

## THE STRETCH-SHORTENING CYCLE TRAINING INCREASES AGILITY AND SPEED IN YOUNG MALES

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### **Abstract**

*The purpose of this study was to demonstrate the effect of stretch-shortening cycle training on developing speed and agility in young males. The method used in this research was pre-experimental with a pre-test-post-test design for one group. Twelve young males aged 20-22 years were recruited as study participants and provided intervention stretch-shortening cycle training at an intensity of 80-90% HR<sub>max</sub>, three times per week for six weeks (18 meetings). The Illinois Agility Test (IAT) was used to assess agility, while the 30 Meter Sprint Test was used to assess speed. Speed and agility were measured twice, once before and once after training. A paired-sample t-test was employed for data analysis, with a confidence level of 5%. The findings revealed a considerable improvement in average agility and speed between pre-and post-training ( $p \leq 0.01$ ). It was concluded that stretch-shortening cycle training for six weeks proved effective in increasing speed and agility in young males. The results of this study can be used as a basis for recommendations for improving and maintaining physical fitness and the performance of futsal players to achieve optimal performance.*

**Keywords:** *Stretch-shortening cycle training, speed, agility, futsal*

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## INTRODUCTION

The growth of sports has been characterized by a high level of community participation in sports activity, because sports may improve athletes' health and physical fitness (Malm et al., 2019). Futsal has recently become the most popular sport among the general population, particularly youngsters (Mendes et al., 2022; Lago-Fuentes et al., 2020). Sports involving futsal can promote mental health, social personality, sportsmanship, and practicing skills in addition to physical fitness (Tanjung et al., 2020; Aswadi et al., 2015).

Indoor team sports like Futsal are played by both males and females worldwide, in both professional and amateur leagues, as well as at schools and most futsal academies as a technique to improve player development (Méndez-Dominguez et al., 2022). A futsal game is a game that demands to always be active in motion. Players must apply a physical movement, such as the movement of the basic techniques of passing, controlling, shooting, and chasing the ball, then running and turning suddenly so they can rotate the body 180 degrees. Therefore, meeting these physical demands requires optimal physical fitness, agility, and speed to maximize skills and achieve optimal performance (Asshiddiqi & Wahyudi, 2020).

Several training methods are reported to be used in increasing agility and speed in futsal athletes. As reported by Hidayat (2019), it shows that agility ladder training significantly increases the agility of futsal extracurricular participants. Kasum et al. (2023) revealed in their study that the agility training techniques of hurdle exercises and agility ring drills had a significant influence on the agility of futsal players. The shuttle run and three-corner drill were reported to be effective in increasing agility but the shuttle run was found to be more effective than three corner drill in increasing agility (Primasoni et al., 2022). Some of the above-mentioned studies have yet to demonstrate the effect of stretch-shortening cycle training on developing speed and agility in young male futsal players. As a result, the purpose of this study is to demonstrate the effect of stretch-shortening cycle training on developing speed and agility in young males. The results of this study can be used as a basis for recommendations for improving and maintaining physical fitness and the performance of futsal players to achieve optimal performance.

## **METHOD**

This study employed a pre-experimental design with a one-group pre-test-post-test design. 12 young males aged 20 to 22 years with a body mass index of 19-22 kg/m<sup>2</sup> and no history of disease were recruited as research subjects and provided stretch-shortening cycle training treatments with an intensity of 80-90%

HR<sub>max</sub>, 3x/week for 6 weeks (18 meetings). The stretch-shortening cycle training was 75 minutes per week or 25 minutes per session. Warming up and cooling down were both done for 5 minutes at 60% HR<sub>max</sub> effort. The instrument used to measure agility was the Illinois Agility Test (IAT) (Primasoni et al., 2022) (Salimi & Ferguson-Pell, 2020), while measure speed using the 30 Meter Sprint Test (Putera et al., 2023). Speed and agility were measured twice, namely pre-training and post-training. The paired sample t-test was employed for data analysis, with a confidence level of 5%. All data are provided with the mean standard deviation (SD). The complete statistical study was performed using the SPSS program for Windows version 21.

## RESULT AND DISCUSSION

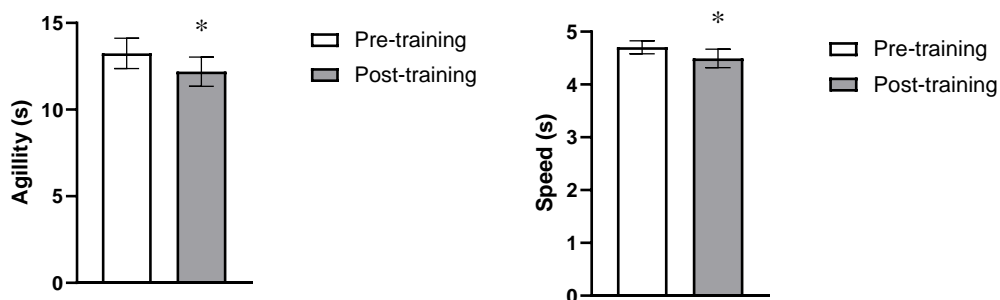
### Results

The results of the study reported that the characteristics of the subjects involved in this study had an average age of  $20.08 \pm 0.90$  years, an average height of  $1.67 \pm 0.06$  m, an average body weight of  $59.25 \pm 5.41$  kg, and an average body mass index (BMI)  $21.11 \pm 0.69$  kg/m<sup>2</sup>. Meanwhile, the findings of a comparison of pre-training and post-training changes in average agility and speed can be seen in Table 1 and Figure 1 below.

**Table 1.** Differences in agility and speed between pre- and post-training

Variable	N	Mean $\pm$ SD		Sig. (2-tailed)
		Pre-training	Post-training	
Agility (s)	12	13.24 $\pm$ 0.87	12.19 $\pm$ 0.85*	0.000
Speed (s)	12	4.71 $\pm$ 0.12	4.49 $\pm$ 0.17*	0.004

(\*) Significantly different with pre ( $p \leq 0.01$ ).



**Figure 1.** Differences in agility and speed between pre-training and post-training.  
(\*) Significantly different with pre ( $p \leq 0.01$ ).

## Discussion

Our research reports that stretch-shortening cycle training for 6 weeks can significantly increase speed and agility in young males. This result is in line with the result by Chandra et al. (2023) reported that stretch-shortening cycle training is effective in increasing performance levels, such as speed, agility, and explosive power. Another result by Huang et al. (2023) discovered that following a stretch-shortening cycle training program, participants' body mass index and body fat % were dramatically lowered, skeletal muscle mass was significantly raised, and post-test speed and agility scores were enhanced considerably. Plyometrics is a type of workout that employs a stretch-shortening cycle (SSC), which consists of a lengthy (eccentric) muscular action followed by a contraction (concentric) movement (Kurt et al., 2023; Komi & Gollhofer, 1997; Komi, 2000). Skeletal muscle is known to be a highly plastic tissue, capable of changing its mass and functional properties in response to various stimuli (Ferreira & Duarte, 2023). The provision of plyometric training stimuli may cause changes in the structure and function of the muscles, in the form of conditioning muscle contractions, so that they can support increased speed and agility.

## CONCLUSION

According to the study's findings, 6 weeks of stretch-shortening cycle training was efficient in boosting speed and agility in young males. The results of this study can be the basis for improving and maintaining physical fitness and the performance of futsal players to achieve optimal performance.

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