

## The Effectiveness Of *Push-Up* Exercises Using *Push-Up Boards* To Improve Lower *Service* Ability

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### ABSTRACT

This research is motivated by the lack of service ability under ITP Surabaya High School students. That will be the team's weakness in the match, so with this research the goal that will be achieved is to improve the lower service ability to be better. In order for the lower serve to increase, there must be additional training methods given during training. Efforts to improve the lower service capability can be done by various methods. One of them is with push-up board exercises. This study uses the one group pretest posttest design experiment method. There are two variables, namely push-up board exercises as the free variable and lower service ability as a bound variable. The use of board push-ups helps in improving posture and exercise techniques, as well as optimizing the strengthening of the main muscles involved in the lower serve technique. This study used a sample of 30 students who participated in extra women's volleyball at SMA ITP Surabaya. From the results of statistical analysis, it shows that the value of the descriptive test, normality test, homogeneity test, and t. test shows that the normality value of sig is  $0.54 > 0.05$ . The homogeneity value of sig was  $0.884 > 0.05$  and the value of the t-test was sig (2-tailed)  $0.000 < 0.05$ . So it can be concluded that there is an effectiveness of push-up exercises using push-up boards to improve the ability of lower serve in extra women's volleyball. Improving lower service ability and supporting the improvement of lower serving ability in football with push-up exercises using push-up boards in ITP Surabaya High School students increased by 25% Keywords: push-ups, bottom serve, volleyball,

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### Introduction

With the advancement of science and technology, sports activities in Indonesia, especially volleyball, have experienced rapid development. All of this is inseparable from the government's interest in the sports sector, which is reflected in Indonesia's participation in the sports sector. The sports field has received a lot of attention, especially in efforts to organize and nurture athletes so that they can perform optimally.

Volleyball is a sport played by two teams, each team consisting of six players on a court separated by a net, with each team touching the ball three times and returning the same ball to the opposing team. The game can be played in 5 sets. This means that the game can be played in five sets, the game lasts about 90 minutes, and the player can perform 250-300 movements with explosive leg strength (Aep Rohendi, 2018). According to Darryl Parker (2023), Parker has shown in research that *push-up* exercises using push-up boards provide a more balanced distribution of weight to major muscles such as *pectoralis major*, *triceps*, and *deltoids*. This exercise helps to improve strength and stability in the upper extremities. It is important to perform a strong and accurate bottom serving.

According to Miller et al, (2022) In their study, Miller and his colleagues found that the use of push-up boards during push-up exercises increases the activation of core muscles. This provides greater stability to the athlete's body when performing dynamic movements such as the bottom serve. The study also showed a significant improvement in arm strength and an athlete's ability to serve after an exercise program involving a push-up board. Meanwhile, Menurru Dr. Angela Reye, (2023) Dr. Reyes noted that in addition to the benefits of strength, push-ups using push-ups also train muscle endurance and improve proprioception. This is especially beneficial for women's soccer athletes, as the ability to maintain proper push-up body position and adjust strength during lower serve becomes more pronounced. According to Santos et al. (2021) In their analysis, Santos and his team showed that push-up boards can reduce the risk of injury by maintaining better posture during exercise. They also emphasized that this exercise is effective in increasing muscle endurance which plays an important role in lower service ability in women's volleyball.

Research Results Gupta et al (2021) In his research, Gupta showed that baliwa push-ups are simple exercises to increase upper body muscle strength in a significant way and have cardiovascular benefits if done consistently. While the results of Anderson & Sweeney (2022) research They suggest that variations of push-ups, such as incline or decline push-ups, can be helpful in targeting different muscles and improving functional fitness, push-ups being one of the most popular and effective upper body exercises. This exercise involves the chest, shoulders, triceps, and core muscles. Push-ups can be done in a variety of variations to increase intensity or target specific muscle groups.

Research Results Johnson & Peters (2024) In their latest study, Johnson and Peters highlighted that push-up boards assist exercisers in maintaining consistency of form during exercise, which is important for progressivity and reduction of the risk of injury. Meanwhile, the results of the study Palladino et al. (2023) This study found that the use of push-up board tools can improve exercise efficiency by providing clear guidance and reducing the risk of injury caused by incorrect hand position.

