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by Desta Asyifa

Submission date: 20-Jul-2026 05:58PM (UTC+0800)

Submission ID: 3000722867

File name: Revision.docx (67.21K)

Word count: 3722

Character count: 20668

METHOD OF REACTION TIME TO IMPROVE THE ABILITY OF FEMALE FUTSAL GOALKEEPER TO FACING PINALTY KICKS

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16

Abstract

This study aims to explore the impact of reaction speed training methods on improving the ability of female futsal goalkeepers to face penalties. The problem raised is the lack of ability to react to the goalkeeper when facing a penalty, which can be seen from the slow response to the direction of the ball. This study applied a quantitative approach through the design of a pre-test-post test group experiment. The number of research samples consisted of 20 women's futsal goalkeepers who were selected by the purposive sampling method. The research instrument was in the form of a test of the ability to face penalty kicks before and after being given treatment. The treatment was carried out through rapid reaction exercises using tennis balls for 10 sessions. Data analysis using descriptive statistics and t-test testing of paired samples. The results showed a significance value of 0.024 (<0.05), which indicated a significant increase between the pretest and posttest results. Therefore, it can be concluded that the speed reaction training method has a significant impact on improving the skills of women's futsal goalkeepers when dealing with penalty kicks.

Keywords: Reaction Speed; Women's Futsal Goalkeeper; Pinalty Kick

INTRODUCTION

Futsal is a team sport played by five players per team. Futsal is one of the sports that is popular these days. (Ardiansah & Hidayatullah, 2022). This sport is also one of the sports that can be enjoyed by various groups, from an early age to adulthood playing it. There are many places that are rented specifically to play futsal. This of course has a big enough impact so that there are many opportunities to play futsal anywhere, with anyone. Stating that futsal is in great demand by all groups from children to adults, both men and women. ¹³ Women's futsal is one of the fastest growing sports worldwide and is regulated by the International Football Federation (FIFA). (Aurora & Hananto Puriana, 2022) (Collins et al., 2021) (Vasquez-Bonilla et al., 2025)

The goalkeeper has the most crucial role as the last line of defense. In futsal, goalkeepers need sharp reflexes, reponsive reactions, and courage, especially during penalty kicks (Susanti, 2021). In the world of sports training, the right training method greatly determines the effectiveness of the process of improving goalkeeper skills. The systematic and consistent use of reaction speed training

methods is believed to be able to provide a positive effect on the mental and physical readiness of a goalkeeper. With the implementation of speed exercises proving to be effective, it is expected that players will be able to respond to stimuli more quickly and precisely, improving their technical abilities in the game. (Nasution1, 2024) (Sinangling et al., 2024)

The results show that the researcher saw firsthand the match for third place in the Futsal Tournament held in Yogyakarta in October 2025. UNNES Women's Futsal played well throughout normal times in the match. so that the score is a draw and the match must proceed to a penalty shootout. However, the goalkeeper seemed slow during the penalty shootout. The UNNES Women's Futsal goalkeeper did not seem to respond to the ball quickly, especially when there was a penalty kick. When goalkeepers make an initial move, they are often late so they cannot anticipate the penalty ball.

Therefore, there is a need for training interventions focused on improving these abilities. Based on this fact, this study aims to explore and test the effectiveness of the reaction speed training method in improving the ability of women's futsal goalkeepers in facing penalty kicks. ¹⁸ the results of this study can be used as a reference for sports coaches and teachers in developing a more effective training program based on the specific needs of athletes. Practically, this study serves as a guide for women's futsal coaches, clubs, and schools in developing effective technical and physical training programs.

²¹ **METHOD**

This study uses a quantitative approach with experimental design. The quantitative approach was chosen because this study focuses on measuring the effect ³ of reaction speed training methods on improving the ability of women's futsal goalkeepers to face penalty kicks. The goal is to test hypotheses and produce findings that can be generalized in a limited way. The experimental design was chosen because in its implementation it is not possible to control all the external variables that affect the results, as in a pure experiment. However, this design still provides sufficient control through the use of experimental groups and pre- and post-treatment measurements. In this study, subjects will be given treatment in the

form of reaction speed training methods over a certain period, then the results will be measured and compared with the results before the treatment. This aims to see the effectiveness of the training given to improve the goalkeeper's ability to face penalties.

