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Small-sided games: alternative exercise to improve cognitive performance of youth futsal players

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Abstract

Small Sided Games are an alternative exercise for athletes to improve cognitive performance which functions as a matter of quick decision making during a match. This study aims to determine in reality the application of SSG exercises to the cognitive performance of adolescent futsal athletes. This research is a type of experimental research using a one class pretest-postest design. The number of samples of the study were 20 youth futsal athletes in Banyumas Regency. The research instrument used in this study was the WAIS IV digit span test. The analysis used was the normality test, homogeneity, and paired sample t-test with a significance level of 0.05. The results of the research conducted showed that: there was a significant effect of small sided games training prizes on the cognitive performance of futsal athletes. It was shown that there would be a t-test of 0.017.

Keywords: *Futsal, Cognitive, Short Term Memory, Small Sided Games*

INTRODUCTION

Sports is one of the most popular activities among people today. An activity as an effort to improve individual performance towards the formation of body quality, personality, and increased sports achievement (Dwyer & Gabret, 2012). Sport forms human endurance which is important as a positive development to understand and deal with the difficulties that lie ahead (Morgan et al., 2013). It takes some time to develop a good immune system for the individual. This is related to body performance, that in order to exceed standards or achieve achievements, an appropriate period of exercise is needed (Kellmann et al., 2018). There are various

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kinds of popular sports activities in the world that can be used as an option for sports, one of which is futsal.

Futsal has now become a popular sport around the world, and has even been competed at the beginner, semi-professional, and professional levels (Moore et al., 2014). Fast movement is a hallmark of the sport of futsal (Sera et al., 2011), the game in teams of five against five people to score goals against opponents is the goal of this sport (Naser et al., 2017). Futsal is different from football, seen from the significant role that it plays (Iedynak et al., 2019), this game prioritizes fast position changes by running so that it is included in high-intensity game activities (Beato et al., 2017). Movements made spontaneously in search of space create goal opportunities against opponents. The ability to develop and maintain high-intensity running performance has an effect on match results (Sánchez et al., 2018). In addition to the physical aspect, technique has an important role in playing futsal, because it is related to the process of achieving game goals. The futsal technique consists of *passing,* dribbling, *shooting,*and *controlling* (Festiawan, 2020), which is an attempt to achieve a high technical on a player and as a supporting component specific to tactics (Naser et al., 2017).

Technical aspects are closely related in sports to perform a movement pattern. Therefore, intelligence is needed by athletes to understand an effective movement, because the cognitive aspect is the basis for achieving good psychomotor aspects (Hagler et al., 2019). Futsal requires good cognitive performance (Agras et al., 2016), in this case it is related to the relatively small size of the futsal field, which causes the rotation of motion to occur as often as possible, so that fast decision making is prioritized both in the attacking and defensive phases (Milanovic et al., 2011). The importance of the role of cognitive performance to take action effectively during the game becomes the basis for implementing an effective training method as an improvement in the cognitive performance of futsal athletes.

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Cognitive performance will continue to develop with age if it is used actively and it is important to control one's cognitive (Jung et al., 2019). Short-term memory is one part of the cognitive system that has a major role in cognitive performance, which is used to respond and process stimuli quickly from the surrounding environment (Bhinnety, 2015). Fast thinking in accordance with the role of short-term memory is needed in futsal, playing a role in creating an effective game scheme to achieve game goals.

A literature shows that giving exercise using a treadmill will have an impact on the cognitive performance of athletes (Won et al., 2017). Exercise is an activity carried out by individuals to improve their abilities according to a planned program (Suganda, 2017). Providing appropriate training will provide good progress, while giving training regardless of the athlete's characteristics will actually worsen their abilities. Therefore, providing a variety of exercises is very important to adapt, stimulate recovery, avoid severe fatigue, potentially in the long term, and maximize performance in individuals so that it will increase effective work results (Pérez-Castilla et al., 2018). In addition, providingtraining 5vs5 game allows individuals to align their abilities with the surrounding environment which determines the development of their ability to form coordination patterns for achieving their goals (Oppici et al., 2019).