Sukadiyanto's Research Results (2021) In his book on basic techniques in sports, Sukadiyanto explained that the bottom serve is an important technique for beginners to master the basics of the game. He emphasized the importance of hand-eye coordination and correct posture to achieve effective serve. Meanwhile, the results of Widiastuti & Anggraini's (2022) research In their study on basic skills in the sport of volleyball, Widiastuti and Anggraini emphasized that the bottom serve is a basic technique that allows players to start the game with accuracy and consistency. They emphasize on regular practice to improve these skills. As for the Research Results Martinez et al. (2023) Recent research by Martinez and his colleagues shows that structured bottom-serve exercises can improve the confidence and skills of beginner players in badminton. They also note that this technique is important in game situations that require good ball control.

One of the important aspects of the game of volleyball is the ability to perform lower serves, which is a basic technique that every player must master. An effective and consistent bottom serve can provide its own advantage in a match, as it can be a weapon to gain points directly or disrupt

the opponent's defense. However, in reality, the lower service ability of the women's volleyball team at SMA 1 ITP Surabaya is still not optimal. There are factors that affect including lack of arm muscle strength and body stability when performing. Therefore, effective training methods are needed to improve this ability. One of the exercise methods that can be used is push-up exercises using a *push up board*. *Push-up boards* are tools designed to maximize *push-up* movements with different angle variations, so that they can train the arm, chest, and shoulder muscles more thoroughly. By using a *push-up board*, it is hoped that the students can increase the strength of the muscles that play a role in performing lower serves, so that their service results become stronger and more accurate. This study aims to evaluate "The Effectiveness of Push-up Exercises Using Push-up Boards in Improving Lower Service Ability in Women's Volleyball Extracurricular at SMA 1 ITP Surabaya". It is hoped that the results of this research can contribute to the development of a more effective training program, as well as help improve the performance of the school puti football team.

## Method

This study used a *pretest and posttest experimental design* that showed a significant improvement in the accuracy of the participants' bottom serve after participating in *push-up* exercises. The place where this research was carried out at SMA ITP Surabaya, this research was given to extracurricular students of volleyball where the observation made by the service ability of under-school football extracurricular students was still not optimal, the time of taking pretest data was adjusted to the schedule of extracurricular soccer training. After the pre-test was carried out, training or treatment was carried out which was carried out twice a week, which took place at ITP Surabaya High School. With a two-day schedule of hours and exercises at 15:00 – 17:00 WIB.

The population is limited to a number of students who have at least one trait in common. The population in this study is 30 female students of ITP Surabaya High School.

The sample used in this study is 30 samples from extracurricular activities carried out by female students of ITP Surabaya High School, divided into two experimental groups 1 (one) of 15 people and experimental group 2 (two) of 15 people.

In this data collection technique, the researcher used a *two-group pre-test and post-test design*. This means that before being treated with *push-up* learning media, students first do a *pre-test*, then give a *post-test* to the student. After the first stage of data collection (*pre-test*), the researcher will train the students who are experimented with *push-up* exercises through an exercise program that has been programmed by the researcher.

The data analysis technique used in this study is analysis using the t-test technique. The t-test (t-test) is a statistical technique used to test the significant difference between two means derived from two distributions before processing data or testing a hypothesis, then a data normality test must be carried out first, the normality test in this study uses descriptive test calculations, normality tests, homogeneity tests and hypothesis tests. The normality test aims to ensure that the data obtained is symmetrical or normally distributed. Normality testing is usually used by kolmogorov-

smirnov and Shopiro-wiks with the help of calculations of the SPSS 26 application, then a t-test (*test*) is carried out. This calculation is to find out the difference between the results of the *pretest* and *Posttest*, and the improvement test to find out whether there is an increase or not of the results of the treatment that has been carried out, commonly also called a difference test

## Result And Discussion

### Descriptive Test

Descriptive statistical analysis is useful for explaining and describing research, including the amount of data, maximum value, minimum value, average value, and so on. After calculating the descriptive analysis from the test participant data, the following results were obtained:

**Table 1.** Statistical descriptive test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
kel A	30	10	18	13.23	1.942
kel B	30	13	20	15.67	1.729
Valid N (listwise)	30				