According to the (Muhandis & Riyadi, 2023) pretest-posttest design, that is, one group of subjects is tested first before being given treatment, then tested again after the treatment is given. In this way, it can be known the extent of the changes that occur in the subject as a result of the treatment of the given exercise method. Even without a control group, this design is still relevant to know the direct effects of an intervention on the same group. In this context, the focus is on changing the performance of the goalkeeper internally. This design also makes it possible to evaluate the development of individual performance longitudinally during the training process. The data collected through goalkeeper ability tests and observations during training will be the basis for assessing the effectiveness of the intervention. By considering these various aspects, this approach and design are expected to be able to provide a complete understanding of the relationship between reaction speed training methods and improving the ability of women's futsal goalkeepers. In this study, the place of research is located in the place of training clubs in Semarang City.

Population refers to all members or elements that have certain characteristics that are to be studied. Populations can consist of people, objects, events, or anything related to the research being conducted. . In this study, the population used is 20 women's futsal goalkeepers in Central Java and specifically in the city of Semarang. (Jailani & Jeka, 2023)

Sampling is a method (procedure or tool) used by researchers to systematically select a number of items or individuals that are smaller than a predetermined population. The item or individual is used as a data source subject for observation or experiment according to the goal to be achieved. In the sample technique used is the (Firmansyah, 2022) purposive sample determination method. Purposive Sampling is a sample selection method in which individuals are deliberately selected based on certain criteria that are considered important by

researchers. This method is often applied in qualitative research, especially when researchers want to explore cases that are unique or highly relevant to the question being researched. By using Purposive Sampling, researchers can focus on groups or people that best suit the research objectives, so that the data obtained becomes more in-depth and detailed. However, due to its highly subjective nature, the results of this study may be difficult to apply in general. A research variable is a collection of several signs that work together in a problem, in this variable there are one or more signs, various elements or components as interrelated parts. Types of variables include independent (Subhaktiyasa, 2024) (Latifah et al., n.d.) variables, bound (dependent) (Hafizah et al., 2025) variables.

A free variable is a variable that can affect or cause a change, or a symbol of a variable of a variable. In this study, there is a free variable (x), namely the reaction speed training method. The bound variable (y) is a variable that is affected or that is caused by the existence of a free variable, namely the reaction speed of the women's futsal goalkeeper in facing a penalty kick. (Irfan et al., n.d.) (Irfan et al., n.d.)

¹⁴ The data in this study is primary data obtained directly from the results of field tests and observations on the research subject, namely the women's futsal goalkeeper. Primary data was chosen because it was direct and actual in accordance with real conditions in the field. The data includes the value of goalkeeper ability before and after being given reaction speed training, as well as observation records during the exercise. This type of data allows researchers to analyze changes that occur objectively and relevant to the research objectives. The main data source in this study is women's futsal goalkeepers who are active in training activities and matches. The criteria for selecting subjects include female athletes with goalkeeper positions in school futsal teams, clubs, or other sports institutions who have basic experience playing futsal. The determination ⁸ of subjects was carried out by purposive sampling, which is selection based on certain criteria that are considered relevant to the needs of the research. This is to ensure that the subject is indeed representative of the population to be studied. (Tajik et al., 2024)

The Pre-test The pretest was conducted at the first meeting to assess the goalkeeper's initial ability. Each participant faced 10 penalty kicks. The experimental group received 10 sessions of reaction time training using tennis balls. Tennis balls were chosen because they bounce faster and unpredictably, which encourages the development of reaction speed, visual focus, and motor readiness. Training variations included: (1) tennis ball toss from a predetermined distance, (2) high-speed catch-throw drill, (3) spontaneous reaction to a bounced ball, and (4) penalty simulation with a tennis ball

The Post-test was conducted after the 10th training session (post-treatment).
 10 Data were analyzed using descriptive and inferential statistics. Descriptive statistics (mean, standard deviation) were used to summarize pretest and posttest results. Inferential analysis used a paired sample t-test (Subhaktiyasa et al., 2025) to determine 12 whether there was a statistically significant difference between pretest and posttest scores. The significance level was set at $\alpha = 0.05$.

