

## Research Design

To evaluate the study's premise, an experimental design with a pre-test and post-test was used. This design was chosen because it enables a comparison between data from the pre-test, which documents the subject's initial state, and the outcomes of the post-test, which was administered following the training intervention. The research also wanted to observe the impact of plyometric training (independent variable) and agility (dependent variable), therefore this design was appropriate. Since there were only 12 people in the team overall, no control group was used.

## Participants

All the football players of GHSS Ramak were the participants of the study, with an age range of 15 to 18 years. All the candidates were willing to participate and acknowledged having read and signed an informed permission form.

## Performance Test

The Illinois Agility Test was utilised to measure agility prior to and following the four-week training intervention.

## Illinois Agility Test

The Illinois Agility Test (IAT), which involves changing directions while running at different angles and without stopping, was used to measure agility during sprints (Miller et al., [2006](#)). Four cones were used in the test procedure to create a path that was 10 meters long and

5 meters wide. The beginning point was indicated by the cone at point A. The turning places were indicated by the cones at B and C. At point D, a cone indicated the test's conclusion. A stopwatch was used to keep track of the time. The test was completed when the players crossed the finish line without causing any of the cones to fall to the ground. The test was initiated with the 'let's go' command.

### Training Procedures

The plyometric training programme (PT), which targeted the lower extremities, included activities like the squat and jump, step and jump on a 45 cm box with one foot on each leg separately, jump with both feet on

a 60 cm box, and jump over a 60 cm obstacle. Each exercise was performed four times for fifteen repetitions, with a 90-second and a three-minute rest period between sets. The players followed the training program on the school field three times a week for four weeks, with at least a 48-hour gap between each session. Before and after the plyometric training, there was running and dynamic stretching comprised the 10-minute warm-up, while jogging and passive static stretching made up the 5-minute recovery (Androutsopoulos et al., 2021). The players were directly observed as the exercises were being performed, and they were instructed to keep their breaks and exercise procedure intact

### Results

**Table 1**

Test of Normalcy (Shapiro-Wilk)

	Shapiro-Wilk		
	Statistic	df	Sig.
pre	.867	12	.06
post	.945	12	.56

The findings of the Shapiro-Wilk test were used to determine if the "pre" and "post" datasets were normal are shown in Table 1. With 12 degrees of freedom for both datasets, the Shapiro-Wilk statistic values were determined as 0.867 for the "pre" dataset and 0.945 for the "post" dataset. The corresponding significance levels

(p-values) for the "pre" dataset and the "post" dataset were found to be 0.06 and 0.56, respectively. As advised, a p-value higher than 0.05 indicates that it is reasonable to infer that the data will follow a normal distribution.

**Table 2**

Descriptive Measurement Data for the Experimental Group (n = 12)

	N	Mean	Median	SD	SE
Pretest	12	15.9	15.9	0.460	0.133
Posttest	12	15.0	15.0	0.536	0.155

**Table 3**

Plots

Pre	Post	Statistic	Df	P	Mean difference	SE difference	
		Student's t	5.32	11.0	< .001	0.895	0.168

**Figure 1**

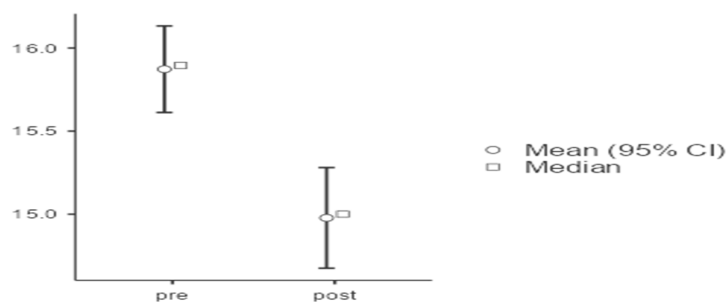
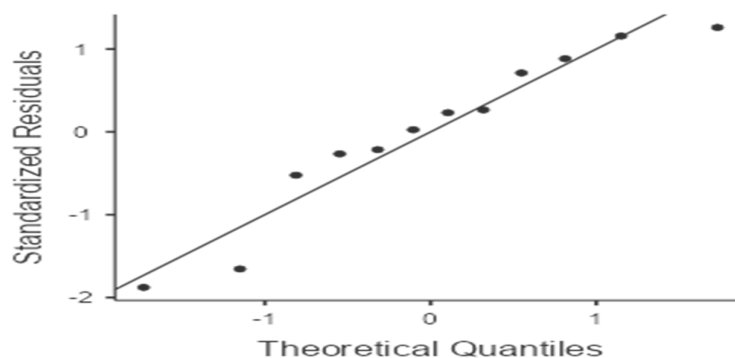


Figure 2



The table displays the descriptive statistics for a sample of 12 participants' agility scores. The pretest's average agility score was 15.9 while the posttest's mean agility score was 15.0.