Small sided games are training models that are considered effective in improving the cognitive performance of futsal athletes. This training model is the provision of training inform of *thegames* by reducing the field area and reducing the number of players, so that ball contact with athletes will be more frequent and the ability to make decisions will increase because it involves actual movement patterns such as matches (Bujalance-Moreno et al., 2019). SSG is also a spontaneous activity, so the speed of play is not determined by the coach but is chosen from the players themselves (Fanchini et al., 2011). Not just moving, SSG includes aspects that are able to support players' abilities both physically, technically and tactically. In accordance with the demands that must be

met by each player which can be achieved when the number of players, field size, objectives and rules used are different, such as the use of 4v2 4v3 4v4 in SSG (Sarmento et al., 2018).

Previous literature from (Sentani & Muhtar, 2019) shows that giving motorbike cognitive coordination training affects the cognitive performance of junior volleyball athletes. Another study from (Firdaus et al., 2019) shows that giving moderate intensity aerobic exercise can improve the function of students' short-term memory. This is in line with the theory which states that short-term memory is a core part of human cognitive performance which is used in a short period of time and can be improved through programmed activity provision (Cai et al., 2018). From this study, it is necessary to review the provision oftraining *small sided games* on the cognitive performance of adolescent futsal athletes.

The results of observations made by researchers in the youth futsal team in Banyumas Regency found that the results varied, the average player controlled the ball by 5.3 seconds so that decision making was slow, or only 45% of the success rate in decision making from a total of 20 athletes. Another thing is that athletes still take too long to control the ball so that it is easily captured by the opponent, fail to carry out attack patterns because there are no team members in an advantageous position, take too long to make decisions in front of the goal so they fail to score goals, and feel confused when in position. defense, as a result it is easy to be scored by the opponent. From this problem, of course, it is reversed with the findings of the theory which states that futsal is a game that prioritizes the movement of the ball and position quickly (Beato et al., 2017), futsal requires players to quickly make decisions so that the goal of the game can be achieved.

Based on the literature review and the problems obtained, it is necessary to study the provision of *small sided games* to improve the cognitive performance of youth futsal athletes in Banyumas Regency as a way to introduce effective training to improve the cognitive performance of athletes. So that this research can be used as a reference for planning a

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futsal exercise program in order to be able to achieve maximum performance, especially in terms of cognitive performance abilities.

METHODS

Research Type

This research belongs to the type of experimental research. Experimental research is research to identify the effect of treatment on subjects (Sugiyono, 2016). The research design used was a *one group pretest-posttest design*. The following is the design in the research:

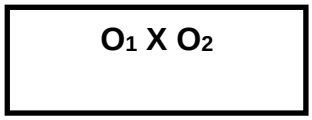

Figure 1. Research Design

Description:
O_1 : *Small sided games*
O_2 : Cognitive performance

The effect of the treatment here is the provision ofexercises *Small Sided Games* 4vs2, 4vs3, and 4vs4with a limited number of touches given to the district youth futsal athletes. Banyumas. Before the *treatment is* carried out pretest to determine the ability of early cognitive performance athletes, *treatment* carried out 16 times according to the guidelines training methods *Small Sided Games* (Komarudin, 2013), followed by a *post-test* to determine the presence of cognitive performance improvement in futsal athlete or not. The following table of exercise program planning is used:

Table 1. Distribution of exercise time

No	Type of Activity	Objective	Time
1	Opening Pray Give directions	Give direction to the aim of the exercise.	10 minutes
2	Warm up	Prepares the body to accept the form of the exercise.	15 minutes
3	Core exercises	Improve technical	60 minutes

		skills, especially *passing*.	
4	Closing: a. Chilling b. Evaluation c. Pray	Evaluating the implementation of theexercise	10 minute