Data were processed using SPSS version 26. The analysis included data entry, verification, 11 normality testing (Shapiro-Wilk), and homogeneity testing (Levene's test). The significance value (p-value) was compared with alpha = 0.05 to determine 3 whether the hypothesis was accepted or rejected.

RESULTS

After the researcher obtained the data, the researcher found the results, namely

Table 1. Normality Test

	Class	Kolmogorov- Smirnov			Shapiro- Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	9 Pretest Control Class	.222	10	.178	.906	10	.258
	Posttest Control Class	.240	10	.107	.886	10	.152
	Pretest Experiment Class	.224	10	.168	.911	10	.287
	6 Post test Experiment Class	.181	10	.200	.895	10	.191

Based on the results of the normality test using Shapiro-Wilk, it is known that all pretest and posttest data in the control and experimental classes have a significance value (Sig.) greater than 0.05. The significance values in each group were the control pretest (0.258), the control posttest (0.152), the experimental pretest (0.287), and the experimental posttest (0.191). This shows that the research data is distributed normally, so it meets one of the requirements for a parametric

test to be conducted. A normal data distribution indicates that the data distribution does not deviate significantly from the normal distribution, so advanced statistical analysis such as t-tests can be performed appropriately.

Table 2. homogeneity test

Result	Levene Statistic	df1	df2	Sig.
Based on Mean	.126	3	36	.994
Based on Median	.067	3	36	.997
Based on Median and with adjusted df	.067	3	32.886	.997
Based on trimmed mean	.118	3	36	.949

Based on the results of the homogeneity test using the Levene Test, a significance value of 0.944 (based on the mean) was obtained. The value is greater than 0.05, so it can be concluded that the variance of data between groups is homogeneous.

Thus, the research data had the same variance between the groups being compared. This condition showed that there was no significant difference in variability between the control and experimental groups, making it eligible for parametric tests, especially t-tests.

Table 3. T Test

Paired Differences									
Pair1	Kontrol-Eksperimen	Mean	Std. Deviation	Std. Error Mean	95% Confidence interval on the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
		-11.000	12.867	4.069	-20.204	-1.796	-2.703	9	.024

Based on the results of the paired sample t-test, a significance value (Sig. 2-tailed) was obtained of 0.024, which means it is smaller than 0.05. In addition, the t-value was calculated at -2.703 with an average difference of -11,000.

DISCUSSION

Based on the results of the study, it shows that there is a significant difference between before and after treatment. Thus, it can be concluded that the training method given has a significant influence on improving the goalkeeper's ability to face penalty kicks.

In practical terms, this improvement shows that the reaction speed training applied is able to improve the motor response and readiness of the goalkeeper in

responding to stimuli, such as the direction of the ball during a penalty. This ¹⁴ is in line with the stimulus-response theory which states that repeated exercise can speed up reaction time and improve coordination between the sensory and motor systems.

Researchers here conducted reaction speed research to improve the ability of goalkeepers to face pinlaty kicks. From these results, researchers found a way to increase the ability to react speed, namely using a tennis ball. From the results obtained by the researcher through pre-test, treatment, and post test, the researcher wanted to compare the exercises that had been treated and those that were not treated. The results that have been obtained and based on ⁷ the paired sample t-test test which shows a significance value of 0.024 (< 0.05), so that there is a significant difference between the results of the pretest and posttest after being given treatment.

So that the article entitled reaction speed training methods to improve the ability of goalkeepers in facing penalty kicks can be used by martial arts teachers or futsal coaches to be used as a reference or handle in providing training programs or materials, especially for reaction speed in facing penalty kicks.

¹ CONCLUSION

Based on the results of the research and discussion, it can be concluded that the reaction speed training method significantly improves the ability of female futsal goalkeepers to face penalty kicks. This ⁴ is supported by the paired sample t-test results, which show a significance value of 0.024 ($p < 0.05$), ¹¹ indicating a meaningful difference between pretest and posttest scores. The observed improvement reflects enhanced motor response, movement accuracy, and readiness in reacting to stimuli, particularly in anticipating the direction of the ball during penalties. Therefore, the hypothesis is accepted. Reaction time training using tennis balls can be considered an effective program to enhance goalkeeper performance in penalty kick situations.

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