To compare the agility scores between the pretest and posttest, a paired t-test was used. There were 11 degrees of freedom (df), a t-statistic of 5.32, and a p-value less than 0.01. This demonstrates that the agility scores on the pretest and posttest differed statistically significantly.

### Discussion on Findings

The purpose of this study is to look into how a 4-week plyometric training programme affects football players' agility. The results show a significant improvement in agility. The findings suggest that football players' agility can be considerably increased with a 4-week plyometric training programme. Plyometric exercise significantly improved agility and decreased the amount of time needed to complete agility tests, according to analysis. Previous research by Thomas and French, conducted in (2009), also found that training with plyometrics improved agility. They found that semi-professional teenage football players' agility improved by 9% after a 6-week plyometric training programme, while their sprint performance remained unchanged. Similarly, Heang et al. (2012) observed a 7% improvement in agility due to plyometric training. According to Thomas et al. (2009), a plyometric training regimen lasting six weeks produced a 9% improvement in agility for semi-professional adolescent soccer players, even though sprint time remained unchanged. Meylan and Malatesta (2009) also discovered that young football players' agility improved by 10% after an 8-week plyometric training programme. On the Illinois Agility Test, Miller et al. (2006) discovered improvements of 5% and 3% following six weeks of plyometric exercise; however,

the participants' training state was not taken into consideration.

It is believed that neural adaptation plays a noteworthy role regarding the advantages of plyometric exercise for agility, particularly in terms of enhancing inter-muscle coordination. In other studies, such as Sudhakar et al. (2016) and Mitra et al. (2013), college basketball players and athletes aged 18-23 years, respectively, also observed gains in the Illinois Agility Test associated with plyometric training. According to past studies by Young et al. (2001), Alricsson et al. (2001), Ozmen and Aydogmus (2017), Silva (2019), Stojanović et al. (2012), and others, Plyometric activities can enhance performance on agility tests by improving motor recruitment or neural adaptations. These outcomes are consistent with what they discovered.

### Conclusion

In conclusion, the research showed that plyometric exercise can considerably increase agility in young athletes, especially male football players when it is used at three sessions a week for four weeks. The results support the effectiveness of plyometrics in not only diversifying training but also in increasing strength and explosiveness while promoting agility. The study also shows that plyometric training can significantly increase agility in a short amount of time, which makes it a useful tool for athletes in the last stages of training leading up to in-season competition. Overall, the study's results are encouraging and show how plyometric exercise can help young athletes improve their agility.

### Recommendations

The study concluded that football players' agility can be markedly increased with a 4-week plyometric training programme. The results are consistent with earlier studies that used comparable length plyometric training

regimens and found comparable outcomes. According to the study's findings, plyometric exercise can help football players become more agile, and these gains may be mostly attributed to neural plasticity. Coaches, trainers, and athletes can use these facts to create training plans that will increase agility. It is crucial to remember that the study's findings are unique to this demographic. To determine whether similar findings may be extended to other populations, more research is necessary.

### **Suggestions for Future Researchers**

Future researchers may want to consider the following suggestions when conducting similar studies:

1. Use a larger sample size: The 12 individuals in this study represent a rather small sample size; in order to improve the generalizability of the findings, bigger sample sizes may be used in future research.
2. Use a control group: A one-group pre-posttest design was employed in this investigation., where all participants were exposed to the same intervention. To further establish causality, future researchers may want to use a control group,

which would allow for a comparison of the results between the intervention group and a group that does not receive the intervention.

3. Include a follow-up assessment: This study only assessed the participants' agility performance before and after the 4-week training program. Future studies may want to include a follow-up assessment to see if the improvements in agility performance are maintained over time.
4. Use multiple measures of agility: The Illinois Agility Test was the only tool utilised in the study to gauge agility performance. Future studies may want to use multiple measures of agility, like the T-test or the Pro Agility Test, to provide a more comprehensive assessment of agility performance.
5. Consider other factors that may influence agility performance: Future studies may want to consider other factors that may influence agility performance, such as overall fitness level, nutrition, and sleep patterns.

Conflicts of interest - Regarding the research, composition, and/or publication of this manuscript, the authors have indicated that they possess no possible conflicts of interest.

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