### Data normality test

The normality test in this study aims to test whether the research data conducted is distributed norm or not. The data normality tester uses the shapiro-wilk formula with the help of spss. The data will be said to be distributed norms or  $H_a$  is accepted if the significance of the value obtained is greater than 0.05

**Table 2.** Normality Test Results

Tests of Normality						
Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk			
Statistic	df	Sig.	Statistic	df	Sig.	
.171	30	.026	.956	30	.242	
.157	30	.058	.932	30	.054	

a. Lilliefors Significance Correction

From the above normality analysis, the significance value for group A was  $0.242 > 0.05$  and the value of group B was  $0.54 > 0.05$ , so in accordance with the basis of decision-making in the normality test, it can be concluded that the bottom service accuracy data is normally distributed. Therefore, the analysis can be continued.

### Homogeneity test

The homogeneity test here is carried out to make the researcher believe that the groups that make up the bearorigin sample of a homogeneous population the homogeneity test formula if the sig value  $> 0.05$  then the data is declared homogeneous and if the sig value is smaller, then the data is declared to be inhomogeneous. Homogeneity is sought by using the homogeneity of variances test. The results of this homogeneity test can be seen in the table below.

**Table 3.** Results of the homoginiity test

		Test of Homogeneity of Variance			
		L			
		evene	d		
		Statistic	f1	f2	
				Sig.	
ha sil belajar	Based on Mean	.022	2	8	.884
	Based on Median	.021	2	8	.886
	Based on Median and with adjusted df	.021	2	7.242	.886
	Based on trimmed mean	.021	2	8	.884

Based on the results of the table above, it is known that the significance value is  $0.884 > 0.05$ , so it can be decided that the data variance is the same or homogeneous.

### T-test

After it is known that the data is normally distributed and homogeneous variance and the same number of samples, according to the guidelines that have been stated, the t-test *paired samples test* formula is used. The results of data calculation using the two formulas can be described as follows:

**Table 4.** Paired Test Sample Test  
Paired samples test

		Paired Samples Test						
		Paired Differences						
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	Sig. (2-tailed)
					Lower	Upper		
air 1	retes t - post test	2.500	.280	.234	2.978	2.022	10.699	.000

Based on the results of the T test in this study, a sig (2 tailed) value of 0.000 was obtained, which is smaller than 0.05, which shows that there is a significant effect of *push-up* exercises using *push-up boards* on improving lower service ability in women's volleyball extracurriculars. The mean difference between the pretest and posttest is -2,500, which indicates a noticeable change after treatment. From the calculation of the percentage change, it can be concluded that there is a 25% increase in the lower service ability of the participant after participating in the training program. This shows that with the use of *push-up boards*, the bottom service technique can be significantly improved, with a fairly high rate of improvement. This figure also reflects the effectiveness of exercise in developing the muscles that support service movements, especially for beginner athletes.

From the results of the normality test above, from the *pre-test* and *post-test* experimental groups using *push-up board* exercises on the ability to serve under volleyballs to significant results greater than 0.05 normal distributed data. In the control group, the results of the *pre-test* and *post-test* without treatment had a significant result greater than 0.05, so the data was normal, it turned out that the tester with statistics based on mean obtained a significant 0.884 far exceeding 0.05. And statistics based on mean of the center learning model group obtained a significant 0.884. Thus, the above research data is homogeneous. Based on the *paired sample test* table, a sig (2-tailed) value of  $0.000 < 0.05$  was obtained. Thus, there is an influence between *push-up board exercises* on volleyball bottom service ability in the extracurricular girls of ITP Surabaya High School. The duration of the study for 2 months has been proven to be effective in improving the lower service ability in bolavolley. During this period of time, there can be an increase in the strength of the *triceps muscles*. Therefore, the duration of 2 months is the ideal time to increase the speed of the lower serviceability in volleyball. With the *push-up method*, the effectiveness of the exercise is better, because students are trained in

strength with *push-ups* using a *push-up board*. In this *push-up method*, students must try to stay focused on performing the bottom serve in a state of fatigue experienced and must be able to pass all kinds of exercises, the player must be able to perform the bottom serve with the aim of being able to do the bottom serve and place the serve in the designated area. In the lower serve movement, as for the muscles that work when performing the lower serve stroke, the muscles that work include: M Biceps Brachialis which functions to bend the forearm of the elbow, flatten the cubit and raise the arm when going to do the bottom serve of the volleyball *Ulnar Karpi Extensor* (moving the arm) when going to do the lower serve of the ball.