Table 2. Smallexercise program *sided games*

Meeting	Intervention	Set	Session	Intensity
1	*Pre test*	-	-	Maximum
2 3	4vs2	8	1x4 minutes	Low
4 5	4vs3	7	1x4 minutes	Moderate
6 7	4vs4	6	1x4 minutes	High
8 9	4vs2	8	1x4 minutes	Low
10 11	4vs3	7	1x4 minutes	Moderate
12 13	4vs4	6	1x4 minute	High
14 15	4vs3	7	1x4	Moderate
16	*Post test*	-	-	Maximum

Population and Sample

All youth futsal players Banyumas regency totaling 20 athletes serve as the study population. While the sample used is *total sampling* or the entire population is used as the research sample. (n = 20, age = 16.3, BMI = 19.7 kg/m^2).

Mechanical Collection Data

The research instrument used is the *WAIS Digit Span Test IV* consists of *digits forward* and *backward* in the form of tests to mention the numbers in sequence from the front and rear rapidly (Jaeger, 2018).

Data Analysis

Analysis was tried to use the support of the SPSS application version 25. The following is the analysis of the information used in this research: The Shapiro-Wilk Test is used to test the normality with a significance level of 0.05. The Levene Test is used for the homogeneity test with a significance level of 0, 05. Test Paired sample T-Test is used to test the hypothesis with a significance level of 0, 05.

RESULTS

1. Data Description

Results Data from measurements of cognitive performance futsal adolescent athletes of the total sample of 20 people can be seen in table 1 below.

Table 1. Data Description of Research Results

Practice Methods		Preliminary Test	Final Test	Gain
Small Sided Games	n	20	20	20
	$\underline{X}$	9.50	11.0	1.63
	Sd	2.35	2.29	2.17

Based on Table 1, the results show that the use of the modeltraining *SSG* can improve the cognitive performance of youth futsal athletes in Banyumas Regency, seen from the average results at *pretest* of 9.50 and *posttest* of 11.0. Therefore, there was an increase seen from the score (Gain) at the *pretest* and *posttest which* had an

average of 1.63. The following is a description of the research data diagram:

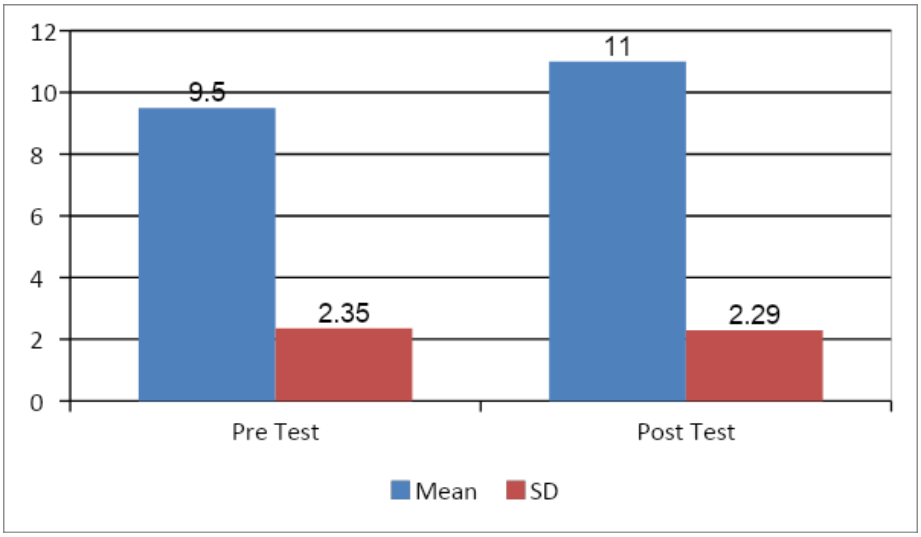

Figure 1. The research data description diagram

2. Test Prerequisites

The normality and homogeneity tests are used as prerequisite tests in this research. Information on normality and homogeneity is calculated using the Shapiro Wilk test and Levene Test on SPSS with a significance level of 0.05. Information is said to be fair and homogeneous if the p value is> 0.05, the results can be seen as follows:

Table 2. Test Results Normality and Homogentias Data

Variable	Normality (Sig.)	Homogeneity (Sig.)	Description
pretest	0.91	0924	Normal and Homogeneous
posttest	0:52	0151	Normal and Homogeneous

Based on the results prerequisite test listed in Table 2, showing that the value significance obtained in thedata is *pretest* P> 0.05, which means that the two data are normally distributed and havevariance a homogeneous.

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3. Hypothesis(Test *Paired Sample*T-Test)

test is done after the test prerequisite hypothesis previously done, namely, normality and homogeneity test data. Hypothesis testing is done to conclude from the problems in this study. The test is carried out with the paired sample t test which has the aim of knowing the effect of taking care calculated through the acquisition of the previous test value and then, here are the results:

Table 3. Results Test Hypothesis (*Paired Sample T-Test*)

Variable	*Pretest* n = 20			*Posttest* n = 20			P value
	M	±	SD	M	±	SD	(Sig.)
Performance Cognitive	9.5	±	2.35	11.1	±	1.99	0.017

Information: n = sample, M = Mean, SD = Standard Deviation

Seen in Table 3. Paired sample test scores produce the previous test results and subsequent test data, indicating a significance value of 0.017. Because the significance value <0.05, it can be concluded that there is an influence on the administration of thetraining method *Small Sided Games* on the cognitive performance of futsal athletes.

DISCUSSION

Based on the results of data processing and analysis with a significance value obtained of 0.017 or <0.05, it shows that thetraining method *small sided game*shas an effect on improving the cognitive performance of athletes due to the training applied in accordance with the conditions in the actual game, this is reinforced. from the explanation (Bujalance-Moreno et al., 2019) which states that *small sided games* are a form of training like an actual match by reducing the field area and reducing the number of players with the aim of players becoming accustomed to making decisions quickly and many who come into contact with the ball because involves real movement patterns. The results showed that repeated exercises would have an effect on futsal playing

skills (Festiawan, 2020), further (Beato et al., 2017) explained that exercise has an important role in mastering movement skills, so that the experience gained can be applied to coordination. between cognitive and psychomotor better.

The form of the training pattern for small sided games 4v2 4v3 4v4 was able to provide significant changes to the cognitive performance of youth futsal athletes in Banyumas Regency, so that there was an increase in the results of cognitive calculations from the initial test to the final test. The results of this study support other research that explains the method small sided games has an effect on the aerobic endurance performance of teenage football players (Moran et al., 2019).

The results of the study is in line and support the results of other studies, namely (Coutinho et al., 2019) said that the provision ofexercise *small-sided games* can improve the regularity of position players so the game becomes more structured pattern. Furthermore, another study conducted by (Chaouachi et al., 2014) stated that givingexercises had an *small sided games* effect on agility and the ability to change direction quickly. Other research, namely (Festiawan, 2020) which states granting exercises with tactical and strategic approach to influence the playing skills futsal.

From the results research conducted by several researchers above, researchers have tested the effects of exercise small sided games against cognitive performance showed that the training methods significantly influence cognitive performance futsal teen athlete Banyumas. The age range of 16-18 years in the sample is a limitation in this study, so it is necessary to conduct research at the age of 12-15 years so that it becomes a continuous coaching process.

CONCLUSION

Based on the findings obtained from the results of data analysis and discussion, it can be concluded that the Small Sided Games training method can improve the cognitive performance of adolescent futsal

athletes in Banyumas Regency, this is because the application of appropriate training methods that resemble matches actually makes athletes' abilities improve both in terms of skill and speed in making decisions in the field.

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