The advantage of this research lies in the application of *push-up boards* as an aid in *push-up exercises*, which are usually done without tools. This approach offers a different method of exercise, which not only focuses on improving the lower serving technique, but also strengthening the upper body muscles, which play an important role in increasing strength and control when *servicing*. This research is relevant because it makes a direct contribution to the development of essential lower service skills for female soccer athletes. If the results of the study show a positive impact, this research can be the basis for designing a more targeted and effective training program for athletes of various levels, as well as opening up the possibility for more efficient use of training aids in the sport of volleyball.

Recommendations for further research include the application of other aids other than *push-up boards*, such as *resistance bands* or *medicine balls*, which can support the increase of upper body strength and lower service ability. In addition, research can explore increasing the duration and intensity of *push-up* exercises with tools to identify significant impacts on improving *service* capabilities down. Further research could also involve a variety of other types of exercises, such as *plyometric* or *agility* exercises, that focus on *bottom-service* techniques. To reinforce the findings, expanding the research sample by involving more athletes of different levels can provide a more comprehensive picture. Finally, the use of *push-up boards* in the routine training of football athletes, under the supervision of the coach, can be integrated to achieve more optimal results in the development of *lower service* techniques.

The implications of this study could provide practical benefits for soccer coaches in developing training programs, by integrating *push-up* exercises using *push-up boards* to increase upper body muscle strength, which is important in improving lower service performance. In addition, this study has the potential to improve the *bottom service* techniques of football athletes, especially female athletes, by strengthening their physical ability to perform *stronger and right on target serves*. This research could also contribute to the development of new training methods that are more effective and affordable, as well as have an impact on other sports research that focuses on increasing upper body muscle strength. In addition, the results of this study can be useful for the development of training of beginner soccer athletes, by providing a training basis that increases physical strength and technical skills required before further training.

The study conducted by Muhammad Miftakhusurur and Achmad Nuryadi in 2024 examined the effect of *push-up* exercises on lower serve accuracy in women's volleyball UKM at PGRI Adi Buana University Surabaya. This study used a *pretest* and *posttest experimental design* that showed a

significant improvement in the accuracy of the participants' bottom serve after participating in *push-up exercises*. The main difference with the authors' research is that it did not use aids such as *push-up boards*, while your study used them to increase the effectiveness of the exercise.

Meanwhile, research by Moh. Sulaiman Jazuly in 2022 at MTs AL-BALAGH Laren Lamongan also researched the effect of push-up exercises on the ability to serve under volleyballs. This study used a *one group pretest-posttest* design and found an improvement in lower service ability after push-up exercises. The main difference with the authors' research is that, although both use *push-ups* as exercises, the authors' research focuses more on the use of an auxiliary dat, which is a *push-up board*, which allows for more measurable variations of movement and intensity to improve lower serving capabilities more specifically. So that the research entitled Effectiveness of Push-up Exercises Using *Push-up Boards* to Improve Lower Service Ability in Women's Volleyball Extras can be used by sports practitioners, especially in volleyball as a training program, because it has been found to increase the *service* ability of women's extra volleyball students.

Discussion is the most important part of the overall content of a scientific article. The purpose of the discussion is to answer the research problem or show how the research objectives are achieved and interpret/analyze the results. Start by presenting the findings. Then relate it to previous theories and research, whether the findings strengthen or correct existing findings/theories. Emphasize new and important aspects. Discuss what is written in the results but do not repeat the results. Also include a discussion of the impact of research and its limitations.

## Conclusion

Based on the results of data analysis, it can be concluded that there is an increase in volleyball bottom service ability with *push-up exercises* using *push-up boards* in ITP Surabaya High School students increased by 25%. The use of *push-up boards* helps in improving posture and exercise techniques, as well as optimizing the strengthening of the arm, shoulder, and chest muscles. The main muscles involved in the lower serving technique. Therefore, *the push-up board* can be considered an effective tool to train the muscles treated in the lower serve and support the improvement of volleyball technique skills in the extra girls of ITP Surabaya High School.

## Conflict of Interest

No conflict of interest.

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